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MORPHOLOGICAL CHANGES IN THE NERVOUS STRUCTURES OF THE EXTRAHEPATIC BILE TRACT AFTER REMOVAL OF THE GALLBLADDER

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Resume Changes in the neural structure of the extrahepatic bile ducts after cholecystectomy were studied in order to determine the participation of disruption of neural connections between the biliary sphincters due to cholecystectomy in the pathogenesis of postcholecystectomy syndrome. The morphology of the nervous structures in the area of localization of the sphincters of the extrahepatic bile ducts was studied at various times after cholecystectomy in dogs and rabbits. The operations were performed under xylazine anesthesia, the material was fixed in 12% neutral formaldehyde, neutralized with a saturated solution of sodium tetraborate. Cryostat sections are impregnated with silver nitrate according to the method of Bielschowsky-Gross and Campos. It has been established that during cholecystectomy, as a result of removal of the Lütken's sphincter,

one link of the single morphofunctional network of the sphincter apparatus of the biliary system is lost, and the innervation connections between them are disrupted. This may serve as one of the reasons for the occurrence of postcholecystectomy syndrome in the form of dysfunction of the sphincters of the biliary system after cholecystectomy. It has also been established that cholecystectomy with leaving a long stump of the cystic duct is less traumatic in terms of disruption of innervation connections compared with cholecystectomy with leaving a short stump.

Keywords. Cholecystectomy, short and long cystic duct stump, disruption of innervation connections.

МОРФОЛОГИЧЕСКИЕ ИЗМЕНЕНИЯ НЕРВНЫХ СТРУКТУР ВНЕПЕЧЕНОЧНЫХ ЖЕЛЧНЫХ ПУТЕЙ ПОСЛЕ УДАЛЕНИЯ ЖЕЛЧНОГО ПУЗЫРЯ

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Резюме Изучены изменения нейронной структуры внепеченочных желчных путей после холецистэктомии с целью определения участия нарушения нейронных связей между биллиарными сфинктерами вследствие холецистэктомии в патогенезе постхолецистэктомического синдрома. Изучена морфология нервных структур в области локализации сфинктеров внепеченочных желчных путей через различные сроки после холецистэктомии у собак и кроликов. Операции проведены под ксилазиновым наркозом, материал фиксирован в 12% нейтральном формалине, нейтрализованный насыщенным раствором тетраборнокислого натрия. Криостатные срезы импрегнированы азотнокислым серебром по методу Бильшовского-Гросса и Кампоса. Установлено, что при холецистэктомии в результате удаления сфинктера Люткенса выпадает одно звено единой морфофункциональной сети сфинктерного аппарата желчевыделительной системы, происходит нарушение иннервационных связей между ними. Это может, служит как одна из причин возникновения постхолецистэктомического синдрома в виде дисфункции сфинктеров желчевыделительной системы после холецистэктомии. Также установлено, что холецистэктомия с оставлением длинной культы пузырного протока менее травматична в отношении нарушения иннервационных связей по сравнению с холецистэктомией с оставлением короткой культы.

Ключевые слова. Холецистэктомия, короткая и длинная культя пузырного протока, нарушение иннервационных связей.

