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EXAMINING THE AUGMENTED REALITY FUNNEL: DOES IT LEAD TO INATTENTIONAL BLINDNESS?

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Abstract. *The use of Mobile Augmented Reality in industry offers possibilities to provide relevant information at exactly the right time registered to the correct spatial position. Our previous studies demonstrated that even with today's rather prototypic Mobile Augmented Reality systems this potential can be used without raising the overall psychophysical strain of the user. One of the thereby identified helpful tools to support the worker is the "AR funnel" which can guide a user to a defined spatial position. While this tool technically works well it is still unknown how much it influences the user's perception of the surrounding. This paper describes a user study to examine the influence of the AR funnel on user's situation advertence.*

Key words: *models and principles, user/machine systems, human factors, information interfaces and presentation, user interfaces—user-centered design*

INTRODUCTION. Research on applications of Mobile Augmented Reality (MAR) are in focus of industry for several years now (e.g. projects ARVIKA [2] and AVILUS [6]). The main idea of MAR here is to support industrial workers with information they need at the right time in the right spatial position to achieve a higher productivity and less errors. At the same time these systems must neither harm nor negatively influence the well-being of the user.

A main focus of our previous research dealt with examination of user's strain while continuously working with MAR systems based on Optical See Through Head Mounted Displays (OST HMD) for several hours [10, 8, 4]: Users were assisted by different MAR systems to find correct positions of real items stored in numerous shelves of our reference scenario (fig. 1a). They had to pick the right object, put it into a basket and continue with the next work task. During their work the heart rate was analyzed to find objective clues on how much the use of the MAR system influences user's strain. All our experiments show that work with the used MAR

systems results in strain levels comparable to work without the MAR system. For the planned industrial use of MAR this is an important finding for company doctors and a precondition for the ergonomic design of AR based assistance systems.

One of the techniques used in our studies was named “AR funnel” or “attention funnel” as explained by Biocca and Schwerdt-feger [1, 7]. This can be best understood as a hose of a vacuum cleaner starting a few centimeters in front of the eye and ending at the target position (fig. 1b). Its use led to a good work efficiency but questions arose concerning work saftey. When the user is highly concentrated and completely focused on the AR funnel it could result in inattentional blindness [9, 11]. For example, if it would be likely for the user to not realize a forklift crossing his way while working with the AR funnel this would make it inapplicable for industrial use. Therefore, we here report a study to examine if inattentional blindness is caused by use of an AR funnel.

a b

Figure 1. User working with a MAR system: Liteye Head Mounted Display, infrared tracking, AR funnel navigation.

CONTRIBUTION. It is the impression of the authors that today’s Augmented Reality research community has a main focus on new technologies and applications. Transfer of newly designed technologies and applications to real use seems to be a minor topic of interest today thus user studies that embed these new technologies are quite rare. This could be a reason for why MAR applications have such a low impact on industry today. Zhou et al. [12] present a state of the art report which confirms this impression: 313 publications from 1997-2007 were analyzed and sorted into eleven

categories such as tracking, interaction and so on. Out of these analyzed literature sources only 18 papers (5.8%) deal with the evaluation of developed technologies and applications. Even lower is the number of citations which credits the value of a publication. Only five (1.8%) of these papers dealing with evaluations have been quoted in other publications. This low value is among the three lowest of the 11 categories. Our interpretation is that the value of reporting on an evaluation study needs to be raised within the research community. At least one important question that - from our point of view- should always be answered by user studies is: "What are challenges to bring this new technology to real practical use and how can we solve them?"

This paper contributes to the AR community by presenting a user study that helps to understand effects of a promising tool for industrial applications. We make use of the "attention funnel" which is a well known AR technology and examine if its application in a realistic work environment possibly results in hazardous side effects to the user.

Next to this an investigation on efficiency of the AR funnel is presented to demonstrate the value of this type of information visualization for industry.

INATTENTIONAL BLINDNESS. Through our eyes we get tons of data each moment. Our brain filters the data and only relevant information reaches our awareness [3]. Inattentional blindness describes the effect that when a person is totally focussed on one or more objects in his sight he does not notice other objects, even if they are well visible and probably don't even belong to the current scene. What gets our attention focus depends on numerous factors, for example knowledge of the scene and the user's intention.

While conducting our previous studies with OST HMDs and various forms of the AR funnel we realized that sometimes the subjects were totally focussed on their task. This of course was good for the study, because we wanted to make full use of the AR system. But questions arose if the users would be able to react on other events happening in their surrounding while they worked with the AR funnel. This

demonstrated the need to examine whether or not inattentional blindness happens when using our AR system and especially the AR funnel.

Simons and Chabris demonstrate inattentional blindness in a simple yet impressive experiment [9]: In a video two teams, black and white, each consisting of four players, run in front of the camera. The white team has a ball. Study participants watch the video to count the number of passes made by the white team. While game in the video is going on and the viewer counts the number of passes, a man in an animal costume moonwalks slowly and clearly visible through the view. About half of the subjects used in the study did not realize this unexpected event at all!

Another study which is closer to our industrial target setup is described by Wickens [11]: Pilots had to follow a "3D flight path pathway" in a simulator environment. This pathway is a relative of our AR funnel. When using the 3D pathway four of eight pilots did not detect a blimp flying nearby, while only one of six pilots flying without the pathway was oblivious of the blimp. An interpretation for our application scenario would be that working with the AR funnel would cause inattentional blindness. This supports our initiative to further study the AR funnel and carry out an experiment as described in this paper.

USER STUDY: DUAL TASK. To find out if we can use the AR funnel in future industrial settings we have to study the perception of users when working with the AR funnel. We must know whether or not users can still perceive relevant information that is not directly related to their primary work task. In reality that kind of information can be warnings ("forklift crossing"), status information ("machine defective") or similar.

To examine if inattentional blindness occurs or not the following is required:

- controllable laboratory setting that is similar to a targeted real world scenario
- AR system with OST HMD and funnel visualization
- controllable stimuli somewhere in the surrounding of the user
- a system that controls the input variables and measures the result

There are different possibilities how a test could be set up. They have in common that it would be dual task where working with the AR funnel is the primary and reacting on a stimulus is the secondary task.

To generate statistically reliable results it would be necessary to show all subjects the exact same visual information. We could for example show a recorded video in egocentric view where the user sees an AR funnel in an industrial workplace and has to react on defined stimuli. But this would totally ignore the primary task and the actual physical strain caused by work which is a main influence on if the user is concentrated or not.

As another idea we could make the subjects work at a realistic reference workplace and show visual stimuli somewhere in the surrounding (e.g. a real forklift moves into the scene). It would take a lot of effort to capture the current position and orientation of the user, the forklift and the current funnel direction - and then finally correlate these inputs to find out if and how well the user can perceive the new situation. What happens if the user does not realize the forklift? Of course the subject must not be put in danger. Even if it's not a real forklift but a "red light" flashing somewhere we still could not control when and how the user looks into the direction of the light. It would also have the disadvantage that the OST HMD itself covers parts of the view on the real world if it has a wide frame (as the LitEye LE-750) which is an influence on perception of the real world.

The third possibility is to have the subjects work at a realistic reference workplace and show stimuli on the virtual display of the OST HMD. This gives us the possibility to have stimuli always in the user's field of view and always at the same position relative to the AR funnel's egocentric starting position. Of course this has the disadvantage that stimuli can only be shown within the (usually very limited) field of view of today's head mounted displays. We decided to realize this third possibility as it can give us a realistic physical strain as well as controllable stimuli and low risk for the user.

Test Setup

Reference Scenario

We have set up a reference scenario (fig. 2) that represents a picking area as used in automotive industry [10, 4]. It consists of 58 boxes, all containing 10 similar items equipped with RFID-tags, distributed over eight shelves. Test subjects are guided via

OST HMD and AR funnel from box to box to collect parts from the shelves one after another. After picking a single part the subject always has to confirm completion by pressing a button on the AR system and put the item into a basket. Then the next task would be displayed in the OST HMD. All jobs are bundled in “job lists”, each job list contains 15 items. For each job list a subject has to walk approximately 60 m and then return the basket. After 45 minutes a subject would have completed roughly 15 job lists, thus picked about 225 items and walked about 0.9 km. A half-automated quality control station was used where the test supervisor could scan the RFID-tags of all collected items for correctness.

Figure 2. Layout of the test area

AR System

We used a LitEye LE-750 full color OST HMD (28◦ field of view) together with a Sony Vaio UX1 Ultra Mobile PC (UMPC). We mounted IR markers to the headband of the HMD so that a stationary OptiTrack tracking system would be able to track user’s head within the work volume. The tracking result was delivered via WiFi to the UMPC which ran metaio Unifeye SDK 3.0 for AR visualization. This setup resulted in average frame rates of 20 frames per second and a latency of approximately 0.5 seconds. The optical see through calibration was performed with our MPAAM method as described in [5]. Figure 5 shows the work area and a subject working with the AR system.

Visualizations for Primary Work Task

Three visualizations were possible for the primary work task: Either "text only" or two variants of the AR funnel:

•**Text-only** provided information on the current job number and the part number of the item that had to be picked. No other AR visualization (funnel, square) was displayed. This presentation was used as control setup (fig. 4c).

•**Funnel A:** Rings of the funnel were equally distributed along a bezier curve. The distance between rings of funnel A was 120 mm (measured along the curve in 3D space). Text information on the target item was presented additionally as in text-only visualization (fig. 4a).

•**Funnel B:** All funnel parameters were the same as funnel A except for distance between rings which was 240 mm. It also included text information on the target item (fig. 4b).

Each subject had to work with each visualization for 45 minutes in a row. The order of visualizations was randomized between the subjects. The AR funnel consists of a variable number of rings that are aligned along a bezier curve. The funnel is characterized by the density of all rings as well as the width of each single ring. These properties can be configured in the AR system. When the user reaches a predefined distance to the target (60 cm) a green square fades in to highlight the box (see fig. 4d) and the funnel fades out.

Visualizations for Secondary Work Task

To contribute to our main question we designed the secondary work task: Will the user be able to react correctly on other stimuli when working with the AR funnel? Therefore it was required to embed stimuli such that the user has to detect them, decide what to do and then react. In addition we did not want to stop the primary work task when presenting the stimuli of the secondary work task. That's why we decided to use landolt rings that open to left, top, right and bottom (fig. 3a) and are presented to the user in one corner of the OST HMD. To where the ring opened and in which corner it would be presented both was randomized.

The user would have to react on the presentation of the landolt ring by first pressing the “A” button of a Nintendo Wiimote to tell the system the stimulus was detected. Then the landolt ring would instantly disappear and the user would press the cross button of the Wiimote showing the direction to where the landolt ring opened (fig. 3b). For example if the ring was shown in the top-left corner with its opening to the right side then the subject would have to press “right” on the Wiimote. It was recorded

•when the landolt ring appeared,

•when (and if) the user pressed the “A” button,

•when he pressed the cross,

•if he detected the opening correctly,

•and a screenshot of the currently displayed image.

A strong indicator for occurance of inattentional blindness would be if subjects miss to react on the appearance of landolt rings.

In addition the display was divided into four equally sized quadrants. It was recorded in what quadrant the landolt ring appeared and what quadrant the funnel currently laid in during that moment.

a b

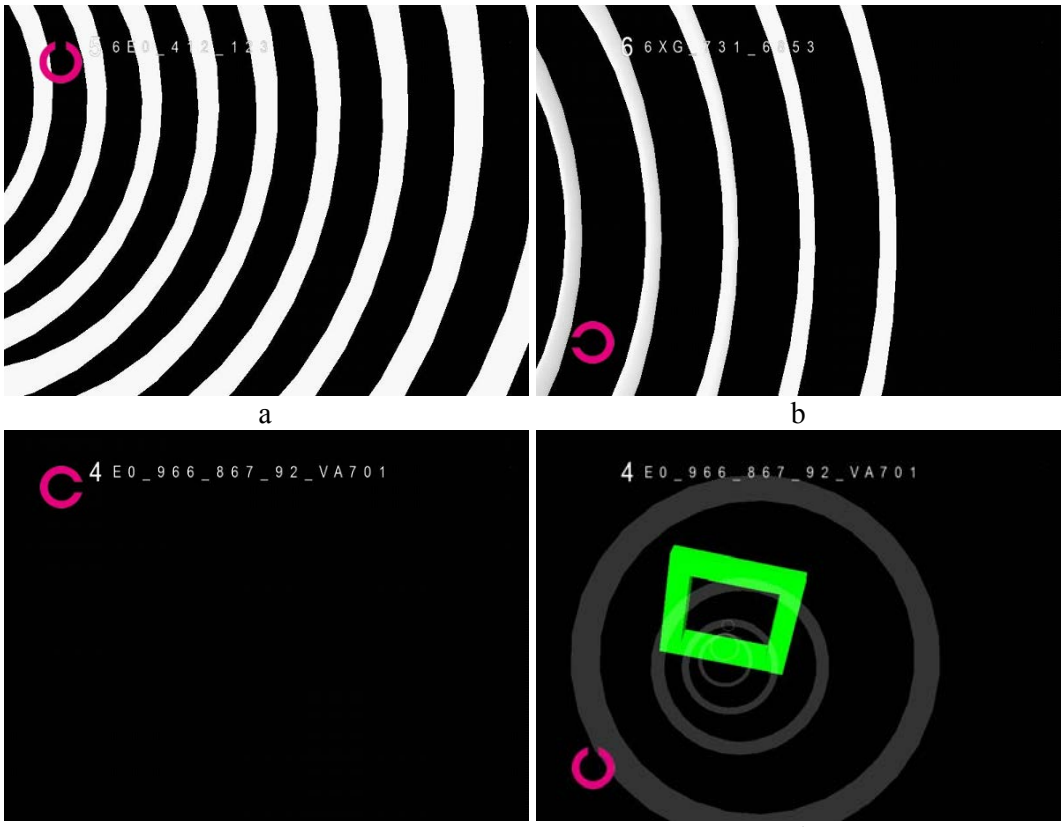
Figure 3. Landolt rings used in secondary task and user pressing Wiimote cross button

Altogether for each text or funnel visualization 80 landolt rings were presented in the corners of the HMD. The average time between showing landolt rings was 30 seconds. Each ring was presented up to 5 seconds during which the subject would have to react (“A” button). This “long” presentation time was chosen, because in a real world application a dangerous situation would not suddenly disappear as well.

We recorded initiation time and movement time. Initiation time (IT) is the time from appearance of the landolt ring to press of button “A” on the Wiimote (i.e. “There is something!”). Movement time (MT) is the time from pressing the “A” button to pressing the cross on the Wiimote (i.e. “It was a landolt ring opening towards ...”). The overall reaction time (RT) is the summation of IT and MT.

$$RT = IT + MT \qquad (1)$$

Figure 4 demonstrates examples of the used visualizations together with landolt rings.



a b c d

Figure 4. Red landolt rings in display corners overlayed on different visualizations of the primary task: (a) funnel A, (b) funnel B, (c) text-only, (d) green square fading in to show position of item to pick

Test Procedure

To create valid and reliable results we would have to use a common AR system in a common AR work environment - both don’t exist yet. We agree to Schwerdtfeger’s opinion [8, chapter 1.1] that even though we don’t know those “future AR systems” or “real AR work environments” we nevertheless have to carefully carry out experiments with systems and environments we have today. Here this happened to

the best of our knowlege. Thus 26 subjects (aged 25.5 ± 4.0, 12 female) voluntarily took part in the test. Most were students without experiences in the field of AR/VR.

Figure 5: Subject in the reference scenario using the AR system

The display condition (text-only, funnel A, funnel B) was randomized so that one third of the subjects started with text-only, the 2nd third started with funnel A and the last third had to begin with funnel B.

Before beginning the test each subject was informed on work safety. Medical anamnesis was recorded and a test for visual acuity (left and right eye, hand card in distance of 30 cm) took place. As in our last publications we again incorporated analysis of heart rate variability (not to be reported about in this publication), so each subject was equipped with an ECG recorder. Then the AR system was put on, usually the Wiimote controller was to be held in the dominant hand. The task for the subjects was explained and questionnaires for analzying subjective strain were filled out. After a 5-10 minute break a test run (one job list, funnel A) took place to familiarize subjects with the AR system (fig. 5). Finally the actual test could be started (funnel A, funnel B, text; randomized; each 45 minutes). The work tasks were to pick items from the shelves and to react on the visualization of landolt rings. At the end a 5-10 minutes relaxation phase followed.

Critical Comments

One might say, when working with the AR funnel you are focused on the OST HMD all the time. Thus reacting on something displayed on the virtual display of the HMD can not be compared to a situation where the user has to react on something happening in his surrounding. The reason might be that the user has to shift his perception focus (as well as the visual focus) from the funnel to an object in the reality. This of course would question the usefulness and validity of our evaluation. In contrast to this we think that this evaluation is suited for a first estimation to find clues towards if inat-tentional blindness happens when working with the funnel. This is because our users of the AR system had to have their main perception focus on the primary work task (picking items) together with the AR funnel. That means a shift of perception focus would happen continuously anyways which allows for presentation of stimuli on the HMD to solve the secondary work task.

While designing the study another question was important: Would working with the funnel be comparable to working with text visualization? The study design had to avoid that the textual information would be easy to remember and easy to interpret. If with text visualization the user would only look at the display once and be able to instantly find the right box to pick the right item from, then reacting on the secondary stimuli would definitely not be comparable to using the funnel visualizations. When using the funnels we realized that users would from time to time focus the tunnel but mostly watch the surrounding. Because both funnel visualizations were very prominent users would mostly not focus the funnel but walk through the test area focusing the spacial target position in real world. The text information was designed in a similar manner such that users would not be able to easily interpret or learn the spacial positions corresponding to their textual descriptions (compare fig. 4c). This could not completely avoid learning effects but made the subjects use the virtual screen multiple times for each item that had to be picked. Thus both with funnel as well as with text visualization every user would switch between real world and HMD screen during each single picking task. This lets us believe both types of visualizations are comparable in our setup.

Hypotheses

The intention of this study is to examine the occurrence of inattentional blindness when working with AR funnel visualizations. Our main question is if the use of the AR funnel would highly focus subjects on their primary work task so they would become blind for other things happening in their surrounding.

Therefore our first hypothesis describes the assumption that reaction times with text visualization in general would be lower than with any funnel visualization. This could be due to the completely empty display screen where one might think that "if something appears on the screen you can instantly see and react on it".

H1: Reaction times for reacting on appearance of a stimulus are lowest for text visualization.

Two funnel visualizations were presented to guide the user through the primary work task. Even though the parameters of the AR funnels are different we expect no difference in reaction times between them.

H2: Reaction times of funnel A and B are equal.

Our third hypothesis is that the AR funnel visualization shifts users perception focus into direction of the AR funnel.

H3: When working with AR funnel reaction times are lowest when funnel and stimulus lay in the same display quadrant.

We think the very dominant AR funnel visualizations keeps subjects focused on their main work task. So we conclude they would make more errors in detecting landolt rings with any of the AR funnels.

H4: Working with an AR funnel visualization results in more detection errors than with text visualization.

The final hypothesis deals with the quality of this study. It was important for us to design the study close to an actual industrial picking setup as in our last studies. The secondary work task should not negatively influence the primary work task. A possible control variable is the numbers of parts collected per minute. If these are similar to our previous study then this would be a usable indicator to verify that the study did not negatively influence the work process. Another option would be to

analyze picking errors. We decided against that because we expected the dual-task paradigm to highly disturb the users concentration. Thus comparing mistakes made here and made in our other studies would not be possible.

H5: The numbers of parts collected per minute for both funnel visualizations are similar to results of our previous study [4].

Results and Discussion

Reaction Times (general)

First of all we analyzed reaction times (fig. 6) to check H1. For all three visualizations the movement time was very similar. This was an expected result as the movement time does not depend on the current visualization type.

The initiation time of text-only was slightly higher than for the AR funnel visualizations. We found that funnel B had best results probably because it did not cover as much of the display as funnel A, allowing a better sight on the remaining display space. The result is statistically significant (Initiation Time of text and funnel B, $p = 0.04$, t-test).

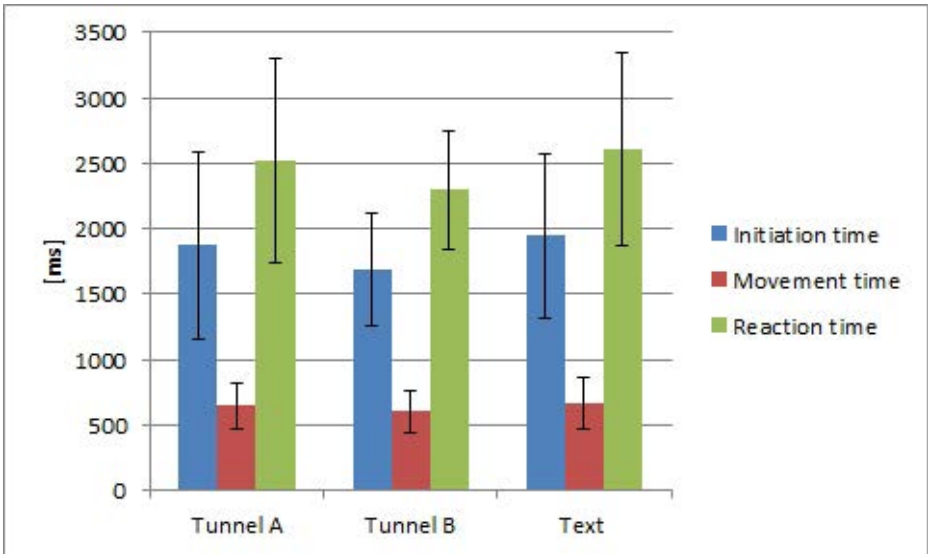


Figure 6. Reaction times of the three conditions funnel A, funnel B, text visualization including wrong ring identifications

The result does not support H1. In general we can not confirm larger reaction times when working with the AR funnel. H2 is not confirmed either - reaction times of both visualizations are not similar even though the difference in values is not statistically significant.

Position of stimulus vs. AR funnel heading

To see if user's attention is pushed towards direction of the funnel (H3) we examined if there's a correlation between the position of the landolt ring and the current heading of the AR funnel. Therefore we separated the data in three groups:

Group 1: Landolt ring and direction of AR funnel are in the same display quadrant.

Group 2: AR funnel directs to a direct neighbor of the landolt ring quadrant. (e.g.: landolt ring is shown top right - neighbor quadrants are top left and bottom right)

Group 3: AR funnel and landolt ring are in opposite quadrants. (e.g.: landolt ring is shown top right, tunnel heads towards bottom left quadrant)

The design of this study did not allow to exactly control where the funnel would be displayed when the stimulus appeared. This was because we could not make all users walk along exactly the same path while at the same time having each user's head in the same position and orientation. Users would look around while fulfilling their primary work task, they would walk at different distances from the shelves and so on. The condition "Group 1" happened for 22% ± 4.5% of all landolt ring appearances over all users. The acceptably low standard deviation shows a quite similar movement behaviour of the users. This makes us believe the generated data can be used for our interpretation.

The lowest average initiation time of 1639 ms could be seen in Group 1 where AR funnel B and landolt ring appeared in the same display quadrant (fig. 7). We think the reason is that the user's focus of perception already was in the right direction so that stimuli could be perceived and reacted to earlier. Group 2 and Group 3 of funnel B had 20% and 30% larger initiation times which supports H3 - but only for funnel B. Interestingly this did not apply for funnel A for which we recorded an average IT of 2050 ms in Group 1. This could be due to the larger number of rings which covered a lot of the screen and thus would make detection of stimuli difficult in that display area. The difference between funnel A and B (Group 1) is statistically significant ($p = 0.03$, Wilcoxon-test). Funnel B covered less display space, thus probably allowed for better detection of the landolt ring. The design used for funnel A did not answer H3.

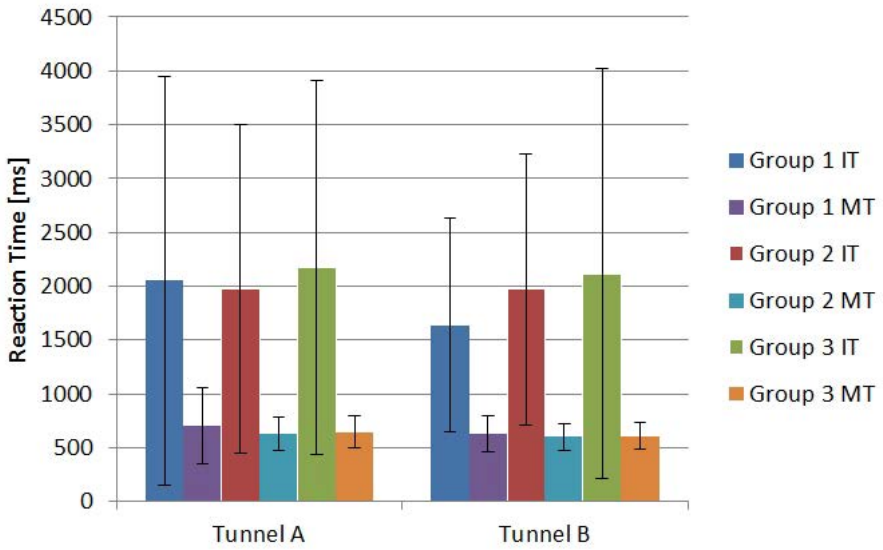


Figure 7. Reaction times depending on display position of funnel and landolt ring (IT: Initiation Time; MT: Movement Time)

Text visualization resulted in a general IT of 1947 ms, values for Group 2 and Group 3 are similar to this for both AR funnel visualizations. No statistically significant differences could be found for Group 2 and Group 3 compared to text visualization.

Errors in identifying landolt rings

Next to reaction times it is important to know how often the type of ring was identified wrong. For each visualization 2000 landolt rings were presented to each subject. Not a single landolt ring was missed throughout all subjects and visualization methods. When using text visualization 60 wrong identifications were recorded in total, funnel A had 54 and funnel B caused 55 identification errors. In average 2.4 ± 1.73 mistakes were made by each subject with text visualization, 2.16 ± 2.03 with funnel A and 2.2 ± 1.89 with funnel B (fig. 8). These numbers are not significantly different.

Interpreting the data means to first point out that only 3% wrong identifications were recorded for any of the used visualizations. The funnel visualization in general did not cause higher identification error rates; error rates were even a bit lower when working with the funnels as compared to text visualization. This is in contrast to our assumption described in H4, thus H4 can be declined.

Again we split the recorded data into three groups as in the previous chapter. Interestingly the absolute number of mistakes for Group 1 when working with funnel

A was about twice as high as when working with funnel B (20 vs. 8). In avarage each subject working with funnel A caused 0.8 ± 1.0 mistakes while working with funnel B caused only 0.32 ± 0.56 wrong identifications. This difference is statistically significant (p = 0.02, t-test). We think this is due to the relatively large density of funnel A's rings which could have disturbed the user.

On the other hand this finding means the numbers of errors for Group 2 and Group 3 were larger with funnel A (1.36 ± 1.38) than with funnel B (1.88 ± 1.56). The differences are not statistically significant (p = 0.11, t-test) so they can not be used to decide whether or not funnel A performs better than funnel B.

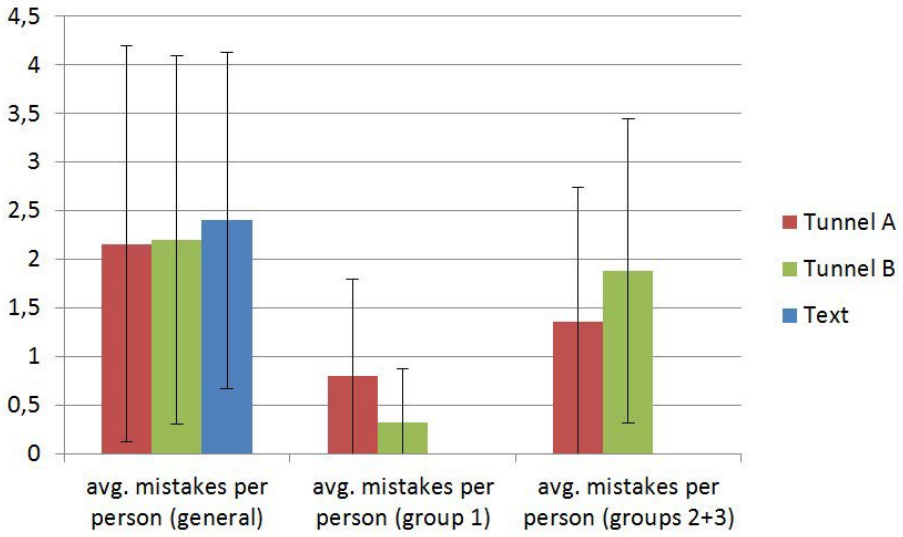


Figure 8. Mistakes in detecting landolt rings

Picking Outcome

The average number of parts collected by use of funnel A was 20% (p = 0.007, t-test) better than with text-only, funnel B outperformed text visualization by 16% (p = 0.005, t-test). The number of items collected per minute was on a similar level compared to our previous study [4] (fig. 9). This result supports H5. The test setup we used to analyze inattentional blindness did not negatively influence the main work task of picking.

The analysis of picking errors revealed a 30% larger error rate for funnel A compared to funnel B (fig. 9, right ordinate). The result is not statistically significant (p = 0.19, t-test) but clearly shows that there is a notable difference between both visualizations as we already found in the results of the secondary work task.

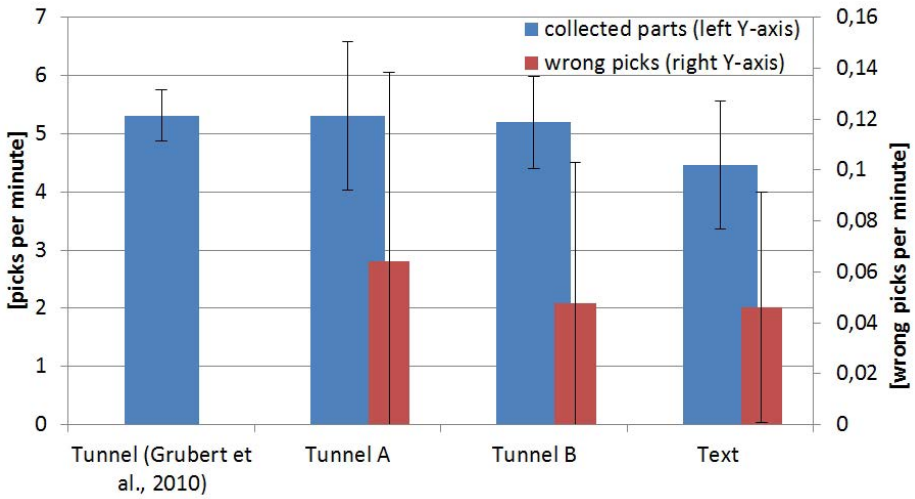


Figure 9. Items collected per Minute (left ordinate; this publication compared to our publication in 2010 [4], left ordinate) and number of wrong picks per minute (right ordinate)

SUMMARY AND CONCLUSION

From a general point of view working with AR funnel visualizations did not cause significantly different reaction times or detection error rates compared to working with text visualization. But we found that this general statement is only partially true as the system's efficiency also depends on the actual design of the funnel. Our visualization named "funnel B" performed better than "funnel A" in most categories.

The user's focus of attention seems to lay in direction of the funnel. Especially with funnel B reactions were faster, when the stimulus was shown in the same display quadrant the funnel visualization currently laid in. When the landolt ring appeared in other quadrants reaction times were larger - as well as with text visualization. We conclude that - under similar conditions - especially AR funnel B does not cause inattentional blindness because reaction times with text visualization were not larger than with AR funnel.

All subjects detected all rings that were presented on the HMD screen. Once a ring was detected it had to be identified. At first glance we found no important difference between text and AR funnel. But after we looked closer we saw that funnel B had significantly better results than funnel A, especially when stimulus and funnel were presented in the same display quadrant.

From these results our recommendation for application of AR funnels is to use a design that is similar to our funnel B. “Less is more”: It should cover as little of the display as possible as long as it still can be clearly detected.

In general we could not find clues for that AR funnel visualizations cause inattentional blindness. This lets us believe the AR funnel has a chance to be implemented in real industrial scenarios that are supported by mobile Augmented Reality.

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Використання воронки додаткової реальності: веде це до перцепціоної сліпоти?

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Резюме. Використання рухомої додаткової реальності (РДР) в промисловості дає можливість надати відповідну інформацію в потрібний час, зареєстроване в правильному просторовому положенні. Наші попередні дослідження показали, що навіть сьогодні потенціал систем РДР може бути використаний без підвищення загальної психофізичної напруги користувача. Встановлено, що одним з корисних інструментів для підтримки оператора є "воронка додаткової

реальності", яка може допомогти користувачеві визначити правильне просторове положення. При тому, що даний інструмент технічно добре працює, досі невідомий його вплив на сприйняття користувачем оточення. Дана стаття присвячена дослідженню впливу воронки додаткової реальності на уважність користувача.

Ключові слова: моделі і принципи, системи користувач / машина, людські фактори, інформаційні інтерфейси і презентація, інтерфейси користувача, орієнтовані на користувача.

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Использование воронки дополнительной реальности: ведет ли это к перцепционной слепоте?

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Резюме. Использование подвижной дополнительной реальности (ПДР) в промышленности дает возможность представить соответствующую информацию в нужное время, зарегистрированное в правильном пространственном положении. Наши предыдущие исследования показали, что даже сегодня потенциал систем ПДР может быть использован без повышения общего психофизического напряжения пользователя. Установлено, что одним из самым полезных инструментов для поддержки оператора является "воронка дополнительной реальности", которая может помо**чь** пользователю определ**и**ть правильное пространственное положении. При том, что данный инструмент технически хорошо работает, до сих пор неизвестно его влияние на восприятие пользователем окружения. Данная статья посвящена исследованию влияния воронки дополнительной реальности на внимательность пользователя.

Ключевые слова: модели и принципы, системы пользователь / машина, человеческие факторы, информационные интерфейсы и презентация, пользовательские интерфейсы, ориентированные на пользователя.

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TUBERCULOSIS OF GENITALS IN HIV-INFECTED WOMEN

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Abstract. *It was analyses of autopsies and postoperative materials from women, who died with HIV-infection and tuberculosis. The research of the autopsies material from died women with HIV-infection and tuberculosis revealed the tuberculosis of genital organs in 13 cases from 30; in postoperative materials revealed the tuberculosis of genital organs in 5 cases from 30. The anamnesis of all patients has uterus myoma and dysfunctional bleeding from uterus. The obligatory research of the postoperative biopsy material gives gynecologists a chance to diagnose the tuberculosis of genital organs for effective specific chemistrytherapy, which is crucial for a favorable outcome.*

Key words: *HIV-infection, tuberculosis, female genital organs.*

Among the female population, tuberculosis is the most common cause of death from infectious diseases. So, in the world die from tuberculosis each year more than 1 million. Many of women are of childbearing age [2]. Violations of immune protection at the level of endometrial lead to increased incidence of inflammatory diseases of the pelvic organs in women with HIV infection [6]. By 2000, developing countries, HIV infection was the third leading cause of death in adults (after tuberculosis and other infections). In Africa 50% of all deaths associated with HIV. In the USA, HIV infection is the leading cause of death among African-American women and the third leading cause of all women. The fastest rate of new infections is increasing among women:

- HIV is more easily transmitted from men to women (2 times).
- Do young women tissue of the vagina and cervix more vulnerable.
- Women more frequently asymptomatic of sexually transmitted infections for which treatment is not carried out.
- Women are less controlled circumstances connected with the peculiarities of sexual life (using a condom).

We know that immunocompromised HIV-infected women often suffer from gynecological diseases than HIV-negative women. Among the extrapulmonary tuberculosis female genital mutilation has a special position. Genital tuberculosis is

caused by Mycobacterium tuberculosis and is not an independent disease, but a manifestation of tuberculous infection of the body. Defeat occurs secondarily genital organs, resulting in introduction of infection mostly hematogenous route, usually from lung, gut and rarely from other chambers. Mycobacterium tuberculosis can long exist in the regional lymph nodes and show the ability to spread at lower immunological resistance. The specificity of the disease dictates the need to address not only medical but also social problems in women of reproductive age (61.7% of patients younger than 30 years) [1]. Tubercular lesion of genitals, in addition to significant morphological changes, leading to severe functional impairment, requires not only chemotherapy, and surgical correction.

The main disorders in patients is the loss of the ability to reproduce, that is primary infertility (85%). The causes of infertility are due to either obstruction of the fallopian tubes, or changes in the ovaries. Prolonged inflammation in the uterine appendages sclerocystic ovary undergoes changes, which leads to disruption of menstrual and reproductive function. The majority of patients with tuberculosis genitals menstrual function is the type of anovulatory cycles. Patients with tuberculosis genitals often (15%) suffer predmentsrualnym syndrome.

The frequency of functional disorders may be associated not only with the activity of tuberculous process, but also with long-term treatment antibacterial drugs that can have toxic effects and reduce the level of steroid hormones.

The ability to restore the function of the genitals as a menstrual and fertility depends on the morphological changes and the degree of severity. The involvement of the body of the uterus and appendages, usually leads to irreversible changes. In this situation, you can count only on an attempt to restore or maintain the menstrual function.

The clinical picture of tuberculosis of female genital mutilation is different polymorphism and determined by the activity of inflammation (acute, subacute, and chronic), the degree of dissemination of the process (infiltration, suppuration, resorption, scarring, calcification), as well as its localization. Mostly tuberculosis affects the fallopian tubes in 100%, 40-60% in the uterus, ovaries in 18-23%, cervix -

3.9% and the vagina - in 3.1% of cases [3,5]. Diagnosis of tuberculosis female genital mutilation often presents considerable difficulties. Always has been suggested even the impossibility of diagnosis of tuberculosis of female genitals in the early stages of the development process [1].

In the first stage detection of tuberculosis of female genital mutilation takes place in the women's clinic. Gynecologist forms "at risk" among patients suffering from chronic inflammation of the uterus, menstrual dysfunction, endometriosis genitalia. A special group of women who underwent extragenital form of tuberculosis (tuberculosis of the lungs, spine, bones and joints, and the urinary organs and limfoabdominal).

The most accurate information about tuberculosis female genitals gives pathomorphologic method by which you can explore a material obtained from the uterus (separation, aspirate, or scraping the uterine cavity mucosa), that is -diagnose tuberculous endometritis. Diagnostic curettage of the mucous membrane of the uterus performed for 1 - 2 days before the onset of menstruation. The resulting material is sent simultaneously on histological, cytological and bacteriological examination.

Bacteriological studies, as well as histological, are reliable methods for diagnosis of tuberculosis of female genital mutilation. Bacteriological research exposed aspirate or scraping the mucous membrane of the uterus, the operational material, fluid of ascites, discharge from the uterus and vagina. To improve the effectiveness of the research carried out repeatedly. The cause of diagnostic errors may be organizational issues related to lack of vigilance of general health care services for the diagnosis and detection of such patients.

Aim: focusing gynecologists and pathologists in the diagnosis, morphology and treatment of patients, including HIV-positive women with tuberculous lesion of the genitals.

Materials and methods. We have studied autopsy (uterus with the cervix and appendages) from deceased HIV-infected women with a history of tuberculosis - 30 cases and postoperative material (scrapings of the uterine cavity and cervical canal with dysfunctional uterine bleeding, uterine and amputated appendages) of

gynecological patients HIV infected women suffering from tuberculosis - 30 cases. The average age of the deceased was 33 years. Almost all the dead were intravenous drug addicts. A statement of fact HIV was carried out in the laboratory of the AIDS Centre by enzyme immunoassay and immunoblotting confirmed twice. The diagnosis of tuberculosis in those who died of HIV-infected women was exposed in vivo in 20 cases out of 30, and the method of bacteriological sputum microscopy, and posthumously was diagnosed with us - tubercular inflammation of the genital organs in 13 cases out of 30.

The results of the study and discussion. Our results are almost identical to those of other authors [1, 4]. According to the research of autopsy material from deceased HIV-positive women - in 13 cases out of 30, we found running tubercular inflammation of the genital organs: 6-x cases tubercular endometritis (a in 5 cases productive form with the formation of disseminated tubercles in the endometrium and in 1 case - caseose necrosys of the transition to the muscular layer), in 3 cases the tubercular pelvioperitonit, in 4 cases, tuberculous salpingitis. In one of 13 cases it has been a combination of all these lesions genitals tuberculosis: tuberculous endometritis with caseose necrosys, bilateral tuberculous salpingitis and diffuse tubercular pelvioperitonites. Despite the fact that the clinical diagnosis of tuberculosis of different localization was exposed during the life of the deceased at the 20 HIV-infected tuberculous lesion of genitals was not suspected in any case (pathologists diagnosed in 13 cases at autopsy).

Productive forms of tuberculous endometritis occurs most often. The tuberculous endometritis occurs, usually without clinical manifestations. The main complaint of patients - menstrual dysfunction. With the defeat of the myometrium body of the uterus may be increased “like” 5-6 weeks of pregnancy. Exudative pelvioperitonitis proceeds with just noticeable clinical manifestations. Adhesive form of the disease characterized by high fever, abdominal pain, severe diarrhea disorders and intoxication. When present caseous form of pelvioperitonitis noted severe disease, with the formation of caseous foci in the pelvic and abdominal cavity.

When analyzing the postoperative material from HIV-infected women identified us tubercular process in the genital organs in 5 cases out of 30, namely, in 4 cases, tuberculous salpingitis, in 2 cases of tuberculous endometritis. All patients complained of menstrual disorders, pain in the lower abdomen, intermittent fever. They were performed surgery to remove the uterus, with a clinical diagnosis of purulent salpingo-oophoritis, as well as amputation of body supravaginal cancer in women with a clinical diagnosis - dysfunctional uterine bleeding, mioma of uterus.

The causative agent of tuberculosis and association immunodeficiency virus called "cursed duet". In HIV-infected patients with tuberculosis presence provokes rapid development of end-stage HIV, the presence of disseminated forms of tuberculosis. However, extrapulmonary tuberculosis in HIV-infected practically not diagnosed (mainly at autopsy). Perhaps this is due to the low information content of bacteriological methods of investigation in this group of patients, suppression of skin tuberculin test and lack of widespread use of alternative (cytological, immunohistochemical, immunological, genetic) research methods.

Conclusions: 1. In a large cohort of patients with genital tuberculosis there is a mismatch between the clinical manifestations of the disease and the severity of anatomic lesions.

2. Diagnosis of tuberculosis of female genital mutilation is based on details collected history, clinical course of the disease, gynecological examinations. To confirm the diagnosis using an improved sample Koch crop discharge from the genital tract, menstrual blood on Mycobacterium tuberculosis and diagnostic curettage of the uterus, followed by 100% histological (biopsy material and post-operative) and microbiological research material, data, radiological and endoscopic methods.

3. If any biopsy material or postoperative tuberculosis, morphology should emphasize the need for the operating gynecologist examination of the patient for HIV antibodies. In everyday practice, gynecologists and pathologists must have continuity in the work.

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Литвиненко М.В.

Туберкульоз статевих органів у ВІЛ-інфікованих жінок.

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Резюме. Досліджено аутопсійний та післяопераційний матеріал від ВІЛ-інфікованих жінок, хворих на туберкульоз. При дослідженні аутопсійного матеріалу від померлих ВІЛ-інфікованих жінок, що хворіли на туберкульоз в 13 випадках із 30 діагностовано туберкульоз статевих органів; у післяопераційному матеріалі в 5 випадках з 30 виявлено туберкульоз статевих органів. В анамнезі у всіх ВІЛ-інфікованих жінок міома матки та дисфункційна маткова кровотеча. Обов'язкове дослідження післяопераційного та біопсійного матеріалу дає можливість гінекологам виявити туберкульоз статевих органів для подальшого проведення ефективної протитуберкульозної хіміотерапії хворих, що є запорукою сприятливого результату.

Ключові слова: ВІЛ-інфекція, туберкульоз, жіночі статеві органи.

Литвиненко М.В.

Туберкулёз половых органов у ВИЧ-инфицированных женщин.

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Резюме. Исследован аутопсийный и послеоперационный материал от ВИЧ-инфицированных женщин, болевших туберкулёзом. При исследовании аутопсийного материала от умерших ВИЧ-инфицированных женщин, болевших туберкулёзом в 13 случаях из 30 диагностирован туберкулёз половых органов; в послеоперационном материале в 5 случаях из 30 выявлен туберкулёз половых органов. В анамнезе у всех ВИЧ-инфицированных женщин миома матки, дисфункциональное маточное кровотечение. Обязательное исследование послеоперационного и биопсийного материала даёт возможность гинекологам выявить туберкулёз половых органов для дальнейшего проведения эффективная противотуберкулезная химиотерапия больных, что является залогом благоприятного исхода.

Ключевые слова: ВИЧ-инфекция, туберкулёз, женские половые органы.

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SIRENOMELIA AS EXAMPLE OF LIMB MALFORMATION

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Abstract. *The article is devoted for syndrome mermaid - very severe syndrome of caudal regression (complex malformation the caudal portion of the embryo), which is a rare severe congenital malformation of the distal spine and spinal cord (his clinical picture is accompanied by hypoplasia of the lower half of the trunk and extremities, a fusion of the lower limbs). We discuss the etiology, classification, pathological anatomy, the prognosis of this disease.*

Keywords: *fetus, sirenomelia, congenital defect*

Congenital limb malformations rank behind congenital heart disease as the most common birth defects observed in infants [8]. A well know example of such pathology is the wave of thalidomide-induced malformations that occurred in middle of XX century. The term «sirenomelia» («mermaid syndrome») is derived from the physical similarity of the affected fetus to mythical creatures mermaids - charming women with the lower part of the body in the form of a fish tail, where there is a fusion of the lower extremities and partial or complete fusion of the feet [7]. It is a lethal developmental defect characterized by different degrees of fusion of the lower extremities in association with lumbosacral and pelvic bone abnormalities, blind-ending colon, absent external genitalia, renal agenesis and SUA [6]. The same applies regarding its relationship with narrow pelvis syndrome and VATER (vertebral defect, anal atresia, interauricular communication; interventricular communication, tracheal and esophageal atresia, and renal or radial agenesis) syndrome [2]. The diagnostic and management aspects of sirenomelia in twin pregnancies as extremely rare case was described by V. Nisenblat and coauthors [4].

The syndrome of the mermaid (fig.1) - a very severe form of the syndrome of caudal regression (complex malformation the caudal portion of the embryo), which, in turn, is a rare severe congenital malformation of the distal spine and spinal cord (his clinical picture is accompanied by hypoplasia of the lower half of the trunk and

extremities, fusion of the lower limbs). Fusion can be within the bone or soft tissues only. There are renal agenesis, blindly ending colon, the lack of external and internal genitalia, single umbilical artery atresia of the anus in most cases of sirenomelia.

Fig.1. Antenatal died fetus with sirenomelia from collection of Pathology Anatomy Department of Kharkiv National Medical University. A 16-year-old pregnant with addictive injections in anamnesis. She reported no familial history of congenital anomalies or diabetes.

The incidence of this fatal defect - 1 for 60 thousand newborns; sex ratio - 2.7:1 (male:female). Type of inheritance - presumably autosomal dominant. Sirenomelia is almost always a fatal disease because birth defects named above. Approximately 50% of infants with this diagnosis are stillborn. However, babies who are born alive, usually don't live long: after a few minutes or a couple of days later, rarely - a few months due to renal anomaly or anomalies of the urinary bladder.

Children with sirenomelia have no chromosomal abnormalities. Defect occurs in the blastula stage, gestation 1 to 28 days. The reason for this violation of the main blood vessels of the body with abnormal circulation of blood in the distal parts of the embryo, followed by violation of development of the child's lower body. Violation of the blood supply leads to the disturbance of tissue differentiation in that area and so severe defects.

The etiology of the syndrome of caudal regression is not finally clarified. Animal experiments have shown that the syndrome of caudal regression may occur when exposed to retinoic acid, diethylpropion, lithium, sulfonamides, cadmium, ochratoxin A, vitamin A deficiency, radiation, hyperthermia, organic solvents, 6

aminonicotinamide. Stevenson reported in 1986 that the etiology of sirenomelia was explained by vascular steal theory [3]. Most authors causative factors is considered maternal diabetes, genetic predisposition, and insufficient blood supply to the lower half of the body of the fetus in the genesis of this pathology. In a normal embryo develops two umbilical arteries that pump blood from the fetus to the placenta and one umbilical vein, which returns blood from the placenta to the fetus. Most babies with the syndrome of the mermaid have only one umbilical artery and one vein. Rarely embryos with this syndrome develop typical two arteries and one vein. One functional artery is more developed than usual and it is a branched from the aorta in high level in the abdominal part. At the same time the aorta becomes narrow wrong. Due to the fact that the lower extremities are not supplied sufficiently and they lack the normal blood flow, they are not formed as separate extremities also kidney are natformed, colon ending blindly into the abdominal cavity, the internal and external genitalia are absent or are developed with disabilities in such disorders. Currently, scientists have not yet determined why only one umbilical artery can cause such changes.

The clinical picture and pathological anatomy: caudal regression syndrome in its extreme form (sirenomelia) fatal. The complex malformations is incompatible with life. Children are missing kidneys and renal arteries, there is hypoplasia of the lungs, causing them to death in the first hours and days after birth. At the birth of a child found fused lower limbs, with hypoplastic pelvis, narrowing, there is the absence or hypoplasia of the caudal spine (sacrococcygeal vertebrae). In general, when viewed from a child marked narrowing of the lower part of the body and shortening it by the length of the lower extremities.

Fusion of the lower extremities can be involving the bones may be skeletal anomalies of the lower limbs in the form of lack of fibula synostosis and hypoplasia of other bones, congenital dislocation of the hips, deformed or non stop. The feet are fairly well formed, divided, resembling a mermaid's tail (hence the term - sirenomelia). There may be a lack of feet or having one foot only. When the feet are formed they

are deformed by the type of clubfeet usually. Flexion contractures and abnormal development of the joints of the lower extremities are typical.

Two separate systems of classification of sirenomelia have been proposed, one based on the number of feet and the other based on the fused bones (Stocker-Heifetz classification) [1,2]. We support that sirenomelia sequence is classified into three groups according to the number of feet present (Sarpong & Headings 1992). The most common of the three conditions is symelia apus, in which both legs are merged completely into a single lower extremity. In this condition both feet are absent or rudimentary. Symelia unipus shows a presentation of one foot, two femora, tibiae and fibulae. In symelia dipus, two distinct feet are present but are malrotated and resemble fins [3]. In the late second and third trimester, symelia unipus and dipus are difficult to diagnose with ultrasound because the bones of the thighs and legs are fully formed. In addition, severe oligohydramnios makes prenatal sonographic visualization of the lower extremities very difficult. Color Doppler imaging can be useful in identifying aortic bifurcation and renal arterial flow to assist in the prenatal diagnosis of sirenomelia [1, 3].

Genitals may be present, but almost always there is a problem of sex determination of the fetus; the child may have a cesspool. As a rule, in all cases, the anus is absent; there is atresia of the anus and rectum. There are disturbance of innervation of the caudal part of the body, characterized by paresis and paralysis.

Diagnosis: When a child is born the diagnosis is obvious. Prenatal diagnosis is important because the presence of such a malformation of the fetus is an indication for abortion. Since the defect is formed very early, it can be diagnosed at the first ultrasound screening for the term of 11-12 weeks. Ultrasound examination of such fetus is always characterized by oligoamnios; kidney are not detectable a in the fetus, and there is a characteristic abnormality of the lower extremities. It can be considered a marker of the syndrome, the presence of this anomaly is reason enough for a diagnosis of "sirenomelia" and abortion.

A diagnosis of sirenomelia may be easier during the first trimester because the amniotic fluid volume is relatively normal, since amniotic fluid is secreted by the

amniotic membrane covering the placenta and the umbilical cord in the first trimester. A diagnosis of sirenomelia is made in early pregnancy by confirmation of the existence of a single lower limb, but few ultrasonographs confirm all of the limbs in early pregnancy because sirenomelia as so rare[5].

Sirenomelia is fatal in most cases because of the characteristic pulmonary hypoplasia and renal agenesia [2]. About 50% of the children are born alive after eight or nine months of pregnancy. Death occurs in the five days following birth. Post-natal management requires the presence of kidneys, even if they are dysgenesic [2]. Prognosis is very poor because of the condition involves variable major anomalies, including bilateral renal agenesis, sacral agenesis and imperforate anus. Only four cases of a surviving infant with sirenomelia have been reported [3]. The death of a child usually occurs during the first hours and days of life. The cause of death is lung hypoplasia and renal failure.

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Сиреномелія як приклад пороку розвитку кінцівок

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Резюме. Стаття присвячена синдрому русалки - вкрай важкій формі синдрому каудальної регресії (комплекс вад розвитку каудальної частини ембріона), який, у свою чергу, є рідкісним важким уродженим пороком розвитку дистального відділу хребта та спинного мозку (його клінічна картина захворювання супроводжується гіпоплазією нижньої половини тулуба і кінцівок, злиття нижніх кінцівок). Обговорюються етіологія, класифікація, патологічна анатомії, прогноз даної патології.

Ключові слова: плід, сиреномелія, вада розвитку

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Сиреномелия как пример порока развития конечностей

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Резюме. Статья посвящена синдрому русалки – крайне тяжелой форме синдрома каудальной регрессии (комплекс пороков развития каудальной части эмбриона), который, в свою очередь, является редким тяжелым врожденным пороком развития дистального отдела позвоночника и спинного мозга (его клиническая картина заболевания сопровождается гипоплазией нижней половины туловища и конечностей, слияние нижних конечностей). Обсуждаются этиология, классификация, патологическая анатомии, прогноз данной патологии.

Ключевые слова: плод, сиреномелия, врожденный дефект

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PROGNOSIS OF ADVERSE OUTCOMES AFTER MYOCARDIAL INFARCTION BASED ON LEVEL OF HEART FATTY ACID BINDING PROTEIN

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Abstract. *Heart-type Fatty Acid Binding Protein (H-FABP) is a cytoplasmic protein. It`s released 30 minutes after onset of ischemia and enhances transportation of fatty acids from cardiomyocytes.*

***Aim**: to examine the prognostic value of biochemical and clinical markers and their sum in relation to the development of adverse outcomes in six months follow up after acute myocardial infarction (AMI).*

***Methods and results**. 189 patients with AMI were examined. They were divided into two groups: 1 - NSTEMI n=36 (9%); 2 - STEMI n=153 (81%), male 138 (73%). H-FABP was determined in blood plasma with ELISA, level of H-FABP was measured using normal value up to 1 ng/ml. During a 6-month follow-up 17 patients (9%) died. About 60 clinical and biochemical markers were analyzed using sequential Wald-Genkin's procedure. The curves of sensitivity and specificity were made using method of ROC-analysis and the threshold values were chosen for each parameter. H-FABP had sufficient level of sensitivity 85.7%, but insufficient specificity (49,2%), and such markers as age, heart failure class (Killip) and glucose level had insufficient sensitivity (50,0%; 66,7%; 43,7%) according to prognosis of death case. Each parameter was estimated in scores in relation to the cut-off value and the scale for measurement of prognostic coefficient (PC) using Gubler's method was proposed. Positive value of PC is associated with adverse outcomes in patients with AMI.*

***Conclusions**: The mathematical model including the sum of markers – H-FABP level, age, glucose level, heart failure class (Killip) allows to prognose adverse outcomes after AMI with sensitivity 88% and specificity 78%.*

Key words: *H-FABP, acute myocardial infarction, prognosis*

There are some biochemical markers, which appear to be predictors of adverse outcomes in patients with acute myocardial infarction (AMI). Heart fatty acid binding protein (H-FABP) is the most widely studied from all this family. H-FABP is a little cytoplasmic protein, which is secreted by tissues with active metabolism of fatty

acids, in cardiomyocytes and hepatocytes (Viswanathan et al., 2012). Its prior function is to induce the intracellular transport of fatty acids. Combination of low molecular mass (15 kDa) and cytoplasmic location means that H-FABP secretion starts 30 minutes after ischemic episode. Peak of H-FABP concentration can be seen approximately in 6-8 hours after symptoms' appearance and returns to normal state in 24-30 hours, that's why it can be considered as biomarker of infarction and reinfarction after some days.

Carrol C., et al., 2013, made systemic examination and meta-analysis of H-FABP tests to classify the early sensitivity and specificity of its quantitative and qualitative analysis. There was a trial for understanding, if H-FABP could be used as a standard among with troponins. The authors analyzed 8 researches of quantitative analysis of H-FABP and 9 – of qualitative analysis. Sensitivity and specificity were 81% (95%; CI: 50% - 95%) and 80% (CI: 26% - 98%) accordingly to quantitative analysis 68% (CI: 11% - 97%) and 92% (CI: 20% - 100%) accordingly to qualitative. The researchers reported that combination of H-FABP and troponins T increased the sensitivity from 42–75% to 76–97% but decreased specificity from 94–100% to 65–93%. H-FABP has moderate sensitivity and specificity for myocardial infarction, but the combination can increase early sensitivity [5].

H-FABP also can identify the defect of myocardium in patients who had their heart operated. The high concentration of H-FABP in plasma correlates with some co-morbidities, such as heart failure, chronic kidney disease, diabetes mellitus and appears to be a factor of risk for post-operational acute renal failure (ARF). Oezkur M., et al., 2014 studied the association between level of H-FABP in plasma before operative treatment with frequency of ARF after operation. Positive correlation was registrated and as a result it was concluded that H-FABP can be used as a biomarker of ARF after operations [21].

1. Mechanism of working of H-FABP, its value in heart diseases, ischemia consequences allows to think that it would have a high prognostic significance for adverse outcomes in patients after myocardial infarction, that's why it is the subject of this study.

Purpose of our work: to evaluate new markers and their combinations with other clinical and biochemical markers and making a mathematical model for prognosis in patients with AMI.

Methods and results: The study included 189 patients with AMI: NSTEMI - 36 patients (9%), STEMI – 153 (81%), 138 (73%) males, who were 72±7,5 years old, and 27% females who were 65±6,9 years old. Patients had routine clinical and biochemical examination. Average level of H-FABP in the 1st group was 3,49±0,91 ng/ml, in the 2nd – 5,63±0,57 ng/ml ($p \leq 0,0561$).

The most effective threshold for dividing into intervals can be the value of markers at a point where the sum of sensitivity and specificity of this current marker in relation to result is maximized. ROC-analysis allows revealing this point (characteristic curve). Optimal dividing point was chosen by using ROC-analysis, made with «MedCalc». The effectiveness of prognosis (its sensitivity and specificity) can be increased by estimation of its results on different intervals of researched markers' change. The simplest case requires the markers' change diapason to be divided in two intervals.

Comparing the groups of patients who survived and those who died by analyzing of nearly 60 clinical-biochemical markers, the 4 most important markers were choosing for making a model, which can predict a lethal result in 6 months follow up after AMI: age >74 years old, glucose level >7,68 mmol/l, heart failure by Killip classification more than 2 class and level of H-FABP >1,23 ng/ml. H-FABP level was determmined using ELISA. Plasma level of H-FABP lower than 1 ng/ml, was considered as normal. It appeared, that age, glucose level and class of heart failure (Killip) had insufficient level of sensitivity (AUC 50; 66,7; 43,7% accordingly), and level of H-FABP was characterized by insufficient level of specificity (49,2%), but a high level of sensivity — 85,7%. That's why there was an attempt to determine their sum and to make a mathematical model, which allows to establish if AMI prognosis is unfavorable.

For the next step, diagnostic coefficients (DC) for each interval of markers' change were counted using Gubler formula:

$$DC = 100 \log (PA / PB),$$

Where, PA — frequency (probability) of examined values to be included into current diapason of marker in state A (lethal); PB — same for state B (survived).

The working of algorithm of classification is next: for each patient prognostic coefficients (points) are defined by all of the markers, which are included in the model depending if they are within according diapason. Then, these points are summed and summary prognostic coefficient, which characterizes the patients' prognosis, is found. If patients have positive values of PC, they dispense into group of high risk of adverse outcomes.

Tabl. 1

Risk of death in different values of PC

PC values	Risk of death
PC>0	High
PC<0	Low

Positive values of prognostic coefficients sum mean high probability of disease with lethal result for a patient. Negative values of sum of prognostic coefficients mean high probability of positive prognosis.

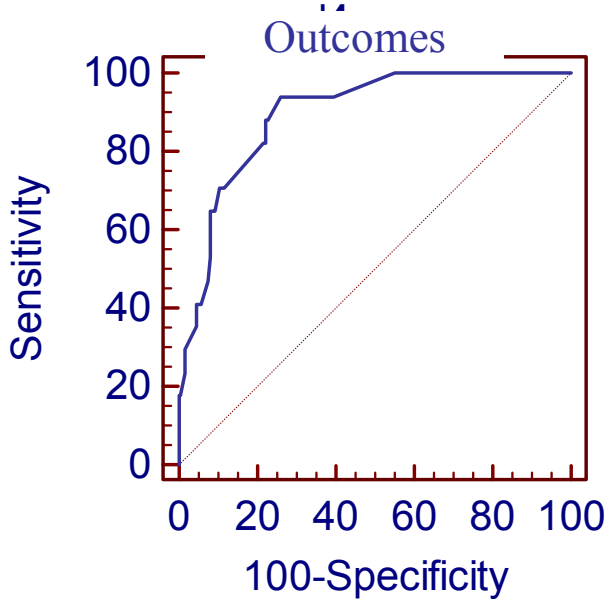
The measured value of PC as independent integral coefficient and prognostic capabilities can be evaluated. Shape of ROC curve for PC and the area under it suggests that the effectiveness for prognosis is high.

Tabl. 2

Prognostic characteristics of certain markers and prognostic model

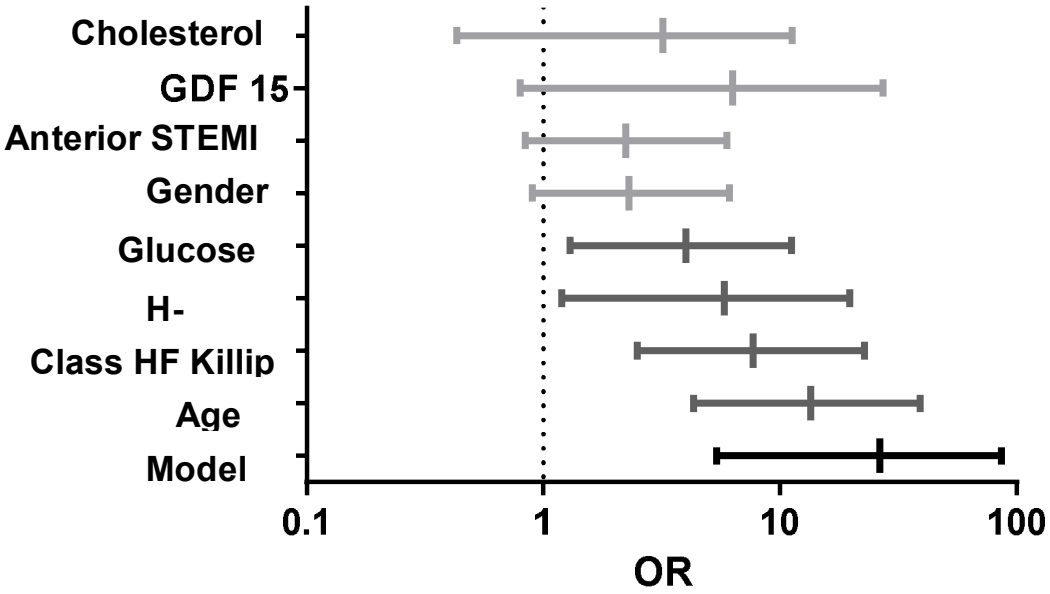
Marker	Se	Sp	AUC	p (AUC)	OR (±95% CI)
H-FABP	85,7	49,2	0,70	0,001	5,8 (1,2-19,7)
Glucose	66,7	66,7	0,68	0,01	4,0 (1,3-11,2)
Age	50,0	93,0	0,76	<0,0001	13,5 (4,3-39,1)
HF by Killip	43,7	90,8	0,70	0,05	7,7 (2,5-22,8)
Model	88,2	77,9	0,90	<0,0001	26,5 (5,4-86,4)

Notes: Se – Sensitivity; Sp – Specificity; AUC – Area under ROC curve; P – (AUC) level of meaning of difference of AUC from value of 0.5; OR (±95% CI) – Odds ratio with lower and higher limits of 95% confidence interval.



Picture 1. ROC-curve of prognostic model.

Influence of individual markers and model on prognosis of adverse outcomes after AMI is shown on picture 2.



Picture 2. Influence of individual markers and model on prognosis of lethal result

Discussion. Kilcullen et al., 2007, observed patients after AMI within 1 year follow up. They are reported that increased level of H-FABP had predictive value of

lethal rezult after AMI and can identify patients with high risk regardless of troponin concentration. Patients who had negative value of H-FABP and troponin, mortality in 6 months was 0%, so they had low risk. Patients who had positive H-FABP and negative troponin, had significantly higher risk of fatal events after 1 year compared to patients with negative H-FABP [16].

After 6 years of follow up, patients in troponin-negative and H-FABP positive group had highest mortality rate (Pearson et al., 2010).

Viswanathan et al., in 2012 investigated that H-FABP`s level higher than 6,48 ng/ml – independent predictor of death or myocardial infarction. Additionally, this research group measured highly sensitive troponin I in cohort and showed that prognostic value of increased H-FABP is additional to troponin in patients with acute coronary syndrome (ACS) with low or moderate risk. Also they reported that H-FABP is a marker of ischemia even without necrosis.

O'Donoghue et al., 2006, observed patients with AMI during10 months for revealing possible major cardiac events, including death from every reason, non-fatal myocardial infarction, new or aggravation of existing heart failure and composite end points. In addition recurrent ischemia which requires hospitalization or urgent revascularization was included. Patients with increased level of H-FABP while being hospitalized (approximately 41±20 hours after the chest pains) had significantly higher level of adverse events after 10 months of observation compared to level of H-FABP which was not defined. Increase of level of H-FABP was associated with death, myocardial infarction and heart failure up to 10 month of follow up in a group of troponin-negative patients (≤1,5 ng/ml), and troponin-positive patients (>1,5 ng/ml). Even when the lowest level of troponin I was used (≤0,1 ng/ml), H-FABP was associated with risk of death, myocardial infarction or heart failure. Increased levels of H-FABP were associated with increased risk of myocardial infarction and recurrent ischemia up to 30 days, especially in patients with unstable angina, whose diagnose was based on negative troponin I test [20].

Our team has made an effort to increase prognostic power of highly sensitive marker – H-FABP and to overcome relatively low specificity in predicting lethal

result with analysing of other clinical and biochemical markers. The research was limited to relatively small amount of patients.

Conclusions. The prognostic mathematical model, which includes a sum of markers – H-FABP level, glucose level, heart failure class by Killip allows to predict lethal results in patients with AMI with sensitivity of 88,2% and specificity 77,9% .

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Копиця М.П., Петюніна О.В., Титаренко Н.В., Гільова Я.В., Вишневська І.Р., Петеньова Л.Л., Опарін О.Л.

Прогноз для розвитку несприятливих подій після перенесеного інфаркту міокарда на підставі рівня серцевого білку зв'язуючого жирні кислоти

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Резюме. Серцевий білок, що зв'язує жирні кислоти (СБСЖК) - цитоплазматический протеїн, який вивільняється протягом 30 хвилин після виникнення ішемії і підсилює транспорт жирних кислот з кардіоміоцитів.
Мета: прогнозування летального результату після перенесеного гострого інфаркту міокарда (ГІМ) на підставі аналізу біохімічних і клінічних маркерів і їх суми.
Матеріали і методи. Обстежено 189 пацієнтів з гострим інфарктом міокарду. Хворих з ГКС поділили на 2 групи: 1- інфаркт міокарду без зубця Q (n=36); 2 - інфаркт міокарда с зубцем Q (n=153), чоловіки 138 (73%). Визначали білок, зв'язуючий вільні жирні кислоти (БЗВЖК) в сироватці крови імуноферментним методом, нормальними значеннями рахували його концентрацію до 1 нг/мл. Протягом 6 місяців періоду спостереження 17 пацієнтів (9%) померли. Були побудовані криві чутливості та специфічності методом ROC аналізу та обрані порогові значення для кожного параметру. Виявлено, що БЗВЖК мав достатній рівень чутливості 85,7%, але недостатню специфічність (49,2%), а показники - вік, клас серцевої недостатності за Killip та рівень глюкози мають недостатню чутливість (50,0%; 66,7%; 43,7%) відповідно для прогнозу летального результату. Бальна оцінка була проведена для кожного параметру відносно порогового значення та запропонована шкала для розрахунку прогностичного коефіцієнту (ПК) за методом Гублера. Позитивне значення ПК асоціюється з летальнім результатом у хворих на ГІМ.
Висновок: математична модель з урахуванням суми ознак - рівня БЗВЖК, віку, рівня глюкози, серцевої недостатності за класифікацією Killip дозволяє прогнозувати летальний результат у хворих на ГІМ з чутливістю 88,2% і специфічністю 77,9%
Ключові слова: БЗВЖК, гострий інфаркт міокарда, прогноз

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Прогноз для развития неблагоприятных событий после перенесенного инфаркта миокарда на основании уровня сердечного белка связывающего жирные кислоты

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Резюме. Сердечный белок, связывающий жирные кислоты (СБСЖК) - цитоплазматический протеин, который высвобождается в течение 30 минут после возникновения ишемии и усиливает транспорт жирных кислот из кардиомиоцитов.

Цель: прогнозирование летального исхода после перенесенного острого инфаркта миокарда (ОИМ) на основании анализа биохимических и клинических маркеров и их суммы.

Материалы и методы. Обследовано 189 пациентов с острым инфарктом миокарда. Больных с ОКС разделили на 2 группы: 1 - инфаркт миокарда без зубца Q (n = 36); 2 - инфаркт миокарда с зубцом Q (n = 153), мужчины 138 (73%). Определяли белок, связывающий свободные жирные кислоты (БССЖК) в сыворотке крови иммуноферментным методом, нормальными значениями считали его концентрацию до 1 нг / мл. В течение 6 месяцев периода наблюдения 17 пациентов (9%) умерли. Были построены кривые чувствительности и специфичности методом ROC анализа и выбраны пороговые значения для каждого параметра. Выявлено, что БССЖК имел достаточный уровень чувствительности 85,7%, но недостаточную специфичность (49,2%), а показатели - возраст, класс сердечной недостаточности по Killip и уровень глюкозы имеют недостаточную чувствительность (50,0%; 66,7%; 43,7%) соответственно для прогноза летального исхода. Балльная оценка была проведена для каждого параметра относительно порогового значения и предложена шкала для расчета прогностического коэффициента (ПК) по методу Гублера. Положительное значение ПК ассоциируется с летальным исходом у больных ОИМ.

Вывод: математическая модель с учетом суммы признаков - уровня БССЖК, возраста, уровня глюкозы, сердечной недостаточности по классификации Killip позволяет прогнозировать летальный исход у больных ОИМ с чувствительностью 88,2% и специфичностью 77,9%

Ключевые слова: БССЖК, острый инфаркт миокарда, прогноз

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DISEASES OF BILIARY SYSTEM AND DIABETES MELLITUS TYPE II: ACCIDENTAL OR EXPECTED COMORBIDITY

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***Abstract**. The issues of comorbid abnormalities secondary to diabetes mellitus (DM) become more relevant year by year and attract the attention of many researchers and clinicians due to a steady increase in the incidence and development of complications. The etiology and pathogenesis of dysfunctional diseases of the biliary system and diabetes mellitus type II (DM-2) are not fully understood up to this day. Understanding etiopathogenetical mechanisms and relationship of these diseases will help to improve their diagnostics and will increase the effectiveness of medical interventions resulting in enhancing of disease prognosis and quality of life.*

***Key words:** diabetes mellitus type II, biliary system diseases, chronic cholecystitis, bile acids.*

The aim of the research is to analyze the literature on etiopathogenetical peculiarities of biliary system diseases and diabetes mellitus type II as well as the relevance of comorbidity studies.

Recently there has been an increase in primary disease incidence and the spread of digestive system diseases in many countries [3]. Chronic diseases of the biliary system are often associated with obesity, atherosclerosis and other metabolic disorders.

Dysfunctional diseases of the biliary tract are among the most common gastrointestinal diseases underlying the development of chronic cholecystitis, which incidence is twice as high as peptic ulcer disease, and ten times as high in women [23].

Chronic cholecystitis (CC) is regarded as the focal disease of the biliary system. Chronic non-calculous cholecystitis (CNCC), which is diagnosed in 55-63% of cases, is the most common form of CC [18].

Chronic cholecystitis is a chronic polyetiological inflammatory disease of the gallbladder, associated with functional disorders (dyskinesia of gallbladder and

sphincter apparatus of the biliary tract), changes in physical and chemical properties and biochemical structure of bile (dyscholia). The latter, in turn, result from impairment of nervous and hormonal regulation, alterations in the immune system [2, 26].

Functional disorders that occur very often, especially in industrialized countries are commonly known to become the basis for the formation of organic disorders of the biliary system. According to ultrasonographic findings, gallbladder dysfunction develops in 7.6% men and 21.0% women. Particular interest to functional disorders of the biliary tract is also associated with the fact that their persistence can result in organic diseases of the biliary system, including cholelithiasis and pancreatitis. According to many authors, CNCC is often preceded by the development of functional motor tonic abnormalities of the gallbladder and sphincter apparatus of the biliary tract, such as dyskinesia and dystonia, caused by incoordination of neurohormonal regulatory mechanisms, psychogenic actions, viscero-visceral reflexes, etc. [4, 6, 11, 12, 14, 19].

There are primary and secondary dysfunctions of the biliary tract, depending on the underlying cause. Primary dysfunctions of the gallbladder and sphincter of Oddi, which develop independently, are rare, comprising on average 10-15%. Primary disorders of contractility may be innate, genetically determined or be associated with impaired smooth muscle sensitivity of the gallbladder to different stimuli, with cholecystokinin, motilin and vagal parasympathetic responses playing the leading role.

Primary dysfunction of the gallbladder commonly affects young people of asthenic constitution with reduced nutrition. Primary biliary dysfunctions include diseases, accompanied by functional disorders of the biliary system, secondary to the disorders of neurohumoral regulatory mechanisms, resulting in the impairment of bile and/or pancreatic secretion outflow into the duodenum in the absence of organic obstacles [1, 2, 13].

In most cases, functional disorders of the biliary tract are secondary in nature and/or result from organic abnormalities of the biliary system, for instance

gastrointestinal tract or other diseases of the digestive system: most of all pancreas, stomach or intestine. Thus, there is evidence that in lesions of the mucous membrane of the duodenum, dysfunctions of gallbladder, biliary ducts and sphincter apparatus of the biliary tract are mediated through cholecystokinin synthesis impairment.

Secondary biliary tract dysfunctions can also occur in systemic diseases (scleroderma, amyloidosis, myasthenia), hormonal disorders (pregnancy, administration of oral contraceptives, treatment with somatostatin or prostaglandins), diencephalic disorders, right-sided nephroptosis. It should be noted that impaired motility of the gallbladder is often correlated with such conditions as pregnancy, obesity, diabetes, low-calorie diet and parenteral nutrition [1, 2, 13, 19, 20].

According to Rome III Consensus Guidelines (Rome, 2006), Chapter E "Functional disorders of the gallbladder and sphincter of Oddi (SO)" includes: E1 "Functional disorder of the gallbladder"; E2 "Functional biliary disorder of SO"; E3 "Functional pancreatic disorder of SO" [24].

Recently there has been a significant increase in the incidence of gastrointestinal tract disorders in DM-II, especially in hepatobiliary system. DM is also considered to be a factor contributing to the development of cholelithiasis. Patients with diabetes mellitus are found to have gallstones two times as often as in general population [28, 30]. It should be noted that cholelithiasis is more often detected in patients with DM-II, where it is associated with such risk factors as female gender, high body mass index, elderly age, genetic predisposition, high concentrations of triglycerides and cholesterol, low density lipoprotein in plasma or use of alcohol. Patients with biliary tract diseases and diabetes are known to have increased levels of lipids in serum and cholesterol saturation of bile [17, 28, 30].

It must not escape our attention that the incidence of diabetes mellitus is increasing. There are over 360 million people suffering from diabetes worldwide. According to the International Diabetes Federation (IDF) the number of patients with diabetes type II is expected to increase to 552 million by 2030 [25].

DM-II is a chronic disease which is considered to be a serious medical and social problem. DM-II prevalence is extremely high, with a tendency to a permanent increase in the number of patients.

Today diabetes is regarded as a severe, progressive disease characterized by an extremely high risk of cardiovascular and microvascular disabling complications [16].

More than one-third of patients with DM-II develop the signs of diabetic gastrointestinal autonomic neuropathy as a dysfunction of the biliary tract and a decrease in gallbladder tone that indicates its early development in diabetes [30].

Functional disorders of tone and motor function of the gallbladder can cause prolonged bile retention, changing its physical and chemical properties, accompanied by inflammation. The evolution of pathological processes in biliary ducts can be represented as follows: first signs include dyskinesia, congestion, metabolic disorders, consequently accompanied by dyscrinia. Functional motor dyskinesia and dystonia are often caused by a disorder of neurohumoral mechanisms of bile secretion regulation, particularly in response to potent stimulants of this process.

Chronic cholecystitis in patients with DM is observed more frequently than in the general population [9]. Chronic cholecystitis associated with diabetes mellitus is characterized by a negative impact of gallbladder inflammation on carbohydrate balance. Carbohydrate metabolism peculiarities in patients with diabetes and chronic cholecystitis include its decompensation [31]. It should be noted that changes in the blood glucose concentration affect the motility of the esophagus, stomach, gallbladder and intestine both in healthy subjects and in patients with diabetes mellitus. In hyperglycemia gastric emptying is slowed down and in hypoglycemia it is accelerated in comparison with normoglycemia. Acute hyperglycemia alters the perception coming from the digestive tract and plays an important role in the etiology of gastrointestinal symptoms [29].

Diabetic cholecystopathy is a form of diabetic visceral neuropathy. It is manifested by a decrease in gallbladder contractile ability secondary to an increase in the tone of sphincter apparatus of the biliary ducts. In early diabetes mellitus patients

most often develop hypertensive dyskinesia, whereas in prolonged diabetes they are found to have hypotonic type. Impairment of mechanisms regulating muscle tone of the gallbladder and extrahepatic biliary ducts sphincters in response to natural nutritional stimulation is based on disruption of motor function or dyskinesia of the biliary tract.

The process of bile formation and bile secretion is another important aspect which should be discussed in more detail. Bile is actively involved in vital processes of the whole body. Physiological significance of bile is well detected due to functional and structural changes occurring in its chronic loss: complex changes in the nervous, endocrine, hematopoietic and other systems. Bile plays a fundamentally important role in the digestive process [10].

Bile is a complex colloidal system, comprising 80% of water, 6% of inorganic and 14% of organic ingredients. Bile acids account for about 60% of organic compounds of bile.

In addition to bile acids the composition of bile includes other lipids (cholesterol, phospholipids). There is also a small amount of bile pigments, proteins and micro-elements [8]. The formation of bile in the liver begins with the synthesis of water-soluble bile acids from cholesterol insoluble in water. The total amount of bile and the rate of its passage through the ducts correlate with the amount of bile acids. Cholesterol is used for the synthesis of cholic and chenodeoxycholic acid in the liver, the so-called primary bile acids, accompanied by amino acids, such as taurine and glycine, excreted in the form of conjugated bile acids through the biliary pole of hepatocytes, passing into the common hepatic duct through intrahepatic bile ducts as part of other components in the form of micellar solution [20, 21].

About 50% of bile secreted on an empty stomach, enters gallbladder through the cystic duct; remaining part flows directly into distal or common bile duct. Approximately 90% of water from the bile that came into the gallbladder is absorbed by its mucosa. Thus, bile in the gallbladder is a concentrated solution of bile acids. Fasting bile acids are concentrated in the gallbladder and the flow of bile from the liver, which depends on the secretion of bile acids, is insignificant. When food enters

the duodenum, hormonal and neural mechanisms start acting consistently. Duodenal mucosa secretes cholecystokinin, which is the main stimulator of gallbladder contractility, relaxation of biliary sphincter systems and enzyme-formation function of pancreas [19, 20, 21].

As for biological function of bile acids, its implementation starts in hepatocytes. With potent detergent properties, bile acids contribute to the removal of large number of substances from hepatocytes, with an important quality of removing lipids not soluble in water. Bile acids are actively involved in the transport of cholesterol and other bile lipids in the composition of micelles. In ducts and gallbladder cavity bile acids provide high bacteriostatic and bactericidal properties of bile and prevent the development of bacterial infections. High antibacterial properties of bile acids are indicated by the development of bacterial complications up to the development of acute calculous cholecystitis in patients with cholelithiasis with calculi localized in cystic duct or bacterial cholangitis with obstruction of bile ducts. In gallbladder cavity bile acids retain cholesterol as part of micellar solution that prevents the formation of gallstones [4, 5, 19, 20, 21].

In the duodenum bile acids, mixing with the constituent elements of the food, convert cholesterol, fatty acids and fat-soluble vitamins into a soluble state, facilitating their transport into the aquatic environment of the intestine and absorption in the intestines. When entering the large intestine, bile acids stimulate secretion of water, thus promoting bowel movement and preventing the development of pathogenic bacterial infections [7, 15, 19, 20, 21].

The total amount of bile acids in the body normally amounts for 3-4 g. Normal digestion requires more bile acids, that is why about 90% of bile acids in the proximal small intestine is absorbed and with the portal vein blood enter the liver, to be modified and used in the gastro-hepatic circulation to 10 - 12 times a day. About 10% of bile acid reaches the colon, where anaerobic bacteria form the secondary bile acids. In the intestine cholic acid is converted into desoxycholic acid, which is largely reabsorbed and conjugated in the liver. Chenodeoxycholic acid conjugates are converted in the colon into lithocholic acid, part of which goes to the liver to be

converted into ursodeoxycholic acid in the liver, conjugated mainly with glycine and to a lesser extent with taurine and is actively secreted into bile [19, 20, 21].

Bile formation occurs on a constant basis, regardless of whether there is food in the digestive tract or not.

Bile acids are regarded as physiological detergents that provide passage of bile and facilitate intestinal absorption and transport of lipids, vitamins and nutrients [22]. Bile acids also monitor optimal balance between intestinal bacterial commensals, regulating morphofunctional transformation of intestinal mucosa components [32]. Recently there has been found evidence, proving the important role of bile acids as systemic metabolic integrators, involved in regulation of metabolism of fats and carbohydrates [27].

Recent studies have convincingly shown that the role of bile acids is not limited to participation in the processes of digestion. It is evident that they take part in various pathological processes both as etiological factors and factors of certain pathogenic stages.

Diabetes is associated with a wide range of hepatobiliary system diseases, which are able to complicate its development and worsen the prognosis. Insulin resistance, production of proinflammatory cytokines and autonomic neuropathy play an important role among pathogenic mechanisms of liver and biliary ducts disorders.

Many factors of etiology and pathogenesis of biliary system diseases are not yet fully investigated and remain controversial which conditions the necessity to provide comprehensive investigation of comorbid disorders. The study of functional state of the biliary system in patients with DM-II can also contribute to the improvement of pathogenetic therapy of diabetes.

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Захворювання біліарної системи та цукровий діабет 2 типу: випадкова чи закономірна коморбідність

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Резюме. Проблеми коморбідної патології на тлі цукрового діабету (ЦД) з кожним роком стають більш актуальними та привертають увагу багатьох

науковців та клініцистів, у зв'язку з неухильним ростом захворюваності та розвитком ускладнень. До теперішнього часу етіологія та патогенез дисфункціональних захворювань біліарної системи та цукрового діабету 2 типу (ЦД-2) залишаються не до кінця вивченими. Розуміння етіопатогенетичних механізмів та взаємозв'язків цих захворювань сприятимуть удосконаленню їх діагностики та дозволить підвищити ефективність лікувальних заходів, що призведе до покращання прогнозу захворювань та якості життя.
Ключові слова: цукровий діабет 2 типу, захворювання біліарної системи, хронічний холецистит, жовчні кислоти.

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Заболевания билиарной системы и сахарный диабет 2 типа: случайная или закономерная коморбидность

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Резюме. Проблемы коморбидной патологии на фоне сахарного диабета (СД) с каждым годом становятся более актуальными и привлекают внимание многих ученых и клиницистов, в связи с неуклонным ростом заболеваемости и развитием осложнений. К настоящему времени этиология и патогенез дисфункциональных заболеваний билиарной системы и сахарного диабета 2 типа (СД-2) остаются не до конца изученными. Понимание этиопатогенетических механизмов и взаимосвязей этих заболеваний будут способствовать усовершенствованию их диагностики и позволит повысить эффективность лечебных мероприятий, что приведет к улучшению прогноза заболеваний и качества жизни.
Ключевые слова: сахарный диабет 2 типа, заболевания билиарной системы, хронический холецистит, желчные кислоты.

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PEDIATRICS

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PECULIARITIES OF THE GENERAL HEALTH AND LIFESTYLE OF ADOLESCENTS FROM INDUSTRIAL CITY AND RURAL AREA

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Abstract. *Anthropometry, vital functions and lifestyle of 9th-grade students from industrial city and beyond have been studied. There are predominant fat mass in body composition of boys from industrial area and higher blood pressure levels comparatively to rural residents. Sedentary style of life, tendency to fast food consuming, increased incidence of colds are typical for the industrial district inhabitants regardless of gender. Thus, the results indicate high probability for potential cardiovascular risk, which requires wide promotion of healthy lifestyle and nutrition with the involvement of all members of the family.*

Keywords: *adolescents, cardiovascular risk, anthropometric parameters, vital functions, lifestyle*

Actuality of the topic. Worsening of ecological situation and socio-economic state of considerable part of population, stress factors lead to progressive worsening of parameters of health of children. In spite of numerous studies in sector of ecopathology of children, detection of abnormalities of children dependent on ecology is still an important mission, because of both a considerable variety of effects of environmental factors on health of children and difficulties of finding of cause-effect relationships [1, 2, 3, 4]. Pollution of atmospheric air by industrial emissions, especially by ones of chemical plants and auto transport, is one of the most important problems of industrial city [5, 6, 7]. Heavy metals are main ecological pollutants, they decrease host defences opportunities in general, effecting on immunity and health state of children and teenagers.

According to official data (guideline ofMinistry of Public Healthof Ukraine [25], annual report of Ministry of Public Healthof Ukraine about health state of population of Kharkiv region and results of work of sanitary-and-epidemiologic institution, ecological atlas of Kharkiv region [17,18,19]), districts with good and satisfactory

ecological situation have been defined.While this distribution it was taken into account such parameters, as pollution of meals, pollution of atmospheric air, anthropogenic load of autotransport on atmospheric air, anthropogenic load of stationary sources on atmospheric air, accumulation and storage of wastes, emissions of pollutants.

Despite of presence of results of study of effects of environmental factors on health state, features of development of children haven't been revealed up to the present.

Purpose – to identify the features of anthropometric parameters, vital functions and lifestyle of 9th-grade students that live in the industrial city (urban) and beyond (rural).

Object and methods of studying.94 teenagers, students of 9th grade (43 boys and 51 girls) aged 14-15 years have been studied. Amongexaminedteenagerstherewere42 students from the city with areas with adverse environmental background (urban) and 52 students from districts of region with favourable environmental background (rural). Data on environmental background have been obtained from official statistical reports by region.The students of 9th grade have been chosen due to the fact that these persons of puberty age, who are preparingto enter high school or other educational institutions, so require monitoring of adaptive opportunities in connection with necessity for development of plans for prophylactic medical examination for entry in adulthood.

While carrying out anthropometry the following parameters have been taken into account: body mass in kilograms (M, kg); standing height in meters (H, m) (measurements have been held by device Seca-202); chest circumference in centimetres (ChC, cm); waist circumference in centimetres (WC, cm); hip circumference in centimetres (HC, cm); mid-arm circumference in centimetres (MAC, cm); thigh circumference in centimetres (ThC, cm); shin circumference in centimetres (ShC, cm); also body mass index (BMI) and body surface area (BSA) have been calculated by formulas. In addition skinfold thickness (mass of subcutaneous tissue) has been measured with a help of mechanical spring Lange Skinfold Caliper (Beta Technology, USA) (accuracy 1 mm) in standard positions:

under scapula (STS), over biceps (STB), over triceps (STT), in ileocecal region (STI)with following calculation of total skinfold thickness (TST) by algebraic sum.

Method for studying of body structure V.G.A. Durnin and others with standards for teenagers, assessment of percentage of fat in organism (% of fat) have been used for studying of body structure.

Following main vital functions have been studied: respiratory rate (RR), heart rate (HR), systolic blood pressure (SBP) and diastolic blood pressure (DBP), which has been measured by«Omron M-6» device.

Features of general life style have been studied by questioning with a help of specially compiling form, answers of which reflect features of diet, physical activity, sleep, presence of acute respiratory infections and chronic diseases.

Mathematical data processing and statistical analysis have been held by personal computer with a help of statistical programs “EXCELL FOR WINDOWS” and “STATISTICA 7.0. FOR WINDOWS”.Both qualitative character (presence or absence of feature) and parametric character (age, height, mass, etc) have been assessed. Mean value (M), standard deviation (σ) have been used as group characteristics. Difference between parameters is considered statistically significant at $p < 0.05$.

Results of research and their discussion.

There were nosignificant changes in fraction of examined teenagers neither in sex(54.3% girls and 45.7% boys), nor in inhabitancy (44.7% inhabitants of city and 55.3% inhabitant of region).

The average age of the examined urban teenagers was 14,36 ± 0,58 years and of rural ones was14,23 ± 0,83 ($p> 0.05$). Significant differences among examined by age among girls and boys has been established ($p> 0.05$), indicating that the groups did not differ significantly from each other.

Comparative analysis of anthropomorphic measurements and parameters of both urban and rural boys and girls separately have been conducted. Results of analysis are submitted in tab. 1.

As it is seen from tab. 1, anthropomorphic measurements and parameters of rural girls and boyshave significant changes: girls have significantly lower such parameters as M, H, BSA, WC, WC/HC than boys, and respectively they have significantly larger STB, STT, STS, STI, TST, % of fat. So far as mentioned parameters don't have significant changes from normalized onesaccording to this age and sex, it maintains that obtained results reflect normal physiological sexual differences of physical development of children, which become significant in pubescence.

Table 1

Anthropomorphic measurements and parameters of boys and girls that live in the city (urban) districts of region (rural)

Parameter	Male		Female	
	Urban (n=26)	Rural (n=17)	Urban (n=16)	Rural (n=35)
	M±σ	M±σ	M±σ	M±σ
M, kg	58,59±8,98	61,50±8,48	52,81±14,47	53,07±8,41
H, m	1,69±0,05*	1,73±0,06*	1,60±0,08	1,63±0,06
BMI	20,54±2,55	20,65±3,16	20,42±4,61	19,98±2,81
BSA, sq m	1,65±0,14	1,71±0,13	1,52±0,21	1,55±0,13
ChC, cm	83,15±6,04	85,00±7,43	82,69±6,79	81,44±8,72
WC, cm	71,69±5,54	74,29±8,84	67,44±10,47	65,56±11,93
HC, cm	89,96±0,33	91,64±6,14	90,63±6,16	90,06±7,30
WC/HC	0,80±0,04	0,81±0,07	0,74±0,06	0,73±0,06
WC/H	0,43±0,02	0,43±0,05	0,42±0,06	0,40±0,04
ThC, cm	45,38±4,09	43,24±5,06	47,69±6,15	45,12±4,81
ShC, cm	31,38±3,58*	34,64±3,25*	32,56±3,86	33,18±2,69
MAC, cm	25,73±2,56	25,06±2,63	24,19±3,25	23,74±2,98
STB, mm	24,31±4,66*	11,47±7,55*	20,75±6,62	19,19±14,43
STT, mm	23,85±6,15*	12,11±6,46*	21,63±4,91	20,09±16,89
STS, mm	12,58±4,75	11,35±6,41	13,75±8,71	16,33±11,48
STI, mm	17,92±8,36	18,06±13,90	21,00±13,46	24,06±8,07
TST, mm	78,65±20,11*	53,00±31,96*	77,12±30,24	79,67±25,31
% of fat	33,29±2,93*	26,45±14,93*	32,83±3,52	32,96±13,35

*P **<0,05**

Other tendency has been found while comparing anthropomorphic measurements and parameters of urbanteenagers. According to data of tab. 4, boys have significantly largerH, BSA, WC/HC that can be explained by physiological sexual differences. At

the same time, male teenagers have statistically larger STB, and there are no sexual differences in such parameters as STT, STS, STI, TST, % of fat. Therefore, enlargement of body mass of boys is due to not muscular component (physiological type), but due to both muscular component and fat component with significant prevalence of the lastone.

On the next step of analysis anthropomorphic measurements and parameters dependent on inhabitancy have been comparing. Taking into account sexual physiological differences, analysis have been conductedseparately for girls and boys.

Obtained data (tab.1) illustrate absence of differences in all anthropomorphic measurements and parameters of girls with different inhabitancy. In addition, all studied anthropomorphic parameters don't significantly differ from normalized ones.

Rural boys have statistically larger H ($p<0.05$) and ShC($p<0.05$). Meanwhile, there is no difference in M ($p>0.05$), boys from villagehave lower STB, STT, TST, % of fat (all$p<0.05$). This data indicate of the fact that urban boys have decreased muscular component of body mass and increased fat component. In addition, it can be proved by the fact that value of TST, % of fat of urban boys is significantly larger than normalized ones.

The data compared with the results obtained by Swedish scientists [34] that in assessing the anthropometric parameters have not obtained significant differences due to inhabitants. At the same time, they assessed only basic parameters (height, weight, BMI), while the thickness of skin folds and fat% have not been evaluated at all. At the same time these parameters allow you to find out the nature of enlargement of body mass, whether it is increased due to muscular component or fat component. The study of body structure provides more accurate assessment of the cardiovascular risk than measuring of only body weight and BMI.

During assessing parameters of vital functions of ruralboys and girls (tab.2), it has been found out that girls have more frequent HR ($p<0.05$). Differences in other parameters haven't been found (all $p>0.05$).

Other situation has been detected during comparing vital functions of urban teenagers (tab.2). Urban boys have statistically significant higher systolic blood pressure than girls ($p<0.05$). Other differences in vital functions haven't been found.

Table 2.

Parameters of vital functions of boys and girls that live in districts of region

Parameter	Female		Male	
	Urban (n=16)	Rural (n=35)	Urban(n=26)	Rural(n=17)
	M±σ	M±σ	M±σ	M±σ
HR, . beats per min	83,67±13,46	93,31±18,65	75,69±14,76	79,00±15,49
RR, breaths per min.	19,20±0,50	18,10±1,06	17,2±2,30	17,3±2,10
SBP mm Hg.	119,93±13,78	116,69±13,50	131,35±11,66*	120,59±16,53*
DBP mm Hg.	74,73±11,90	76,69±10,93	75,69±12,05*	69,29±7,28*

*P **<0,05**

While comparing vital functions of girls, significant differences dependent on inhabitancy haven't been found ($p>0.05$ for all) (tab.2). Urban boys have significantly higher SBP and DBP than both parameters of rural male teenagers and normalized ones.

This fact attract attention, if enlargement of % of fat of urban boys is also added. On one side, this relation is interdependent, on the other it marks out urban boys to risk group of formation of cardiovascular pathology.

Features of way of life of teenagers have been analyzed (tab.3). As it is seen from tab.3, urban teenagers (place with unsatisfactory general ecological assessment) eat fast food, suffer from respiratory diseases significantly more frequent and spend significantly more time at TV and computer (all $p<0.05$). They spend significantly less time on open air than rural teenagers of the same age ($p>0.05$).

Worldwide studies founded out that there is a correlation between main causes of overweight or obesity and inappropriate eating habits with lack of physicalactivity [37]. Ostrowska et al. [38] found that obese people ate moreoften between meals, had a night eating problem, did notcontrol the calorific value of meals, compared to people withnormal weight.

Scientists pay an increased attention for the differences of life style in rural and urban adolescent. Most of these results indicate dietary faults and a high risk of developing obesity in people living in rural areas. While analyzing school journeys and leisure activities in rural and urban adolescents Norway scientists have been found out that both rural and urban teenager spent more time on inactively, such as television and computer games, than on regular physical activity with no differences between the two groups. However this study also indicated that the median distance walked or cycled to school or bus stop of urban teenagers was three times greater than the same median distance of rural teenagers [39].

Table 3.

Features of general life styleof teenagers from the city (urban) and from districts of region (rural)

Feature	Urban teenagers, % (n=42)	Rural teenagers, % (n=52)
Training in sports group	28.6	28.8
Walking in the open air for more than 8 hours a week	26.2*	46.2*
Eating fast food for more than 3 times a week	64.3*	23.1*
Eating vegetables and fruits more than 5 time a week	69.0	71.2
Acute respiratory diseases more than 3 times a year	45.2*	15.4*
Sleep for more than 8 hours a day	80.9	84.6
Presence of chronic diseases	33.3	28.8
Time spend at computer, TV for more than 2 hours a day	83.3*	38.5*

*P**<0.05**

Some American authors have observed that rural youths are at greater risk than urban youths for obesity and physical inactivity [40, 41]. The study conducted in Ontario, Canada [42] found that the level of urbanization had an influence on increased body mass among teenagers, in which percentage of overweight and obesity from the rural area was significantly higher than in the urban area. Scientists from Croatia reported that rural teenagers eat more fast food and soft drinks than urban ones [43]. Also adolescents from rural area more often preferred fast food than fruit and vegetables.

There is a similar research of the USA scientists [44] observed that school-age children in rural Mississippi were at a high risk of obesity caused by a prevalence of fat, salt and soft drinks and a low part of fruit and vegetables in their diet.

However in our study we received other data and according to them urban adolescents had more mistakes in lifestyle with inappropriate eating habits and lack of physical activity. It may be explained by different traditions and life style habits in our region.

Conclusions.

1. General anthropometric parameters of boys and girls who live in the industrial city and beyond don't significantly differ from normalized ones. The identified gender differences are physiological for teenagers. At the same time, urban boys has significantly higher fat component than muscle component of body composition.
2. Systolic and diastolic blood pressure of boys from the industrial city significantly exceeds normal levels as well as the value of boys from rural districts.
3. Sedentary lifestyle, tendency to consume fast-food and recurrent respiratory problems more typical for the urban adolescents.
4. Peculiarities of physical development, general health and lifestyle of 9th grade adolescents form industrial city, are potentially unfavourable for the cardiovascular risk development, which requires promotion of healthy lifestyle.

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Особливості стану здоров'я та стилю життя підлітків, що мешкають в індустріальному місті та за його межами

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Резюме. У роботі вивчалися основні особливості антропометричних параметрів, вітальних функцій та особливостей способу життя учнів 9-х класів, що мешкають в індустріальному місті та за його межами. Встановлено, що у хлопців, що мешкають в індустріальному районі міста перевагу має жировий компонент структури тіла, а також рівні артеріального тиску вищі, ніж у мешканців села. Для всіх мешканців індустріального району незалежно від статі типовими є статичний спосіб життя, схильність до споживання фаст-фуду, підвищена захворюваність на застуду. Отже, отримані результати свідчать про високі шанси потенційного формування кардіоваскулярного ризику, що потребує широкого впровадження соціальних програм щодо здорового способу життя та харчування із залученням всіх членів родини.

Ключові слова: підлітки, кардіоваскулярний ризик, антропометричні параметри, вітальні функції, спосіб життя

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Особенности состояния здоровья и стиля жизни подростков, проживающих в индустриальном городе и за его пределами

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Резюме. В работе изучались основные особенности антропометрических параметров, витальных функций и особенностей образа жизни учащихся 9-х классов, проживающих в индустриальном городе и за егопределами. Установлено, что у мальчиков, проживающих в индустриальном районе города, жировой компонент структуры тела преобладает над мышечным, урони артериального давления выше, чем у жителей села. Для всех жителів индустриального района независимо от пола типичны статичный образ жизни, склонность к употреблению фастфуда, повышенная заболеваемость простудой. Таким образом, полученные результаты свидетельствуют о высоких шансах потенціального формирования кардиоваскулярного риска, что требует широкого внедрения социальных программ по здоровому образу жизни и питания с привлечением всех членов семьи.

Ключевые слова: подростки, кардиоваскулярный риск, антропометрические параметры, витальные функции, образ жизни

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ELECTROCARDIOGRAPHIC FEATURES OF CHILDREN IN AN EARLY NEONATAL PERIOD

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***Abstract**. The article provides a brief overview of the features of the cardiovascular system and its role in the process of adaptation of newborn children. As a screening method has been chosen by routine methods electrocardiography (ECG). Review of published information did not provide with a full picture of normal ECG parameters in infants of early and late neonatal period. The usage of the method of electrocardiography was studied as a screening for early diagnostics of adaptation failure and identification of diseases of the cardiovascular system in neonates. The findings of the study can be used in screening for cardiovascular disorders.*
***Keywords:** healthy neonate, early neonatal period, adaptation, ECG.*

Childbirth and early neonatal life is a unique combination of extreme effects on the organism of a child, requiring continuous change of adaptation mechanisms at different levels of self-regulation. After the birth, in the organism of a newborn compensatory-adaptive mechanisms engage aiming at the adaptation of organs and systems to changed life conditions such as the beginning of the external breathing. A crucial role in this is played by the restructuring of the circulatory system [1,2].

The global restructuring of hemodynamic includes desolation of placental communications; the launch of the pulmonary circulation; deterioration of blood viscosity, closing fetal communications - foramen ovale and patent ductus arteriosus stop functioning; the diameter of the right atrium changes - right atrium decreases and becomes approximately equal to the left one; the change in the basic hemodynamic load leads to a reduction of the right ventricular diastolic diameter and an increase in the diameter and diastolic left ventricular ejection. The ventricles of the heart work in series, each of them separately pumps a half of the total cardiac output. The tone of blood vessels and peripheral regulatory systemic blood pressure (BP), which depends on the mass of the child, gradually increase [1,2,3].

Significant changes in the metabolism are expressed in conjugation processes of anaerobic glycolysis and oxidative phosphorylation. Lactate along with glucose are important sources of energy for the heart muscle in the first two weeks after the

birth. The simultaneous use of these two energy sources depicts the transition in energy supply of the myocardium of a newborn baby and characterizes the energy adaptation of myocardium to extrauterine life [1,2,3].

Features of ion exchange in the myocardium. The myocardium of a newborn has a reduced amount of sarcoplasmic reticulum, which regulates calcium metabolism in cardiomyocytes. The blood plasma is determined by the specific digoxin-like immunoreactive substance, the maximum content of which is reached between the 4th and 6th days of life. Its physiological importance lies in the regulation of metabolism of sodium and water by impacting the sodium pump and cardiac glycoside receptors [1,2].

The histological structure of the myocardium of a newborn is characterized by the presence of badly divided thin myofibrils containing a large number of oval nuclei and the lack of cross-striation. Connective tissue is represented insignificantly and the amount of elastic elements is small. Endocardium is characterized by a loose structure and consists of two layers. The capillary network, which has a large number of anastomosis between the coronary arteries, is well-developed [3].

The muscle of the heart is constantly developing, differing in general from the adult heart muscle by functional immaturity, relatively low motility and speed reduction. A complex and stressful process of postpartum adjustment of intracardiac and general blood circulation, undoubtedly, is reflected in the electrocardiogram of a newborn.

The literature review on the subject revealed that newborns, especially in the early neonatal period, are characterized by high lability of the main ECG parameters and varying limits of the so-called physiological norm at this time.

A wide range of parameter variation in the same child during the process of the general adaptation is the measure of the high reserve capacity of the organism of a newborn. Data analysis of contemporary literature indicates that the interest to this problem is not decreasing, leading cardiologists continue to study the features of neonatal ECG [4,5,6]. Nowadays, enough data have been accumulated in the literature on the features of the ECG of healthy children of different ages. The

problem of diagnosis of pathological conditions of the cardiovascular system in children using the electrocardiogram has been widely studied [7,8,9]. However, these works did not investigate ECG features in children of early and late neonatal period. Currently, there is a need for an intensive study of neonatal cardiology. New results constantly appearing in foreign literature serve as the basis for revising the interpretation of some of the previously accepted electrocardiographic phenomena and regulations.

Materials and methods. To clarify the parameters of ECG standards in newborns in the early neonatal period and early diagnosis of the heart adaptation, ECG parameters in infants were studied in the Kharkov regional perinatal center during the period from November 2012 to January 2013. The study included 31 healthy newborns of 3.3 ± 1.4 days of life, of which 48% boys and 52% girls, divided into two groups by age — the children of the first 3 days of life (the first group of 20 persons) and children 4-7 days of life (the second group of 11persons).

Results of the study. The children of both groups had the average duration of the P wave 0.04 ± 0.01 sec.; amplitude 0.12 ± 0.05 mV (Group 1); 0.15 ± 0.05 mV (Group 2). The most pronounced in the II, III, aVR, aVF and right chest leads, which is probably due to the predominance of work of the right heart compartments; it is negative in aVR and may be reducing the amplitude of up to the contour in aVL leads. In Group 2, it becomes most pronounced in the left chest leads.

The duration of the interval PQ 0.23 ± 0.34 sec (Group 1). In children of 4-7 days age (Group 2) it is shortened to 0.21 ± 0.29 seconds. This indicates an improvement in impulse conduction in pathways of the heart.

The duration and amplitude of the QRS complex in children in both groups were not significantly different ($p < 0.05$) - 0.05 ± 0.01 sec. (Group 1); 0.06 ± 0.00 sec. (Group 2), 0.06 ± 0.12 mV (Group 1); 0.05 ± 0.09 mV (Group 2).

The amplitude of the Q wave in children of both groups did not differ — 0,06 ± 0.12 mV (Group 1); 0.05 ± 0.09 mV (Group 2). Its duration was 0.02 ± 0.01 sec. (group 1); 0.01 ± 0.01 sec. (Group 2). Q wave was absent in I, aVL and all chest leads, but in the child of 7 days of life Q wave appears in I, aVL, V4, V5 leads.

The duration of R wave in children of both groups were not significantly different 0.02 ± 0.01 sec. The amplitude of the R wave - 0.06 ± 0,12 mV (Group 1); 0.09mV ± 005 (Group 2), and varies depending on the lead: R wave amplitude increases from the first to third lead in standard leads; highest amplitude was recorded in lead aVF in limb leads; in the chest leads highest R-wave amplitude was recorded in the right chest leads, and decreases in left chest leads. It characterizes right axis deviation.

The duration of S wave in children of both groups were not significantly different ($p < 0.05$) 0.02 ± 0.01 sec. The amplitude of the S wave in infants also varies depending on the lead — the highest amplitude of the S wave is in the I standard lead; the highest amplitude in lead aVL in the limb leads; the highest amplitude of the wave S is recorded in the chest leads, and right chest leads can reach 0,65 ± 0,57 mV. S wave is absent in III and aVR leads, but in some children S wave is recorded in the III standard lead.

ST complex in children early of neonatal period is variable, and it is not possible to explore its duration, therefore only its description is given: ST complex is not expressed in I and III standard leads, S wave goes into the rising T wave when entering the contour line; ST complex in II standard lead is largely shifted up over the contour line at 0.05-0.1 mV; in the limb leads, ST complex has the following characteristics: in aVR it is shifted down to a negative T wave; ST complex is in the contours in aVL; mostly shifted up to 0.05-0.1 mV in aVF or may not be expressed and go directly to the T wave, in the chest leads the complex mostly shifted in relation to the contour: in V1-V4 is shifted down to 0.05-0.1 mV, but in some children ST complex has been shifted upward to 0.05 mV in leads V3-V4; ST complex is most inconstant and can be shifted up or down by 0.05-0.1 mV, or be unexpressed and transform into the rising T wave; ST complex is located on the contour or goes into the rising T wave. These changes characterize the processes associated with the significant restructuring of the physiological hemodynamics, show the physiological adaptation of the heart and can be partly explained by the

relative shortage of oxygen in the process of transition from a post-natal placental circulation.

The amplitude of the T wave — 0.13 ± 0.05 mV (Group 1); 0.14 ± 0.05 mV (Group 2). In standard leads T wave is positive, but a negative or flattened T wave was observed in the standard lead III. The limb leads have different characteristics: in aVR—negative in aVL—mostly flattened, may be positive and in aVF—mostly positive. In chest leads T wave is mainly biphasic and may be positive or negative, in the V6 it is always positive, sometimes flattened.

Table 1.

ECG-norms for the children of early neonatal period the real research

	1 group, N = 20		**2 group, N = 11**	
Heart rate	141,00±17,52 (p<0,05)		150,45±10,77 (p<0,05)	
	Amplitude (mV)	**Duration (sec)**	**Amplitude (mV)**	**Duration (sec)**
P wave	0,12±0,05 (p>0,05)	0,04±0,01 (p>0,05)	0,15±0,05 (p>0,05)	0,04±0,00 (p>0,05)
Interval P-Q	–	0,23±0,34 (p>0,05)	–	0,21±0,29 (p>0,05)
Complex QRS	–	0,05±0,01 (p<0,05)	–	0,06±0,00 (p<0,05)
Q wave	0,06±0,12 (p>0,05)	0,02±0,01 (p>0,05)	0,05±0,09 (p>0,05)	0,01±0,01 (p>0,05)
R wave	0,06±0,12 (p>0,05)	0,02±0,01 (p>0,05)	0,05±0,09 (p>0,05)	0,02±0,01 (p>0,05)
S wave	0,65±0,57 (p>0,05)	0,02±0,01 (p<0,05)	0,65±0,57 (p>0,05)	0,02±0,01 (p<0,05)
Segment S-T	–	–	–	–
T wave	0,13±0,05 (p>0,05)	–	0,14±0,05 (p>0,05)	–
Interval Q-T	–	0,24±0,04 (p>0,05)	–	0,51±0,52 (p>0,05)

The average duration of the QT complex reached 0.24 ± 0.04 sec. in examined infants (Group 1); 0.51 ± 0.52 sec. (Group 2). Since heart rate was 141.00 ± 17.52

(Group 1); 150.45 ± 10.77 (Group 2) beats per minute ($p < 0.05$), which does not contradict the research of a number of the QT complex done by several researchers.

Conclusions. Established standards of the ECG in children of early neonatal period, characterized by the adaptation of the cardiovascular system to the new changed conditions of life, are important for early detection of cardiovascular disorders in newborns.

Significant differences in heart rate in children of surveyed groups were detected. The duration of the QRS complex and the S wave did not differ significantly in healthy newborn of 1st-3rd and 4th-7th days of life, which showed the normal course of adaptation. There were no significant differences between the other ECG parameters in infants of both studied groups.

The findings confirm the expediency of an electrocardiogram as a highly informative screening method for diagnosing pathology of the cardiovascular system and features of adaptation period in newborns of the early neonatal period.

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Особливості електрокардіограми у новонароджених раннього неонатального періода

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Резюме. В статті розглянуто особливості та роль серцево-судинної системи в процесах адаптації новонароджених дітей та важливість ранньої діагностики серцево-судинних порушень в даному віковому періоді. В якості скринінгового метода був обраний рутинний метод електрокардіографії (ЕКГ). В ході огляду літератури виявлено недостатню вивченість та систематизованість параметрів ЕКГ-норми у новонароджених. В ході даного дослідження були уточнені та систематизовані параметри ЕКГ у новонароджених раннього ненатального періоду. Автори пропонують використовувати отримані показники в процесі скринінгу серцево-судинних розладів перинатального періоду.

Ключові слова: здоровий новонароджений, ранній неонатальний період, процес адаптації, ЕКГ.

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Особенности электрокардиограммы у новорожденных раннего неонатального периода

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Резюме. В статье представлен краткий обзор особенностей сердечно-сосудистой системы и ее роли в процессах адаптации новорожденных детей и обоснована необходимость ранней диагностики сердечно-сосудистых нарушений в данном возрастном периоде. В качестве скринингового метода был выбран рутинный метод електрокардиографии (ЭКГ). В процессе обзора литературы выявлено недостаточную изученность и систематизированность параметров ЭКГ-нормы у новорожденных. В ходе данного исследования были уточнены и систематизированы параметры ЭКГ-нормы у детей раннего неонатального периода. Результаты могут бать использованы в процессе скрининга сердечно-сосудистых растройств перинатального периода.

Ключевые слова: здоровый новорожденный, ранний неонатальный период, процесс адаптации, ЭКГ.

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SURGERY

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DIFFERENTIAL DIAGNOSTIC AND SURGICAL TREATMENT OF PATIENTS WITH KLATSKIN'S TUMOR

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Abstract. *Klatzkin tumor is characterisedaccount by 10-20% of all tumors of the liver ducts. Most often, patients report the presence of jaundice, which is the occasion of treatment in hospital. The purpose of this study was to evaluate the results of surgical treatment. For diagnosis using standard clinical trials, as well as ultrasound, performed percutaneous transhepatic cholangiography, endoscopic retrograde cholangiopancreatography, computed tomography, magnetic resonance imaging to determine the extent of tumor invasion of hepatic ducts used anatomical classification H. Bismuth – M.V. Corlett. After the study came to the conclusion that patients with Klatzkin tumor preparation for surgery should include biliary decompression to minimize cholestasis and portal vein embolization of branches to increase the weight of the remaining part of the liver, which significantly reduces the risk of postoperative liver failure and mortality. Total caudal lobectomy and extended lymphadenectomy yavlyayutsyaobyazatelnymi elements of the operating protocol of surgery at hilarnyh cholangiocarcinoma. When local tumor invasion into a branch of the hepatic artery and portal vein it is possible to plastic correction.*
Key words: *liver surgery, imaging, lobectomy, lymphadenectomy*

Malignant tumors of the bile ducts of the liver, and the portal area are an actual problem in biliary surgery. Klatskin Tumor (KT), extrahepatic cholangiocarcinoma, proximal bile duct cholangiocarcinoma constitute about 10-20% of all tumors of the biliary ducts, 70-80% of cases of cancer of the bile duct, and about 15% of all malignant tumors of the liver. In literature there are also "the portal cholangiocarcinoma," "hilus tumor", "gate liver cancer." Cancer of the bile ducts makes 1-3% of all malignancies. In autopsy, of cancer common bile duct is detected in 0.01% of cases [1,2,3,5,10].

Klatskin tumor affects mainly the common hepatic duct at the level of confluence, and can then move to the right or left hepatic duct. This tumor - epithelial origin is usually malignant nature, with infiltrative growth form [4,6,7,11,12,13].

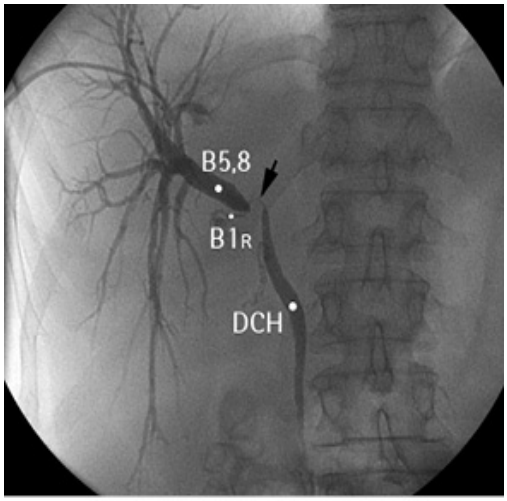
The clinical symptoms observed, do not differ from the manifestations of cancerous lesions of other organs of the hepatopancreatobiliary system. Most often, patients report the presence of jaundice, which is the reason for treatment in hospital. The intensity of cholestasis may be different from subclinical manifestations of hyperbilirubinemia and painless obstructive jaundice in a few cases up to the terminal stage of jaundice (93%); it does not usually depend on the level of the lesion and is proportional to the duration of the disease. In addition, if jaundice is long, high cholemia, there may be expressed metabolic disorders - endogenous intoxication symptoms, pruritus, cholangitis, liver failure, loss of body weight. The duration of such a state before going to the hospital is from 2-3 days to 2-3 weeks [14-23].

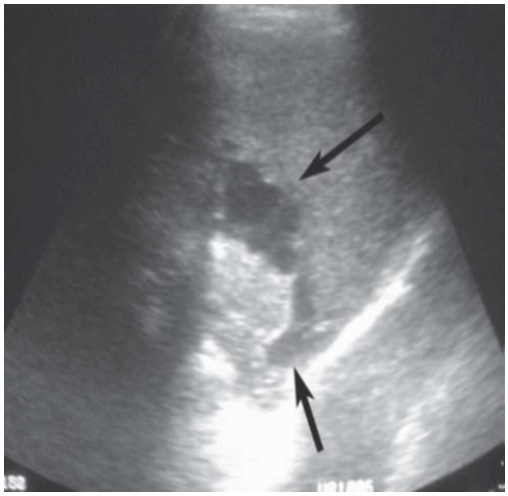
Materials and methods. The purpose of this study was to evaluate the results of surgical treatment Klatskin tumor. The study included 49 patients, of whom 31 (63.2%) were women and 18 (46.6%) were men with cholangiocarcinoma, which in the period from April 2001 to October 2015 performed surgery. As a rule, the volume of liver parenchyma infested by the cholangiocarcinoma is small, at the same time, as a result of the defeat of the duct system, the volume of resected functioning parenchyma may be 70-80% [21,22]. The presence of cholestasis significantly impairs functional condition and regenerative ability of a small amount of the remaining part of the liver. Due to frequent invasions of vessels of hepatoduodenal ligament, pancreas and duodenum surgery, a complemented stage of vascular plasty or pancreatoduodenectomy can significantly degrade its portability. For the prevention of liver failure cholestasis should be minimized. Permissible levels of hyperbilirubinemia in the preoperative period, should be <60mmol / l, preferably <3 0mmol / l.

As for methods of screening used for diagnosis of klatskin tumors, at first we used ultrasonography(US). In this study, to determine the presence of tumor is usually not possible, but there is expansion of intrahepatic bile duct obstruction above

the tumor. In rare cases (10-12%) in the echogenic (iso / hyper) a rounded shape can be found forming in the gate of the liver, in the projection of the confluence of the hepatic ducts with irregular indistinct contours, 2-6.5 cm in diameter in the liver parenchyma at the bifurcation . The overall accuracy of ultrasound reaches 75-85% of cases when determining tumor mass, and up to 92% - when determining the level of obstruction.

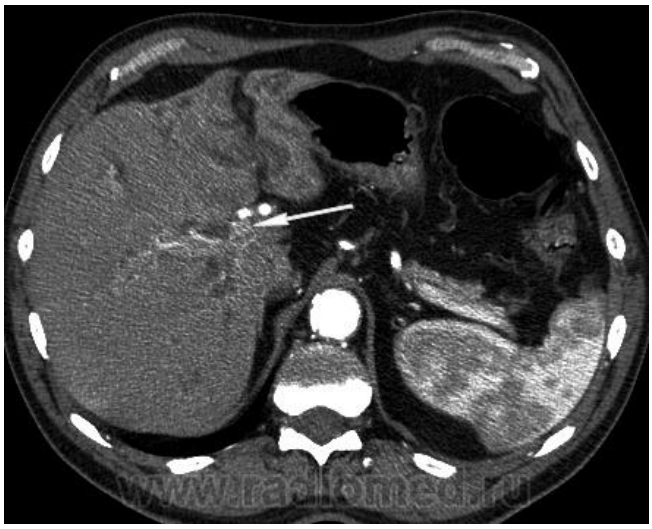
If there was problem with percutaneous liver drainage at a moderate dilatation of the intrahepatic ducts, percutaneous transhepatic cholangiography (PTHC) was performed under ultrasound, which is the "gold standard" in determining the nature of the lesion of the biliary tract, especially in the proximal section of the biliary tract. It has a sensitivity of about 95.2%, specificity - 87%, the estimation of ability to resect-93%, determination of position - up to 100%. At the same time you can get a biopsy by trepanation of the tumor using ultrasonography for verification of the diagnosis, and in the future - cholangiography with percutaneous liver cholangiostomy.

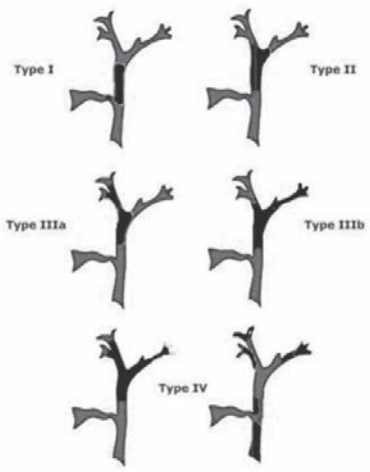




Endoscopic retrograde cholangiopancreatography (ERCP), is used when there is obstruction by tumor (complete obturation of the lumen of the duct)of proximal or central localization, when combined with PTHC under ultrasound double-contrast enhancement can more accurately determine the duration of the pathological process and define the scope of the operation. ERCP sensitivity in determining the lower limit level gall block is about 92%, also this method does not provide information about the state of the ducts above the obstruction. To reduce the risk of acute suppurative

cholangitis and biliary hypertension due to blockage, direct contrast diagnostic methods should be used or internal and external drainage of the biliary tract.





Computed tomography (CT) often helps to visualize the tumor, enlarged bile ducts, and lymph nodes. But this method is more informative in the performance of drainage of the hepatic duct. In addition, CT allows us to estimate the degree of invasion of the blood vessels by the tumor, which can be regarded as signs of infiltration of the vessel by tumor, around or narrowing of the portal vein or its branches. There may be non-specific signs: atrophy of one of the lobes of the liver with hypertrophy of the contralateral lobe, either that or other evidence of tumor invasion into the branches of the portal vein. With the defeat of the tumor process blood vessels of the liver gate, clearer and more detailed information can be obtained using enhanced spiral CT (with IV contrast) and angiography.

Accuracy of CT is 85-88%, and the determination of obstruction - up to 98.1%. Ultrasound and CT with obtaining a biopsy improves diagnostic accuracy up to 94-96%

The best method of investigation in the Klatskin tumor can be considered magnetic resonance imaging(MRI), which allows not only to determine the precise location of the tumor, but also to visualize the detailed structure of the blood vessels of the liver. In order to determine the spread of tumor invasion of hepatic ducts used anatomical classification H. Bismuth – M.V. Corlett:

- Type I - common hepatic duct tumor without infiltration of its bifurcation (place of confluence of the ducts);
- Type II - the tumor extends into the bifurcation of the bile duct without involving the hepatic ducts, obstruction of the common hepatic duct tumor;
- Type IIIa - mainly invasion of bifurcation and right hepatic duct;
- Type IIIb - predominant invasion of bifurcation and left hepatic duct;
- Type IV – multicentric spread tumors or tumor invasion of both hepatic ducts and their branches.

According to this classification type I was 16 (32.7%) patients; Type II in 19 (38.9%); IIIa 6 (12.2%); IIIb in 5 (10.2%); Type IV in 3 (6.1%) patients. Life span of patients with proximal cholangiocarcinoma is an average of 4-6 months after diagnosis.

The main method of treatment of tumors of the extrahepatic bile ducts is surgical. But it presents certain difficulties, which are due primarily low and high frequency of postoperative complications and adverse outcomes after radical or palliative surgery. Resection of the ducts and the formation of the liver gate anastomoses , bile abductor, is extremely dangerous, due to the location of the tumor in the liver and the gates close proximity to the hepatic artery and portal vein, and liver parenchyma. Also an important fact is that the majority of patients diagnosed with KT in the late stages involve obturation biliary tract and obstructive jaundice. Presence of hyperbilirubinemia increases risk of postoperative complications and mortality, however, before embarking on etiological surgery, perform decompression of the biliary system, which can be one-sided and, using PTHC or endoscopic stenting. Bilirubin level should not exceed 50 mmol / l. Planned surgery can be performed 2-3 weeks after decompression. KT in most cases it is small, so as resection surgery uses a fork resecton of the bile ducts with subsequent formation hepaticojejunoanastamosis with the passage of food from the jejunal loop. This operation is accompanied by a low number of postoperative complications and mortality, but after, it is not always possible to achieve complete resection. In the propagation of tumor, segmental resection of several segments of the liver, up to the

right or left hand extended hemihepatectomy to delete or save the caudate lobe. However, this is accompanied by a high rate of postoperative liver failure, which often leads to death. In severe general condition of elderly patients and IV type lesions with extensive tumor invasion recommend external or internal drainage on a hidden drainage through the tumour.

Radical surgery to remove the tumor and resection of the common hepatic duct are possible only with type I for Bismuth, and at II, IIIa, IIIb type - only when there is anatomical liver resection on the side of the pre-emptive destruction of liver bile ducts, with resection of the extrahepatic bile ducts and the possibility of resection of hepatic artery or portal vein, I segment of the liver. Disease recurrence after radical surgical intervention is usually detected in a period of from 0.5 to 5 years after surgery. Patient survival is about 12% (to 15 years), 94% (1 year after the surgery).

Laparotomic Palliative surgery for Klatskin tumor is in the inner or outer extraction of bile, but mortality in this is high (17%). Life expectancy after external drainage of 1.4-5 months, after an internal - 3,6-10,4 month.

Effective and relatively safe to remove bile hypertension allow minimally invasive procedures, which are widely used. Among them: the endoscopic and percutaneous transhepatic cholangiodrainage, stenting of the bile duct, endoprosthesis tumor stricture or bile ducts, and others.

Results and discussion. In the period from April 2001 to October 2015 in Kharkov Regional Hospital 49 patients with Klatskin tumor were operated on. Of these, 36 patients underwent radical surgery. In 13 patients underwent explorative laparotomy. Operability was 70.2%, which corresponds to international data. The average time of surgery was (564 ± 56) minutes, the mean intraoperative blood loss was (836 ± 240) ml.

10 (27.8%) cases required surgical intervention in the vessels of hepatoduodenal ligament. 17 (47.2%) patients underwent resection of the portal vein with Confluence portoplastic anastomosis end-to-end. The average time required to complete portoplasty was (18 ± 3) min. For adequate exposure of the distal portion of

the portal vein transfissuralny approach was used. During portoplasty, arterial blood flow the remainder of the liver was maintained, minimizing ischemia.

The average residence time of patients in the intensive therapy after the operation was 2.4 days, the average time spent in the surgical hospital patients after surgery was 35.6 days. Both figures are significantly higher than those for patients after liver resections over the focal hepatic lesions. Overall mortality was 3 (6.1%) patients. The main cause of death was postoperative hepatic failure in combination with sepsis, which arose in 2 (4.1%) patients. In 1 patient the cause of death was bleeding from arrosive hepatic artery and portal vein.

Conclusions.

1. Preparation of Klatskin tumor patients for surgical intervention should include biliary decompression to minimize cholestasis and portal vein embolization of branches to increase the weight of the remaining part of the liver, which significantly reduces the risk of postoperative liver failure and mortality.
3. Total caudal lobectomy and extended lymphadenectomy are mandatory elements of the operational protocol of surgery at hilar cholangiocarcinoma.
4. Local tumor invasion of the branches of the hepatic artery and portal vein at the possibility of its plastic correction is not a contraindication to complementary surgery.

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Криворучко І.А., Тесленко С.М., Тонкоглас О.А., Сикал М.О., Гончарова Н.М., Кожем'яка К.О.

Диференційна діагностика та хірургічне лікування хворих з пухлинами Клацкіна

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Резюме. Пухлина Клацкіна становлять близько 10-20% всіх новоутворень протоків печінки. Найчастіше хворі відзначають наявність жовтяниці, що і є приводом звернення до лікарні. Метою цього дослідження було вивчення результатів оперативного лікування. Для проведення діагностики використовувалися стандартні клінічні дослідження, а також ультразвукове дослідження, виконувалася черезшкірна чреспеченочная холангіографія, ендоскопічна ретроградна панкреатохолангіографія, комп'ютерна томографія, магнітно-резонансна томографія, для визначення поширення пухлинної інвазії по печінковим протоках використовувалася анатомічна класифікація H. Bismuth - M.B. Corlett. Після проведеного дослідження прийшли до висновків, що підготовка хворих пухлиною Клацкіна до оперативного втручання повинна включати билиарную декомпресію для мінімізації холестазуі емболізацію гілок ворітної вени для збільшення маси залишається частини печінки, що істотно знижує ризик розвитку післяопераційної печінкової недостатності та летальність. Тотальна каудальна лобектомія і розширена лімфаденектомія являютьсяобязательнимі елементами операційного протоколу хірургічних втручань при хіларних холангіокарціноми. При локальній пухлинної інвазії в гілку печінкової артерії і ворітної вени можливо її пластична корекція

Ключові слова: печінка, хірургія, томографія, лобектомія, лімфаденектомія

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Дифференциальная диагностика и хирургическое лечение больных с опухолями Клацкина

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Резюме. Опухоль Клацкина составляют около 10–20 % всех новообразований протоков печени. Чаще всего больные отмечают наличие желтухи, что и служит поводом обращения в больницу. Целью настоящего исследования явилось изучение результатов оперативного лечения. Для проведения диагностики использовались стандартные клинические исследования, а также ультразвуковое исследование, выполнялась чрескожная чреспеченочная холангиография, эндоскопическая ретроградная панкреатохолангиография, компьютерная томография, магнитнорезонансная томография, для определения распространения опухолевой инвазии по печеночным протокам использовалась анатомическая классификация H. Bismuth — M.B. Corlett. После проведенного исследования пришли к выводам, что подготовка больных опухолью Клацкина к оперативному вмешательству должна включать билиарную декомпрессию для минимизации холестаза и эмболизацию ветвей воротной вены для увеличения массы остающейся части печени, что существенно снижает риск развития послеоперационной печеночной недостаточности и летальность. Тотальная каудальная лобэктомия и расширенная лимфаденэктомия являютьсяобязательными элементами операционного протокола хирургических вмешательств при хиларных холангиокарциномах. При локальной опухолевой инвазии в ветвь печеночной артерии и воротной вены возможно ее пластическая коррекция.

Ключевые слова: печень, хирургия, томография, лобэктомия, лимфаденэктомия

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NEW METHOD OF SURGICAL CONTROL OF RETROHEPATIC IVC: ANATOMICAL STUDY

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Abstract. *The study presents results of our anatomical investigation of feasibility of a new surgical maneuver: formation of a cross-tunnel under the mouths of the major hepatic veins during removal of a tumor thrombus of the inferior vena cava. The parameters of this surgical approach were compared with the results of "piggyback" liver mobilization. Our results have demonstrated possibility of forming a tunnel under the mouths of the major hepatic veins in 80% of cases. This maneuver has similar risk level parameters compared to "piggyback" mobilization of the liver. No prognostic factors for feasibility of such an approach were identified. Further clinical study is definitely required to determine its effectiveness.*

Key words: *inferior vena cava, tumor thrombus, piggyback mobilization of the liver, cross-tunnel*

Introduction

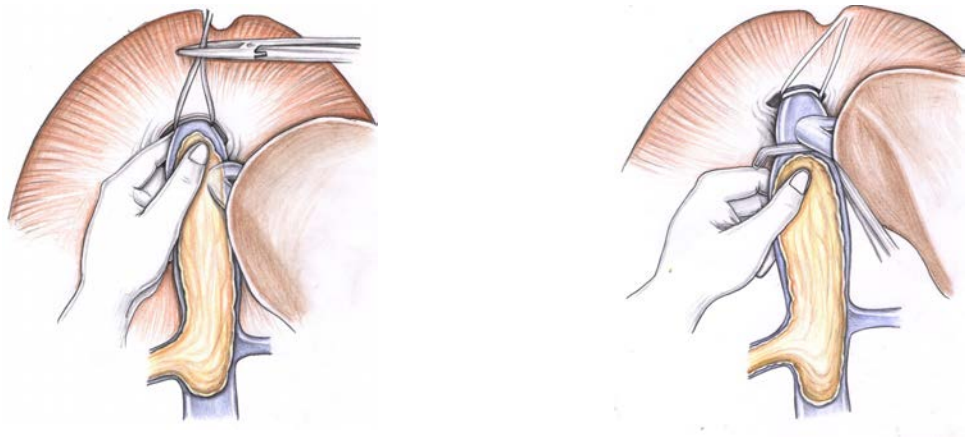
Obvious limitations of high tumor thrombus removal with the use of balloon catheters or cardiopulmonary bypass have determined the development of alternative methods making it possible to fully control subhepatic, retrohepatic and intrapericardial segments of the inferior vena cava (IVC) [1, 2]. The most important aspect of this approach is the feasibility of external digital displacement of the thrombus apex below the diaphragm [3, 4]. However, due to weakness of caval collateral vessel development the clamping of the IVC above the insertions of the major hepatic veins can lead to serious hemodynamic changes. Therefore, the main task of a surgeon in such a situation is to further displace the thrombus downwards and clamp the IVC below the mouths of the major hepatic veins [5,6] (Figure 1a, b). This maneuver allows us to maintain the hepatic blood flow, which accounts for about 25% of blood inflow to the inferior vena cava. The essential condition for performing this stage of the operation is to carry out the liver mobilization using the classical and "piggyback" methods [2].

During the classical variant the liver is mobilized *en bloc* together with the inferior vena cava. It requires ligation and transection of the right lumbar, adrenal and inferior phrenic veins and complete separation of retrohepatic IVC from the posterior abdominal wall.

The "piggyback" technique is characterized by maximum separation of the anterior surface of the inferior vena cava from the liver (only major hepatic veins are preserved) via transection of the small hepatic veins draining the caudate lobe. The terminal regions and mouths of the major hepatic veins are carefully mobilized.

To facilitate the mobilization of the retrohepatic IVC Belghiti J. et al. proposed a liver-hanging maneuver [7]. It included passing the tape through between the front surface of the inferior vena cava and the rear surface of the hepatic parenchyma [8].

Elevation of the liver with the help of a tape provides a better overview of the entire suprahepatic space and significantly facilitates manipulations on the hepatic veins and intrapericardial section of the IVC, especially in cases of severe hepatomegaly.



A b

Figure 1 **a** Digital fixation of tumor thrombus; **b** Displacement of the thrombus apex below the mouths of the major hepatic veins.

However, one should bear in mind that due to the problems associated with venous anatomy, "piggyback" mobilization of the liver is possible to perform only in 80-92% of cases [2]. In a number of observations the major hepatic veins and veins of the caudate lobe of the liver have got a very short extrahepatic portion, quite thin walls and a variable location. Besides, in some patients several dozens of veins draining into the retrohepatic IVC are found.

All the above mentioned factors predispose to trauma of the veins, which in its turn can cause heavy bleeding. Iatrogenic injury of the short hepatic veins is the most unfavorable complication of this procedure. It is observed in approximately 4-6% of patients [8].

From our point of view, "piggyback" mobilization of the liver is not always required. This primarily relates to the situations where the liver covers less than half the circumference of the retrohepatic vena cava segment. At the same time, in order to bring the thrombus down it is enough to mobilize the liver using the classical variant, and to release the posterior vena cava.

Taking into account the geometrical features of the retrohepatic IVC and major hepatic veins, as well as the imaging findings, we have assumed that there is an vascular zone immediately below the mouths of the major hepatic veins, which is about 1.0 cm wide, through which a vascular clamp can be passed without performing the "piggyback" mobilization of the liver (Figure 2).

Thus, a surgeon with his hand above the thrombus apex and grasping the vena cava posteriorly and laterally, rather than circularly, can easily displace the thrombus below the mouths of the major hepatic veins. At the same time, the clamp above the apex of the thrombus can be passed through the cross-tunnel directly under the mouths of the major hepatic veins (Figure 3).

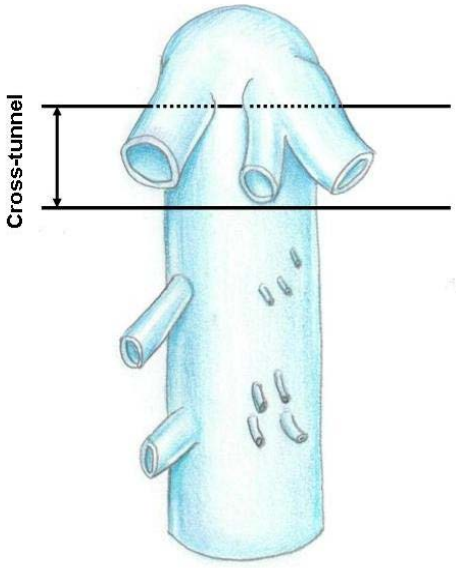


Figure 2. Layout of cross-tunnel below a mouth of the major hepatic veins

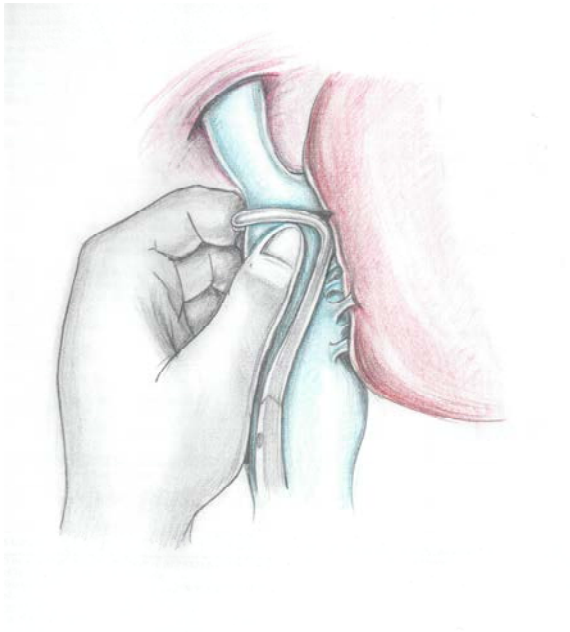


Figure 3. The clamp above the apex of the thrombus passed through the cross-tunnel directly under the mouths of the major hepatic veins.

To confirm this hypothesis we performed an anatomical study of the retrohepatic IVC regarding the assessment of feasibility and risk level of two options of surgical approaches to this segment of the IVC: "piggyback" mobilization of the liver and creation of a cross-tunnel under the mouths of the major hepatic veins.

Materials and methods

The materials for this anatomical study were 35 fresh cadavers (less than 48 hours after death). The autopsies were performed between June and September 2012 on the base of the departments of Pathological Anatomy of Hospital No.8 and Regional Clinical Center of Urology and Nephrology in the city of Kharkov, Ukraine. The age of the deceased patients (18 men and 17 women) ranged from 42 to 85 years and was 69.3 years in average. The mean height did not exceed 168 cm, and the weight was not more than 82 kg.

In order to examine the characteristics of the intrapericardial IVC and its tributaries we used the following method. After removal of the organs using *en masse* technique, the posterior surface of the entire length of inferior vena cava was sharply and bluntly exposed. Then, the organs were turned their ventral side up and the mobilization of the liver was performed using the classical method (transection of the falciform, triangular and coronary ligaments), which allowed us to expose the suprahepatic infradiaphragmatic IVC with the mouths of the major hepatic veins. Afterwards, we tried to bluntly create a cross-tunnel about 1.0 cm wide immediately below the mouths of the main hepatic veins without "piggyback" mobilization of the liver with evaluation of probability of hepatic and vascular injury.

Thereafter, the vena cava was opened longitudinally from the bifurcation up to the retrohepatic segment of the IVC. The incision was made along the left lateral

surface of the vein at 9 o'clock to preserve the posterior wall of the IVC as much as possible. At the level of retrohepatic segment the inferior vena cava was dissected longitudinally along the midline. When the incision was completed the rear IVC wall was turned away outwards, making it possible to examine the mouths of the main inflows of the IVC on its front and rear surface. We examined the length and diameter of each segment of the inferior vena cava, as well as the size of each venous tributary mouth. For topographic recording of the mouths of the hepatic veins the retrohepatic segment of IVC was conventionally divided into 12 sections, which were entered into a special chart. The major hepatic veins were described as the upper right, middle and left. Others, smaller venous vessels draining into the posterior surface of the liver (dorsal hepatic veins) were classified according to De Cecchis et al. [9]. When the diameter of the mouth was more than 4 mm the lower right and middle right hepatic veins were exposed [10]. The veins of the caudate lobe of the liver and other small venous tributaries were examined separately. Taking into account the location, size and number of the venous mouths the feasibility and risk level of "piggyback" mobilization of the liver were studied. We took photographs of all the stages of our anatomical study.

Feasibility of "piggyback" mobilization of the liver and formation of a tunnel under the mouths of the major hepatic veins was assessed using the following scale: easy (100 points), difficult (50 points), impossible (0 points). The risk level of the operation was graded as safe (100 points), risky (50 points), and which caused the trauma of the vessels or liver parenchyma (0 points).

Results and discussion

The main results of the study are presented in Tables 1-4. The average length of retrohepatic IVC was 85.8 mm (70 mm to 130 mm), and the diameter was 31.1 mm (25 mm to 40 mm). The retrohepatic IVC was completely surrounded by the liver in 1 case (2.9%), half the circumference in 17 cases (48.5%), 2/3 in 16 (45.7%), and 1/3 only in one case (2.9%).

Table 1.

Feasibility values for "piggyback" mobilization of the liver and formation of a tunnel under the mouths of the major hepatic veins.

Feasibility	Easy		Difficult		Impossible		Average score
	N	%	n	%	n	%	points
"Piggyback" mobilization	7	20	24	68.6	4	11.4	54.3
Formation of a tunnel under the major hepatic veins	11	31.4	17	48.6	7	20	55.7

Table 2.

Risk level values for "piggyback" mobilization of the liver and formation of a tunnel under the insertions of the major hepatic veins.

Safety	Safe		Risky		Trauma		Average score
	N	%	n	%	n	%	points
"Piggyback"mobilization	1	2.9	29	82.8	5	14.3	44.3
Formation of a tunnel under the major hepatic veins	0	0	25	71.4	10	28.6	35.7

The number of mouths of all types of the hepatic veins varied from 4 to 16, and averaged7.6. The mean number of dorsal vein mouths of the liver 3 mm in diameter did not exceed 5.1 (1 to 14) and >3 mm was 2.5 (0 to 5).

"Piggyback" mobilization of the liver was graded as "impossible" in 4 cases (11.4%), its feasibility was "difficult" in 24 cases (68.6%). In respect of the tunnel under the mouths of the major hepatic veins it should be noted that its formation was not possible in 7 cases (20%). Nevertheless, in 11 cases (31.4%) formation of the tunnel was graded as "easy" (Figure 4).

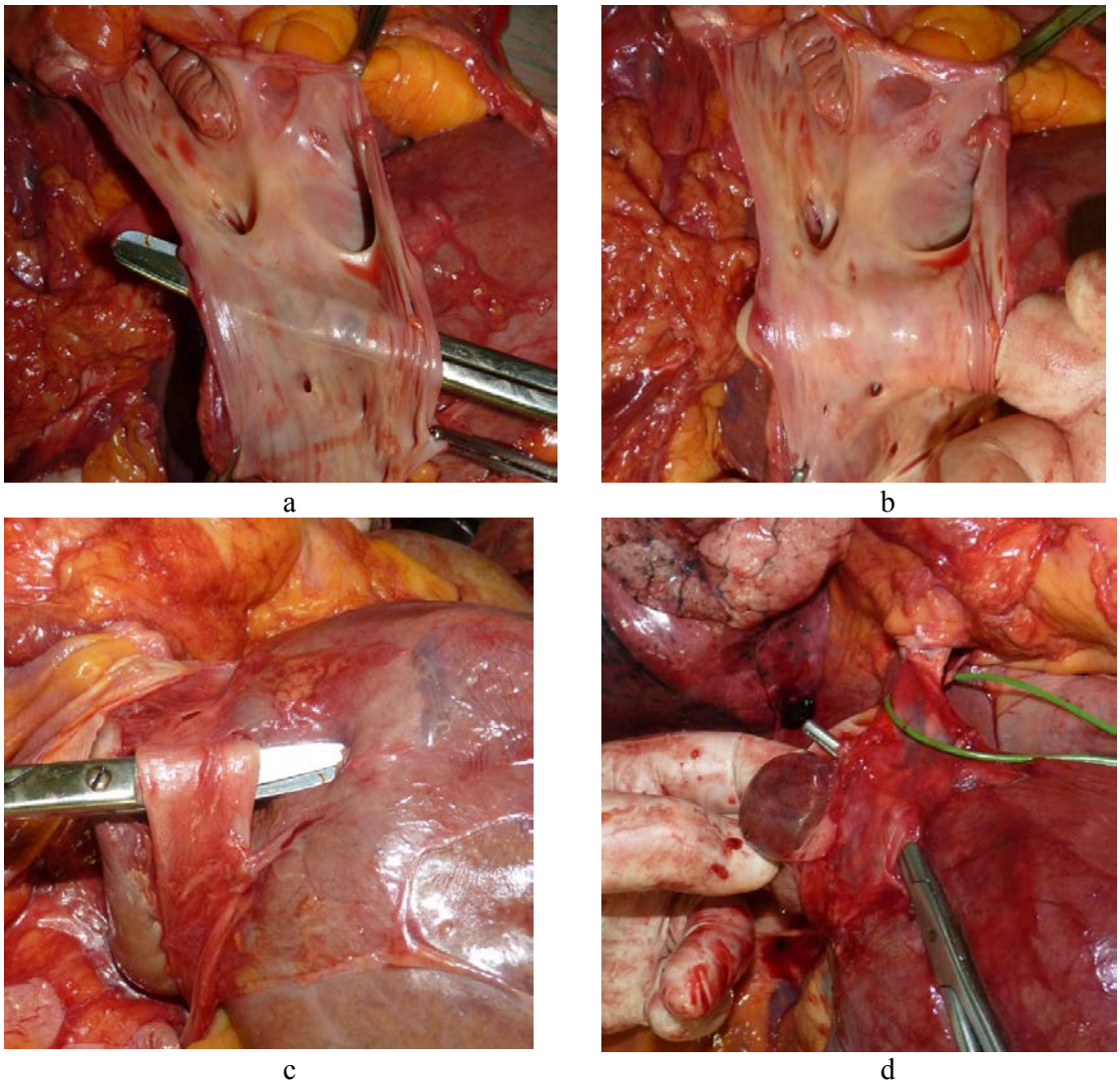
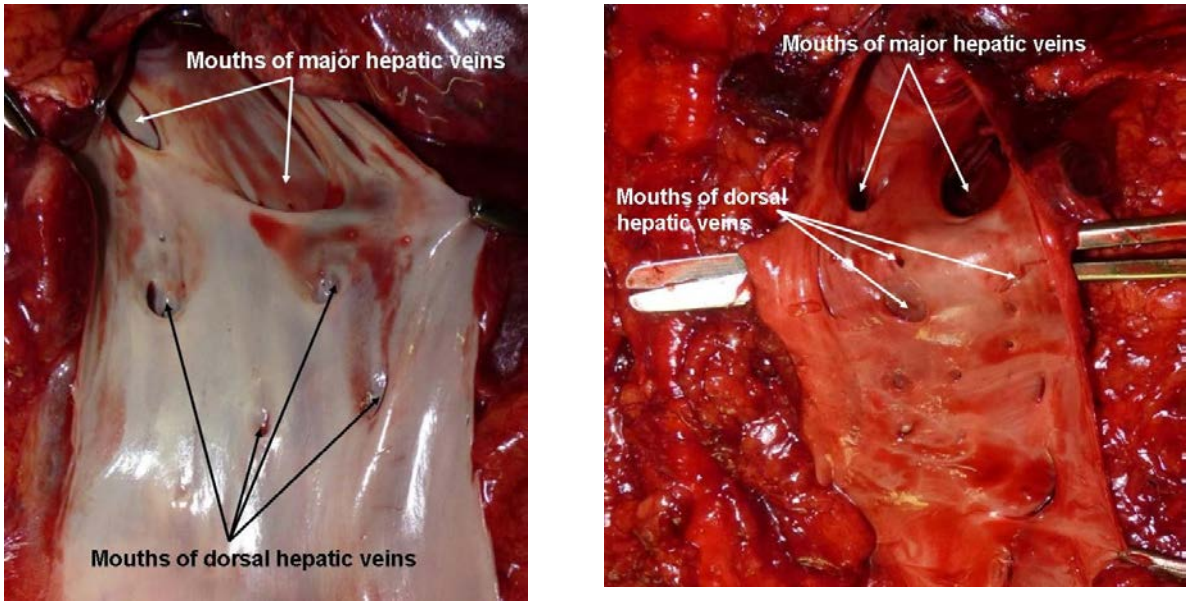


Figure 4 a, b, c, d Autopsy observations of successful and safe formation of the cross-tunnel below the mouths of major hepatic veins.

Injury of the liver parenchyma, hepatic veins or inferior vena cava was established in 14.3% of the cases using "piggyback" mobilization of the liver, where as formation of a tunnel under the mouths of the hepatic veins caused the similar problems in 28.6% of cases (Figure 5).

Nevertheless, the risk level values were slightly higher for "piggyback" mobilization of the liver (82.8% vs. 71.4%). Combination of parameters "easy +

risky" was more frequently observed during formation of the tunnel (31.5% vs. 17.1%), while parameters "difficult + risky" occurred more frequently during "piggyback" mobilization of the liver (62.9% vs. 40.0%). It is of interest, that impossibility of "piggyback" mobilization and formation of the tunnel was noted only in one patient. Feasibility of "piggyback" mobilization did not correlate with the ability to create a tunnel.



A b

Figure 5. Autopsy observations of difficult and risky formation of the cross-tunnel.

Among feasibility prognostic parameters of "piggyback" mobilization of the liver only the quantity of mouths of the hepatic veins ($p < 0.05$) was statistically significant. None of the three examined parameters have demonstrated their validity in terms of predicting the feasibility of tunnel creation under the mouths of the major hepatic veins.

Table 3.

The values of parameter combination of feasibility and safety for "piggyback" mobilization of the liver and formation of a tunnel under the mouths of the major hepatic veins.

Combination of parameters	"Piggyback"mobilization		Formation of a tunnel under the major hepatic veins	
	n	%	n	%
Easy + safe	1	2.9	0	0
Easy + risky	6	17.1	11	31.5
Easy + trauma	0	0	0	0
Difficult + safe	0	0	0	0
Difficult + risky	22	62.9	14	40
Difficult + trauma	2	5.7	3	8.5
Impossible + risky	1	2.9	0	0
Impossible + trauma	3	8.5	7	20
Total	35	100	35	100

Table 4.

The prognostic value of some parameters as for feasibility of "piggyback" mobilization of the liver and formation of a tunnel under the mouths of the major hepatic veins.

Prognostic parameter	"Piggyback" mobilization (p)	Formation of a tunnel under the major hepatic veins (p)
Length of retrohepatic IVC	0.067	0.086
Length of circumference of IVC covered with the liver	0.056	0.696
The number of hepatic vein mouths	0.024	0.425

The results of our study have demonstrated that "piggyback" mobilization of the liver is possible in about 90% of cases, whereas formation of a tunnel under the mouths of the major hepatic veins is possible in 80% of cases. It is interesting, that both variants of access to the retrohepatic segment of the IVC were not possible only in 1 case (2.9%). Therefore, we believe that difficulties either approach can be compensated for by using the other one.

Both approaches have demonstrated rather high risk levels (82.8%, and 71.4%).However, the combination of parameters "easy + risky" in a more proportion of cases was observed during creation of a tunnel, while parameters "difficult + risky" much more frequently occurred during "piggyback" mobilization of the liver. Of course, one of the drawbacks of our study was a certain subjectivity of the results despite our efforts to unify this value by the way of creating a scale of feasibility and risk level of the operation stages. There is no doubt that the most considerable factor influencing the evaluation of these parameters is the experience of hepatic surgery and the knowledge of anatomy possessed by a surgeon performing removal of the tumor thrombus.

Another important aspect of the study was to identify possible prognostic performance factors of "piggyback" mobilization of the liver and formation of a tunnel under the mouths of the major hepatic veins. For performing "piggyback" mobilization of the liver the only one statistically significant prognostic parameter was identified, which was the number of mouths of the hepatic veins. None of the examined parameters demonstrated any statistical significance for predicting tunnel formation.

Our work presents a model access to the retrohepatic inferior vena cava via creation of a tunnel under the mouths of the major hepatic veins during an anatomic study. More detailed and objective evaluation of this approach requires further clinical investigation. There is no doubt that intraoperative ultrasonography of the liver can greatly facilitate the performance and reduce the risk level during creating a tunnel under the mouths of the major hepatic veins.

Conclusions

The results of our anatomical study have demonstrated feasibility of performing new maneuver during vena cava thrombectomy by the way of forming a cross-tunnel under the mouths of the major hepatic veins in 80% of cases. This

approach has similar risk level parameters compared to “piggyback” mobilization of the liver. Noprognostic factors for feasibility of this maneuver were identified. In order to determine the effectiveness of this approach further clinical study is required.

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Новий метод хірургічного контролю ретропечінкового сегменту НПВ: анатомічне дослідження

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Резюме. У нашій роботі представлені результати анатомічного дослідження можливості виконання нового хірургічного маневру - формування поперечного тунелю під вічками головних печінкових вен при видаленні пухлинних тромбів нижньої порожнистої вени. Параметри даного хірургічного підходу порівнювалися з результатами piggyback мобілізації печінки. Результати нашої роботи продемонстрували можливість формування тунелю під вічками

головних печінкових вен у 80% пацієнтів. Даний маневр має подібні показники рівня ризику в порівнянні з piggyback мобілізацією печінки. Яких-небудь прогностичних факторів щодо можливості виконання такого підходу ідентифіковано не було. Для визначення його ефективності необхідно подальше клінічне дослідження.

Ключові слова: нижня порожниста вена, пухлинний тромб, piggyback мобілізація печінки, поперечний тунель

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Новый метод хирургического контроля ретропеченочного сегмента НПВ: анатомическое исследование

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Резюме. В нашей работе представлены результаты анатомического исследования возможности выполнения нового хирургического маневра - формирования поперечного тоннеля под устьями главных печеночных вен при удалении опухолевых тромбов нижней полой вены. Параметры данного хирургического подхода сравнивались с результатами piggyback мобилизации печени. Результаты нашей работы продемонстрировали возможность формирования тоннеля под устьями главных печеночных вен у 80% пациентов. Данный маневр имеет сходные показатели уровня риска в сравнении с piggyback мобилизацией печени. Каких-либо прогностических факторов в отношении выполнимости такого подхода идентифицировано не было. Для определения его эффективности необходимо дальнейшее клиническое исследование.

Ключевые слова: нижняя полая вена, опухолевый тромб, piggyback мобилизация печени, поперечный тоннель

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COMPLICATIONS OF LAPAROSCOPIC PLASTICS IN VENTRAL HERNIA

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Abstract. *Solving of the problem of effective treatment of abdominal hernias is currently relevant because of the prevalence of this disease among people of working age, and quite a high percentage of complications, relapse and mortality. Using laparoscopic techniques can significantly reduce postoperative complications and disability. During the period from 2011 to 2015 laparoscopic plastics in ventral hernia was performed in 1546 patients. Bleeding, bruising groin neuralgia and paresthesia, frozen shoulder pain, subcutaneous emphysema were met often as intraoperative complications. The advantages of laparoscopic hernia repair over traditional methods - it is possibility to inspect the abdominal cavity, the simultaneous closure of the graft of all the weaknesses of the anterior abdominal wall, reducing the duration of hospital stay.*

Keywords*: abdominal hernia surgery, laparoscopic hernia repair, complications*

The problem of surgical treatment of abdominal hernia is very actual, because of the high recurrence rate, especially in operations for postoperative recurrent hernias. However, they may be according to some authors more than 50%, especially autoplastic methods. With the advent of modern materials alloplastic an opportunity to reduce the number of relapses. However, conventional techniques are accompanied by quite a significant soft tissue trauma, leading to severe pain in the immediate postoperative period for disability and up to 1.5-2 months. New perspectives in laparoscopic hernia surgery opens a technique that avoids many of the drawbacks of traditional surgery [1-3].

At the same time, negative features of laparoscopic surgery include the need for general anesthesia and intense carboperitoneum, the probability of damage to internal organs, technical difficulties in the presence of adhesions, postoperative neuralgia and paresthesia, the development of hematomas and accumulation of serous fluid, a long period of development techniques, the high cost of equipment and supplies [1, 5]. Positive aspects considered minor trauma, hernia repair and the ability to perform simultaneous interventions from one access, lower incidence of wound infection [4, 6].

Objective: To analyze the results of surgical treatment of abdominal hernia using laparoscopic techniques

Materials and methods: since from 2011 started laparoscopic hernioplasty. During the period from 2011 to 2015 hernioplasty performed in 1546 patients, including 943 (61%) with inguinal hernias (in 237 of them - recurrent) and 603 (39%) from the ventral (including postoperative) hernias, of which 278 were large, while 90 - gigantic. In 131 of them were relapsed, 92 patients had lateral hernia, 33 of them - recurrent. The age of patients ranged from 18 to 84.

To determine the shape and size of hernia ring ultrasound and CT were used. Application of these methods is especially important in patients with irreducible hernia that allowed the operation to select the type and size of the grid, as well as to determine the most optimal way of its installation.

Pneumoperitoneum under the unconditional presence of adhesions in the abdominal cavity is recommended after the ultrasound scan in place minimally expressed adhesion, and at the maximum possible distance from the hernia sac. We use several methods of "first of injection." The standard procedure using a Veress needle is feasible in patients with predicted poor development of adhesions, confirmed the data of instrumental (ultrasound, MRI) studies. In all other cases, it is desirable to use either the optical trocar, or Hassan technique.

The choice of method laparoscopic plastic depended on the location and size of the hernia ring.Transabdominal preperitoneal plastic (Tapp) was used in patients (86 patients) with inguinal hernias of which 12 had recurrent hernias after repair of Liechtenstein and 14 with bilateral. For the implantation of mesh implants used ULTRAPRO (ETHICON) and PARIETEN LIGHT (COVIDIEN) 15 x 10cm size of his catch hernia-stapling "Protak", as well as a self-PROGREEP (COVIDIEN) the size of 15 x 9 cm and restoration of peritoneum with endoseam. In 5 patients Tapp produced simultaneously with laparoscopic cholecystectomy.

To perform laparoscopic surgery in 29 patients with ventral hernias (umbilical, white line and median postoperative) using the following method, which consisted of intraperitoneal location (IPOM) composite endoprosthesis with layer or non-

absorbable and sutures and fixation trans-aponeurosis by hernia-stapling. Indications for the use of this technique were median hernia medium size (W2-3). It is important to note that we used a prosthesis that completely cover the hernia defect, retreating 5-8 cm around the perimeter.

Along with the intervention of hernia in 20 patients took concomitant removal of abdominal diseases: colotomy in chronic intestinal obstruction was performed in 3 patients, cholecystectomy – in 14 patients and amputation of the uterus - in 3 patients.

Postoperatively, conduct prevention of local inflammatory complications and prevention of pulmonary and thromboembolic complications of conventional surgery techniques. All patients with large and giant hernias applied Hosiery which greatly reduces the pain and reduce the load on the joints soft tissues of the abdominal wall, which makes it possible to give them an active load with the first day after surgery. To reduce the effects of edema at the site of intervention technique used by us magneto therapy the first day after surgery.

Results and Discussion: Of the intraoperative complications often met bleeding (4). In early postoperative period after Tapp marked preperitoneal hematoma in 5 patients, who were diagnosed by ultrasound and eliminated punctures. The average length of in-patient treatment was 2.4 days and ranged from 12 hours to 4 days.

The greatest technical difficulties arose in damage inferior epigastric vessels. 1 noted bleeding from the trocar wound in 3 cases - during dissection of the parietal peritoneum and the stapler. Average blood loss was 147.3 ml. Hemostasis is achieved in all cases laparoscopically - stitching or coagulation. Damage to the inferior epigastric vessels in all cases occurred in patients with obesity I-III degree. We consider it essential to conduct a thorough hemostasis, even with little intensity and duration of bleeding. This is necessary due to the fact that, after the end of surgery deflated small damaged vessels may bleed some time again, causing the development of postoperative hematomas.

Because of the complications associated with the use of carboperitoneum, we noted the development of subcutaneous emphysema in 2 patients.

Postoperatively, the most frequent groin hematoma (4), neuralgia (paresthesia and 2 (5), scapula-humeral pain syndrome (4).

When the IPOM methods of intraoperative complications was not. In the immediate postoperative seroma was observed (6), which were liquidated conservative punctures.

Conclusions. Experience with alloplasty in the surgical treatment of abdominal hernias showed that it is an effective alternative to conventional operations and enables the closure of large defects of the abdominal wall in various ways, including by no tension technology, which greatly reduces the likelihood of post-operative complications, recurrence of complex hernias.

It should be noted specific advantages of laparoscopic hernioplasty over traditional methods - it is possible to inspect the abdominal cavity, the simultaneous closure of the graft of all the weaknesses of the anterior abdominal wall.

Surgeries using laparoscopic techniques are effective, pathogenically justified in recurrent inguinal hernias and ventral hernias of medium size, whereas the large and giant hernias shows open technique.

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Сивожелезов А.В., Сикал Н.А., Чугай В.В., Тонкоглас О.А., Колесник В.П.

Ускладнення лапароскопічної герніопластики

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Резюме. Рішення проблеми ефективного лікування черевних гриж нині актуальна через поширеність цієї патології серед осіб працездатного віку і досить високого відсотка ускладнень, рецидивів та летальності. Використання лапароскопічної техніки дозволяє значно скоротити післяопераційні ускладнення і втрату працездатності. За період з 2011 по 2015 р герніоаллопластіка виконана у 1546 хворих. З інтраопераційних ускладнень найчастіше зустрілися кровотечі, гематоми пахової області, невралгії і парестезії, плечолопатковий больовий синдром, підшкірна емфізема. Гідності лапароскопічної герніопластики перед традиційними методами - це можливість огляду черевної порожнини, одночасне закриття трансплантатом всіх слабких місць передньої черевної стінки, зниження терміну перебування хворого в стаціонарі.

Ключові слова: черевні грижі, хірургічні втручання, лапароскопічна герніопластика, сітчастий імплант, ускладнення

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Осложнения лапароскопической герниопластики

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Резюме. Решение проблемы эффективного лечения брюшных грыж в настоящее время актуальна из-за распространенности этой патологии среди лиц трудоспособного возраста и достаточно высокого процента осложнений, рецидивов и летальности. Использование лапароскопической техники позволяет значительно сократить послеоперационные осложнения и потерю трудоспособности. За период с 2011 по 2015 г. герниоаллопластика выполнена у 1546 больных. Из интраоперационных осложнений чаще всего встретились кровотечения, гематомы паховой области, невралгии и парестезии, плечелопаточный болевой синдром, подкожная эмфизема. Достоинства лапароскопической герниопластики перед традиционными методами - это возможность осмотра брюшной полости, одновременное закрытие трансплантатом всех слабых мест передней брюшной стенки, снижение срока пребывания больного в стационаре.

Ключевые слова: брюшные грыжи, хирургические вмешательства, лапароскопическая герниопластика, сетчатый имплант, осложнения

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INFLUENCE OF MATERNAL PATHOLOGY AND ATOPIC DISEASES ON DEVELOPMENT OF ORAL CAVITY PATHOLOGY IN CHILDREN

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Abstract. *The recent growth in children somatic pathology can often be attributed to a violation of prenatal development or early neonatal period of life. Maternal diabetes, hypertension, preeclampsia, threatened abortion, premature birth are described as adverse effects on a growing body. The increasing prevalence of atopic diseases, including asthma associated with atopy, atopic dermatitis and allergic rhinitis, has become a major concern for allergists and health authorities in many countries. The aim of the study was to examine the effects of adverse pregnancy on the state of the oral cavity of children, their dental status.*
During the in-depth examination performed dental examination of apparently healthy children referred pediatrician. The survey included patients aged 6-14 years with a diagnosis of caries (study group - 119 people). Also fifty-five children aged 12 to 18 suffering from allergies (asthma, atopic dermatitis, allergic rhinitis) were examined with common dental methods.And healthy children with intact teeth (control group - 15 persons). Result of dental checkup children were divided into two main groups: non-sanitized and sanitized. Our results are combined with the known facts that one of the most important factors leading to the formation of the child's pathology may cause the presence of adverse factors during pregnancy. Thus, the unfavorable factors of pregnancy lead to persistent changes of the oral cavity in children.
Keywords: child, oral cavity, pregnancy, atopic pathology.

The recent growth in children somatic pathology can often be attributed to a violation of prenatal development or early neonatal period of life. Maternal diabetes, hypertension, preeclampsia, threatened abortion, premature birth are described as adverse effects on a growing body [8,9]. That leads to difficulty postnatal adaptation, disruption of the formation of the nervous, cardiovascular and other functional systems of the body [3]. However, it is believed that the incidence of adverse pregnancy increases, which makes in connection with this study the pathogenesis of the impact of these factors on the child's body in order to develop appropriate

approaches to prevention, early correction of violations and optimal rehabilitation. This approach seems important not only medical but also social spheres.

Currently, there is no doubt the fact that practically all diseases are accompanied by neonatal disorders of the vascular system. This is due to the fact that the vascular system is an indicator of any pathological process, identifying infant state regulatory and adaptive mechanisms, especially connective tissue matrix. At the same time, we know that the consequences of a breach of the vascular system, particularly at the level of the microvasculature are degenerative and inflammatory periodontal disease [1, 3, 6].

Other point of view is increasing prevalence of atopic diseases, including asthma associated with atopy, atopic dermatitis and allergic rhinitis, has become a major concern for allergists and health authorities in many countries. Asthma is a major cause of morbidity and mortality at all ages. It is important that allergic diseases have chronic recurrent nature, so dental status of children undergoes some changes. Today there is a need for detailed clinical studies that will identify clinical characteristics of periodontal diseases in children with atopic diseases [6,7].

The aim of the study was to examine the effects of adverse pregnancy and atopic pathology on the state of the oral cavity of children, their dental status.

Materials and methods. During the in-depth examination conducted dental examination of apparently healthy children referred pediatrician. The survey included patients aged 6-14 years with a diagnosis of caries (first study group - 119 people). Fifty-five children aged 12 to 18 suffering from allergies (asthma, atopic dermatitis, allergic rhinitis) were examined with common dental methods. To identify the degree of gingivitis index CPI was used. And healthy children with intact teeth (control group - 15 persons). In each group, isolated groups according to the presence of adverse factors of pregnancy. Result of dental checkup children were divided into two main group: non-sanitized and sanitized. The intensity of caries was assessed in accordance with the classification of T.F. Vinogradova. Dental health of children in group 1 corresponded to the I degree or compensated form of caries with single carious lesions. Caries index ranged from 1 to 3. The children in group 2 had multiple

caries (II degree of caries). Caries index ranged from 10 to 20, which corresponded to subcompensated form of caries.

Results and discussion. Tooth decay is the most common disorders of the teeth, especially in childhood. Along with the change in the shape and size of the tooth there is a change of its tissues, there is a tendency to slow down the ripening enamel disruption timely full maturation other solid tissues. Caries in children at different ages proceeds differently. For a caries of deciduous teeth affect the anatomical and physiological characteristics, the overall resistance of the body of the child and the highly reactive properties of childhood. Caries is determined not only by the condition of the tooth tissue, but also factors largely oral, oral fluid, whose composition depends on the organism and reflect its numerous variations.

In addressing the problem of caries a significant place has an important physiological properties of the enamel - permeability. This property enamel depends on the characteristics of its structure and chemical composition of the solid, highly mineralized tissue incapable of regeneration. The level of permeability of the enamel is determined pH. Permeability increases with caries in the step chalk stains, i.e. at the earliest stage of the pathological process (focal demineralization). The permeability of enamel for inorganic and organic substances varies. Calcium and phosphorus slowly penetrate the enamel and never overcome the enamel-dentine connection. Organic substances penetrate hard tissues is significantly faster. Permeability of enamel immature temporary and permanent teeth is significantly higher than the permeability of permanent teeth formed [2].

Increased permeability of enamel - a sign of progressive demineralization of dental hard tissues, but thanks to this property is developed and the reverse process - remineralization, which contributes to the suspension of caries. Saliva plays an important role in maintaining homeostasis of the oral cavity. Caries resistance and caries susceptibility to a large extent depend on the qualitative and quantitative changes in the saliva, the nature of salivary pH. Contained in plaque bacteria stimulate the production of cytokines, in turn, enhance the permeability of proinflammatory cytokines, oral tissue, which is important in the pathogenesis of

dental caries. However, there is no consensus about the role of pro- and anti-inflammatory cytokines in the development of caries.

Nineteen children had asthma; fifteen children were suffering from atopic dermatitis, twenty-one suffered from allergic rhinitis. Among children with asthma, periodontal disease were detected in 73.4% of cases. The bleeding gums have been established among 61.3% of the examined children, calculus - among 12.1% of patients. Average sextant characterized by healthy periodontal tissues was 1.2, with bleeding - 3.6, with mineralized dental calculus - 1.2. The most common clinical form of periodontal disease detected in children with this pathology was catarrhal gingivitis - in 78.3% of patients. Also during the investigation was found hypertrophic (14.2%) and ulcerative-necrotic (7.5%) gingivitis. In most cases, generalized gingivitis was diagnosed (62.4%); localized form - in 37.6% of cases.

Among children with a diagnosis of atopic dermatitis periodontal disease were detected in 71.6% of cases. Results of clinical examination showed that bleeding gums were observed in 48.3% of children, dental calculus - in 23.3% of children. Number of intact sextants in children was 3.2, with bleeding - 1.5, with dental calculus - 1.3. Among periodontal diseases catarrhal gingivitis was the most common (75.7%), hypertrophic was met in 24.3% of cases, ulcer-necrotic ginigivitis was not detected in any child. The prevalence of generalized form of gingivitis was 58.2%, localized gingivitis was diagnosed in 41.8% of cases.

In children with allergic rhinitis, periodontal diseases were found most frequently among all groups of children with atopic conditions - in 78.8% of patients. The study of periodontal status showed that bleeding gums were found in 45.8% of children, dental calculus - in 33.0% of children. According to our data, the average number of intact periodontal sextant was 2.8, with bleeding - 2.2, with dental calculus - 1. The most common forms of periodontal diseases were defined: catarrhal gingivitis - in 74.6% of cases, hypertrophic gingivitis - in 24.4% of cases. The prevalence of generalized gingivitis was 59.6% of children.

Our results are combined with the known facts that one of the most important factors leading to the formation of the child's pathology may cause the presence of adverse

factors during pregnancy is often accompanied by the development of chronic placental insufficiency [4]. Emerging with immune, trophic, endocrine and metabolic disorders, along with activation of free radical oxidation have a damaging effect on the fetus, the nature and extent of which depends on the duration and length of gestation.

Conclusions. Thus, the unfavorable factors of pregnancy lead to persistent changes of the oral cavity in children. Such atopic pathology as asthma, atopic dermatitis, allergic rhinitis could be cause of changes in periodontal tissues in childhood.

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Крівенко Л.С., Назарян Р.С.

Вплив материнської патології та атопічних захворювань на розвиток патології ротової порожнини у дітей

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Резюме. Зростання у дітей соматичної патології часто може бути віднесено до порушення внутрішньоутробного розвитку. Материнські цукровий діабет, гіпертонія, прееклампсія, загроза переривання вагітності, передчасні пологи характеризуються як несприятливі фактори для зростаючого організму. Зростаюча поширеність атопічних захворювань, включаючи астму, атопічний дерматит та алергічний риніт, є серйозною проблемою для алергологів в багатьох країнах. Під час діспансерного спостереження оцінювали стоматологічний стан дітей. У дослідженні взяли участь пацієнти віком 6-14 років з діагнозом каріес (перша дослідницька група - 119 осіб). Крім того п'ятдесят п'ять дітей у віці від 12 до 18 страждали від алергії (бронхіальна астма, атопічний дерматит, алергічний риніт). Результат огляду стоматологічного статусу дітей вказує, що одним з найбільш важливих факторів, що ведуть до утворення патології дитини може викликати присутність несприятливих факторів під час вагітності та наявність атопічної патології.

Ключові слова: дитина, ротова порожнина, вагітність, атопічна патологія

Кривенко Л.С., Назарян Р.С.

Влияние материнской патологии и атопических заболеваний на развитие патологии ротовой полости у детей

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Резюме. Рост у детей соматической патологии часто может быть отнесен к нарушению внутриутробного развития. Материнские сахарный диабет, гипертония, преэклампсия, угроза прерывания беременности, преждевременные роды характеризуются как неблагоприятные факторы для растущего организма. Растущая распространенность атопических заболеваний, включая астму, атопический дерматит и аллергический ринит, является серьезной проблемой для аллергологов во многих странах. Во время диспансерного наблюдения оценивали стоматологический статус детей. В исследовании приняли участие пациенты в возрасте 6-14 лет с диагнозом кариес (первая исследовательская группа - 119 человек). Кроме того 55 детей в возрасте от 12 до 18 страдали от аллергических проявлений (бронхиальная астма, атопический дерматит, аллергический ринит). Результат оценки стоматологического статуса детей указывает, что одним из наиболее важных факторов, ведущих к образованию патологии ребенка может быть наличие неблагоприятных факторов во время беременности и наличие атопической патологии.

Ключевые слова: ребенок, ротовая полость, беременность, атопическая патология.

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EXPERIENCE OF THE ONLINE DATABASE "SCIENCE ONLINE" USAGE IN MONITORING OF THE RESEARCH ACTIVITY OF THE UNIVERSITY

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Abstract. *The article describes the experience of the online database "Science Online" usage in monitoring of research activity of the research and educational staff of the University and the impact of this rating on the effectiveness of their scientific work. Rating evaluation is a type of quantitative and qualitative monitoring of the research activity carried out by teaching staff.*

Key words: *rating of research and educational staff activity, adapted information system, monitoring of scientific activity.*

Urgent renovation of theoretical views and practical actions in improving the mechanism of evaluation of the quality of research and educational staff in medical universities is determined by certain internal and external factors which have an influence on the quality of higher medical education.

The current state of higher medical education is characterized by an further realization of the principle of autonomy of higher medical institutions that meets the priorities of the new Law "On the higher education" approved by the Ministry of Education and Science of Ukraine on the 1st of July, 2014.

Along with the increased tendencies to decentralization in higher education state administering, the mechanisms, forms and structures of its regulation in the society are in progress. Under these conditions a necessity arises to develop new procedures of provision, control, and evaluation of education quality which would be favourable in solution of the key problems of higher medical education.

Monitoring of research and educational teaching staff activity is one of the most effective methods in system of evaluation of their professional activity quality. Its purpose is to accumulate objective information about the real quality of the

research and educational staff activity. Monitoring of quality for this cohort's training is a system of specially organized observations concerning the quality of the lecturers' activity and its influence on educational environment and ass well quality the edicational process as a whole.

It is obvious that currently the integration processes which concern the sphere of education arrange real conditions to elaborate comparative criteria and methodologies in evaluation of the medical education quality. In this aspect, problem of evaluation of the teaching staff activity becomes especially topical. The available world level system of evaluation of the teaching staff activity quality becomes an indispensable condition of national medical education in the world's and European education space [3].

Recent years are characterized by increased attention of the researchers to the problems of managing of professional education quality. The basics of theory and methodology of education quality are based on the works written by M. Budyanskiy, I. Zyazyun, V.I. Baidenko, I.A. Zymnyaya, N.A. Selesnyova. Theoretical and practical basics of managing the educational process at university level are revealed in the works of G.A. Bordovskiy, V.A. Kachalov, B.K. Kolomiyets, V.M. Sokolov, S.Yu. Trapitsin, etc. Qualimetric basics for managing the quality of education in the university (E.Yu. Vasilieva, L. Vatchenko, O. Velichko, V. Ivashchenko, etc.) are currently being elaborated.

At the same time the search of up-to-date mechanisms is being provided to evaluate research educational activity of the teaching staff including the university education quality assessment models.

Research and educational activity is a kind of creativity with feasible different options for assessment. It is obvious that the most objective is evaluation according to the final result but not the procedure of its attainment and efforts spent on it [1]. Rating evaluation allows to consider these peculiarities of professional activity of the university teaching staff.

Adapted to the fields and specialities, rating systems for evaluation of research and educational activity of university teaching staff function in the higher educational

establishments of Ukraine. In particular, Kharkiv National Medical University proposed and introduced such system which is the Online database "Science Online" (http://nauka.knmu.edu.ua/sierep/index.php, certificate of authority №45902 dated 03.10.2012).

This system is appointed to elaborate the results of every lecturer – member of research educational staff of the department, faculty, and university. The process of substantiation of the rating system model includes formation of hierarchical system of parameters, ranking the values of figures, determination of the parameters significance coefficients in grades and establishing measuring of the results of the lecturer's work.

The online database "Science Online" is a web-oriented system which is assigned to provide online analysis of the research work of the university units during the year. This system includes the following parts:

- staff and logistical support of research activity, general information;
- list of research works being performed at the department (subdivision), contracts on cooperation;
- information about the obtained grants;
- partnership in pre-clinical trials of pharmaceuticals;
- concised information about the most important research achievements of the department (subdivision) for the reporting year;
- list of innovations which are proposed to be included to the Register of the field innovations this year;
- information about introduction of the results of research included in the previous issues of the field innovation registers (clinical, economic, social efficiency, examples of positive influence on the population health parameters and activity of public health centers);
- patent and licence activity of the departments (units), discoveries;
- information about training of the research staff;
- participation in congresses, conferences, exibitions;
- publishing activity of the department (unit);

- information about participation in international scientific technical co-operation;
- students' science;
- propositions concerning increase of efficiency of the reseasrch work in the university.

Each of these items has a list of charts. After the data entered, the rating calculation procedure is being completed automatically. On the grounds of the processed results of the activity and grade evaluation of the parameters levels at estimated period the marks for the parameters are given and the final rating is calculated.

Rating of the unit depends on the available several items in the tables or on their special margins, e.g., concerning the publication written in foreign languages, placing the publication in library depositary, etc. The results of calculation of the general rating of the university's unit and the data of each member of the staff (personal rating) of the named subdivision are presented.

There is a possibility to search data in all units of the University according to the key words or the numbers or titles of charts. Among its potential is generating the complete report about the research activity of the university's unit followed by printing.

Online database "Science Online" provides individual ranging of research and educational staff of the departments of various profiles, namely: clinical, social economic and humanities, natural sciences.

Currently, the system "Science Online" is unique. This system aims to realize online opportunity to observe research activity of the lecturers of the University, and this material is a basis for analysis.

The value of rating of research and educational staff is taken into account while planning the academic process of the department, considering while awarding bonus for the results of academic year, establishment of various extra and additional payments to salary and competetive election for the position at the following period.

The system of rating evaluation for research and educational staff activity is permanently in progress. Taking into consideration the fact that new types of work

appear to be done, some model values of the parameters which should be achieved may be corrected to the following stimulation of creative activity of the staff.

It is necessary to mention that usage of the great storage of graphic images in this system is considered to be perspective to increase the data visualization.

Thus, the high rating of lecturer is an indicator of the education quality. Owing to the system of rating evaluation of research and educational staff the conditions have been making to provide contested action and good competition, increased motivation to work effectively as well as the given possibility to be competitive at labor market.

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Лісовий В.М., Капустник В.А., Гетьман В.О., М'ясоєдов В.В.

Досвід використання інтерактивної бази "Наука онлайн" у моніторингу наукової діяльності вищого навчального закладу

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Резюме. У статті розглядається досвід використання інтерактивної бази "Наука онлайн" у моніторингу наукової діяльності викладачів та вплив рейтингового оцінювання діяльності науково-педагогічнихпрацівників університету на ефективність їхньої наукової роботи. Рейтингове оцінювання є одним з видів кількісного та якісного моніторингу діяльності викладача.

Ключові слова: рейтингове оцінювання діяльності викладача, адаптована інформаційна система, моніторинг наукової діяльності.

Лесовой В.Н., Капустник В.А., Гетьман В.А., Мясоедов В.В.

Опыт использования интерактивной базы "Наука онлайн" в мониторинге научной деятельности вуза

Харьковский национальный медицинский университет, Украина

В статье рассматривается опыт использования интерактивной базы "Наука онлайн" в мониторинге научной деятельности преподавателей и влияние рейтинговой оценки деятельности научно-педагогических работников университета на эффективность их научной работы. Рейтинговая оценка является одним из видов количественного и качественного мониторинга деятельности преподавателя.

Ключевые слова: рейтинговая оценка деятельности преподавателя, адаптируемая информационная система, мониторинг научной деятельности.

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Kojemiaka A.I., Sirenko T.V., Kandyba V.P., Klymenko V.A., Plakhotna O.N.

THE HISTORY OF PROPAEDEUTIC OF PEDIATRICS DEPARTMENT №2 OF KHARKIV NATIONAL MEDICAL UNIVERSITY

Kharkiv National Medical University, Ukraine

Abstract. *The essay is devoted to the history of the Propaedeutic of Pediatrics Department №2 of Kharkiv National Medical University. It sets out the role of prominent pediatricians, namely professors M.D. Ponamarev, I.P. Kamensky, M.M. Maksimovich-Ambodyk, I.V. Troitskiy, I.S. Arkavin, N.M. Freshman, V.A. Belousov, G.I. Tets, A.I. Kojemiaka, V.A. Fjoklin, in the development of pediatric departments and the works created by these scientists is listed.*

Key words: *history of the Propaedeutic of Pediatrics Department №2, the prominent pediatricians*

The department of children diseases in Kharkiv University was established in 1892. It was founded by prominent scientist M.D. Ponamarev. But some time before this term the course of children diseases in obstetric department of Kharkiv University was done by Professor I.P. Kamensky, who used materials of M.M. Maksimovich-Ambodyk and his own experience. It is known that professor I.P. Kamensky made the report “Physical education of children and it’s influence on the neural and psycological condition”, that was done at day of the 7th anniversary of the university (1812). After the professor’s I.P. Kamensky death the teaching of children diseases was stopped up to 1875. In 1875 according to the recommendation of the council of medical faculty the teaching of children diseases was entrust with associate professor M.D. Ponomarev, who worked in the obstetric department. M.D. Ponomarev insisted an organization of independent department of children diseases. This department was organized only in 12.01.1892. M.D. Ponamarev became the head of the department, at that time he was the honorary professor. He was the preacher of principle integration of the theoretical lecture teaching with practical work of student near patient bed. His scientific research was devoted to the infection diseases (measles, scarlet fever, smallpox). In 1879 he published the monograph “Neonatal diseases”. Professor I.V. Troitskiy, talented scientist, was

elected the head of the department after M.D. Ponomarev in 1902. I.V. Troitskiy who was in charge of it up to 1918. He made the contribution in improvement and systematization in the teaching –pedagogical process. According to his application for university it was allocated means for building clinic of children diseases. He organized society of pediatricians (1912), was organizer of the Ist Russian congress of pediatricians (1912) and the Ist World congress (Paris, 1912).

I.V. Troitskiy was talent, high educated scientist pediatrician. He is an author of 150 scientific works, including some manuals of pediatrics, hygiene of children, history of medicine. Scientific, practice and public work of I.V. Troitskiy was excellent standard of self-denying service to his nation.

I.V. Troitskiy and professor M.D. Ponomarev were founders of Kharkiv professional pediatric school, which had carried substantial contribution in development of children health service in Ukraine.

After integration medical faculty of Kharkiv University and Woman's medical institute into the medical academy since 1920 the head of the pediatric department was I.S. Arkavin, who perfected teaching of pediatric in clinic (to this time children clinic was created).

After professor I.S. Arkavin professor N.M. Freshman was elected in 1929, he was disciple scientist-pediatrition A.A. Kisel. N.M. Frishman brought to Kharkiv region the main ideas of his teacher – prophylaxis trend in pediatric. N.M. Frishman and his assistants (Professor V.A. Belousov, associate professor R.V. Gilman, associate professor S.M. Benderskaia) perfected the training physician for pediatrics establishments. In 1930 after opening of the pediatrics faculties in the country, pediatrics department was common for medical and pediatrics faculties. Due to increase the adnossion in pediatrics faculty in 1938 the independent department of children diseases was opened for medical and sanitary-hygienic faculties. Professor V.A. Belousov was elected as a head of this department; he worked as a head of this department from 1938 to 1941. During The World War II the medical institute was evacuated to Orenburg, where both departments were integrated. In 1930-1941 methods of the diagnostic and treatment of tuberculosis and children infections

worked out. After return from evacuation professor V.A. Belousov was the head of the department of pediatric faculty, professor G.I. Tets was elected as a head of the medical department and sanitary-hygienic faculty, he was the head of this department from 1944 to1967, professor A.I. Kojemiaka was the head of this department from 1967 to 2002, professor V.A. Feklin – from 2002 to 2010. And a doctor of medical science, associate professor V.A. Klimenko – from 2010 to present time.

Professor G.I. Tets and his assistants worked after war and paid attention on improvement of the training physicians in pediatric.

The staff of department and clinic worked in the Southern Railway hospital. From 1938 to 1941 staff worked out problems of clinical characteristic and pathogenesis diphtheria and scarlet fever in children. It was established the important meaning of the nervous system in pathogenesis of dysentery toxic syndrome in infants (G.I. Tets). It was established disorder of metabolism and immunoreactivity in case of dysentery (G.I. Tets, R.P. Soloviova, M.V. Golodets), the influence of an acute infection and helminthes on duration and exist of dysentery (E.F. Semenova, E.A. Vashev).

The second important problem, which was studied during some years, was the rheumatic fever. Many aspects of pathogenesis of the rheumatic fever in children, condition of the central nervous system had been studied (V.S. Prihodko), the change of an arterial and venous pressure (R.P. Soloviova, N.N. Efimova), functional condition of kidney (S.M. Benderskaia), the liver and pancreas (N.N. Efimova, A.I. Kojemiaka) and other.

Apart from the main course of the scientific work of department long term study clinical peculiarities cholepathy in children and investigation the pancreas in this diseases was done (L.A. Nikitenko, A.I. Kojemiaka). This investigation gave possibility to work out the diagnostic and methods of the stage treatment cholecystitis.

Scientific investigation under guidance professor G.I. Tets was the foundation for carrying out 3 doctoral dissertations and 20 PhD theses. The majority of this investigation had an application in practice by publication in the periodical scientific

press, reports on the forums, conference, meetings of pediatricians' society (200 articles and 129 reports).

Since 1968 problems etiology, conditions of immunity, allergical reactivity, clinical characteristic, treatment and prophylaxis of acute and chronic diseases of the respiratory system in children were starchy under guidance professor A.I. Kojemiaka. It was established peculiarities of the etiological structure and immunological reactivity in the acute pneumonia in infants (A.I. Kojemiaka), which were used for work out complex therapy with inclusion immunostimulated medicines – methacil, prodigesan, decaris and tymolin (V.F. Nakonechny, V.A. Kasanov, M. Rahman, V.P. Kandyba, E.T. Dadambaiev) and immunoreplace therapy with specific immunoglibulines (D.T. Dreval, I.N. Poddubnaia, P.N. Martalog). Serious attention was paid on study pathology of children in neonatal period: clinical peculiarities of pneumonia (T.I. Goculiak, I.N. Poddubnaia), clinic-immunological parallels of pneumonia in newborns with perinatal affection of central neural system (P.N. Martalog, V.D. Girka, T.V. Sirenko); sepsis and meningitis of newborns (O.N. Plahotnaia, M. Rahman). These investigations were performed with the use of modern immunological methods (with cooperation with department pathological anatomy), what gave possibility to characterize condition of T and B system of the immunity. Assistants of the department (L.P. Pushkarenko, D.T. Dreval) approbated methods of immunoprophilaxis of the virus respiratory infections in children collectives by polyvalent immunoglobulin and timogen. Problem of the chronic pathology of the respiratory system (chronic and recurrent bronchitis, cystic fibrosis) were studied during many years (V.A. Kazanov, E.T. Koliushko, V.P Kandyba, D.T. Dreval).

Complex scientific work performed with department of social hygiene, it was devoted to study epidemiology of allergical diseases in Kharkiv region according ISAAC recommendations (A.I. Kojemiaka, V.A. Ognev, V.V. Basilashvili, T.V. Sirenko, V.A. Klymenko, V.K. Shmulich and other). It was introduced in practice medicine methods of treatment atopic forms of the bronchial asthma with use hystoglobulin and specific hyposensibilisation with oral vaccine frome home dust

(V.A. Markov, A.K. Solodun). Assessment of clinical affectivity grade therapy was done (V.A. Klymenko). The clinic-pathogenetic peculiarities atopic dermatitis in condition of a hospital and outpatient clinic was study (V.A. Klymenko, I.A. Sankova, F.H. Alexanian).

Some investigations about immunology glomerulonephritis were performed (E.A. Vashev, E.T. Dadambaev, N.M.Petrenko).

The above researches are summarized into 5 doctoral dissertations (A.I. Kojemiaka, E.A. Vashev, E.T. Dadambaev, T.V. Protsuk, V.A. Klymenko) and into 26 PhD theses.

From 2002 to 2010 professor, doctor of medical science V.A. Feklin was a head of the department. His scientific work was devoted to the clinic-pathological motivation and treatment severe forms broncho-pulmonal disease in children. He trained 6 PhDs.

From 2010 to present time Doctor of Sciences V.A. Klymenko is a head of the department. The main course of the scientific work is children allergology. Under her leadership was performed one PhD work (D.N. Krivorotko), 3 PhD are making. Collective of the department carried out scientific work about improvement the diagnostic and treatment the pneumonia in newborns with perinatal affection of central nervous system.

The department of the children diseases of medical faculty (at present time the department of pediatrics propaedeutic №2) prepared scientific-pedagogical cadres. Many persons from assistants of the department, post-graduate students, clinical registers stated to be high educated specialists in pediatric service: professor S.M. Benderskaia (Kharkiv institute of postdiploma education), professor L.K. Ephimova-Masnikova (department of pediatric Ujgorod University), professor A.S. Lihacheva-Kalinichenko (neonatology department KMAPE), professor E.T. Dadambaev (department of pediatric, Alma-Ata), doctor of medical science, professor O.I. Sirenko (department of polyclinic pediatric, KMAPE), doctor of medical science, associate professor V.A. Klymenko (the head of the department of propaedeutic pediatric №2 KNMU), professor E.V. Sereda-Kozina (the head of the

department of pediatric SRI AMS, Russia), professor K.S. Tihomirova (the head of the department Piatigorsk SII health resort, Russia).

Highly-skilled personnel trained for foreign countries – E.T. Dadambaev, T.I. Gotsulak (Kazahstan), P.N. Martalog (Moldova), F.H. Aleksanian (Armenia) and other foreign countries - Nepal, Bangladesh, Palestine, Lebanon, and Cyprus.

Team of the department perfects methodical work constantly. According to the task of the Ministry of Health of USSR a program in pediatrics, which have been used by all medical institutes of the country during ten years, for students of medical faculty, was done by professor G.I. Tets.

Due to the reform of high medical education in Ukraine and introduction Bolon's system (credit-module training) propaedeutic pediatric studies since 1993 during III course of education for native students of the I and IV medical faculty and for foreign students of V and VI faculty (with Russian, Ukrainian and English languages of education). Practical course "Care about sock patient in hospital" studies on the II course, "Nurse work" – on the III course. New methodical recommendations were created for students and for teachers. The manual "Introduction of children diseases" on 220 pages was printed in 2005, "Propaedeutic of pediatric" on 330 pages was printed in 2010. The main work of creation of this manual an English language was done by associate professor T.V. Sirenko.

During all time existing of the department student scientific society is working, every year students make reports in the university and interuniversity scientific conferences.

Since 1976 clinical base of Pediatric department was children hospital #7 (since 1992 – Regional children clinical hospital #1). Eight candidates of medical science (PhD) were prepared from practical physicians (A.F. Ruchko, V.M. Savvo, A.K. Solodun, D.T, Dreval, F.H. Aleksanian, L.P. Pushkarenko, E.G. Koliushko, V.D. Girka).

The staff of the department took active part in organization of the specialized hospital departments (allergological, pulmonological, immunological departments and department of pathology newborns).

At present time 1 professor, 1 doctor of medical science, 3 associate professor, PhD, 6 PhD assistant, 3 laboratory assistant, 2 postgraduates are working at the department. The staff of the department is continuing glorious traditions which were pleaged by domestic luminaries of pediatrics and strive to meet the expectations of their teachers.

Кожемяка А.І., Сіренко Т.В., Кандиба В.П., Клименко В.А., Плахотна О.Н.

Історія кафедри пропедевтики педіатрії № 2 Харківського національного медичного університету

Харківський національний медичний університет, Україна

Резюме. Нарис присвячений історії кафедри пропедевтики педіатрії №2 Харківського національного медичного університету. Викладена роль видатних педіатрів (професорів М. Д. Пономарьова, І. П. Каменського, І. В. Троїцького, Я.С. Аркавіна, М.М.Фрішмана, В.О.Бєлоусова, Г.І.Теца, А.І.Кожем'яки, В.О.Фьокліна) у становленні педіатричних кафедр і зазначені праці, створені цими вченими.

Ключові слова: історія кафедри пропедевтики педіатрії №2, видатні педіатри

Кожемяка А.И., Сиренко Т.В., Кандыба В.П., Клименко В.А., Плахотная О.Н.

История кафедри пропедевтики педиатрии № 2 Харьковского национального медицинского университета

Харьковский национальный медицинский университет, Украина

Резюме. Очерк посвящен истории кафедры пропедевтики педиатрии №2 Харьковского национального медицинского университета. Изложена роль выдающихся педиатров (профессоров М. Д. Пономарёва, И. П. Каменского, И. В. Троицкого, Я.С. Аркавина, Н.М.Фришмана, В.А.Белоусова, Г.И.Теца, А.И.Кожемяки, В.А.Феклина) в становлении педиатрических кафедр и указаны труды, созданные этими учеными.

Ключевые слова: история кафедры пропедевтики педиатрии №2, выдающиеся педиатры.

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