ЎТ ПУФАГИНИ ОЛИБ ТАШЛАНГАНДАН СЎНГ ЖИГАРДАН ТАШҚАРИ ЎТ ЙЎЛЛАРИ НЕРВ ТУЗИЛМАЛАРИДАГИ МОРФОЛОГИК ЎЗГАРИШЛАР

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Резюме Постхолецистэктомия синдроми патогенезида холецистэктомия туфайли ўт йўллари сфинктерлари орасидаги нерв боғланишлари бузилишининг иштирокини аниқлаш мақсадида холецистэктомиядан сўнг жигардан ташқари ўт йўллари нерв тузилишидаги ўзгаришлар ўрганилди. Жигардан ташқари ўт йўллари сфинктерларини локализация қилиш соҳасидаги асаб тузилмаларининг морфологияси итлар ва қуёнларда холецистэктомиядан кейин турли вақтларда ўрганилди. Операциялар ксилазин наркози остида ўтказилди, материал 12% нейтрал формальдегидда ўрнатилди, натрий тетраборатнинг тўйинган эритмаси билан зарарсизлантирилди. Криостат бўлимлари Бильшовский-Гросс ва Кампос усули бўйича кумуш нитрат билан сингдирилади. Аниқланишича, холецистэктомия пайтида Люткенс сфинктерини олиб ташлаш натижасида ўт йўллари сфинктер аппарати ягона морфофункционал тармоғининг бир бўғини юқолади ва улар орасидаги иннервация алоқалари бузилади. Бу холецистэктомиядан кейин сафро тизимининг сфинктерларининг дисфункцияси шаклида постхолецистэктомия синдромининг пайдо бўлишининг сабабларидан бири бўлиши мумкин. Ўт пуфаги узун бўғинини қолдириш билан холецистэктомия иннервация алоқаларини бузиш нуқтаи назаридан қисқа бўғин қолдириш билан холецистэктомияга нисбатан камроқ шикастли эканлиги аниқланди.

Калит сўзлар. Холецистэктомия, ўт пуфаги қолдиғининг калта ва узун бўғинлари, иннервация алоқаларини бузиш.

Introduction. Cholecystectomy is one of the frequent operations in urgent and planned surgery. After gallbladder removal a certain number of patients (from 5 to 25%) suffer from some complications related to the surgical intervention or to the disease that was the cause of cholecystectomy [3,5,10]. In complex these complications are united under the name of postcholecystectomy syndrome. According to the surgical literature in pathogenesis of this syndrome the residual stump of the gallbladder, long stump of the gallbladder duct, so-called "blocked stones" of the bile-excretory ducts, as well as some or other complications of the

main disease play a certain role [1,4,8]. Thus, this not quite successful term does not reflect the pathogenetic essence of various clinical manifestations, often completely unrelated to the undergone surgery [2]. In this complex complex of symptoms and syndromes it is difficult to differentiate pathological processes directly related to gallbladder removal. For this purpose it was necessary to put a "pure experiment" on healthy laboratory animals. As it is known, the biliary system is distinguished by the presence of many sphincters (sphincters of Lutkens, Oddi, Mirizzi, Boyden, Westphal, own sphincters of common bile and pancreatic ducts), the flow of bile into the duodenum at the moment of digestion in it and into the gallbladder outside the moment of digestion depends on the interdependent work of which. Neurohistological studies proved the presence of direct innervation connection between these sphincters [8] and in morphofunctional respect they make a single functional chain, the disturbance of one link of which causes the change of morphology, hence, and function of others. The sphincter of Lutkens and Geister's valves are located in the area of the gallbladder neck. In this zone are located the largest intramural nerve nodes, containing a huge number of nerve cells and afferent nerve endings of different design. At cholecystectomy with leaving a short stump (which is often observed) together with the gallbladder the sphincter of Lutkens and Geister's valves with their rich nerve apparatus are removed. Consequently, one link of the functional chain of sphincters of the biliary system falls out. At cholecystectomy with leaving a long stump (when the surgeon will be forced to leave a residual stump of the gallbladder or a long stump of the vesicular duct), the functional chain of the sphincter complex remains united as a whole. Taking into account the above-mentioned, we studied the changes of nervous structures in the area of sphincters of extrahepatic bile ducts and in the wall of duodenum after experimental cholecystectomy with leaving long and short stump in dogs and rabbits.

Material and methods. Gallbladder removal was performed antegrade way, under xylazine anaesthesia. In different terms (1,3,5,7 days) after the operation the animals were killed under anaesthesia by bloodletting. Extrahepatic bile ducts were fixed in 12% neutral formalin in stretched form. A flap of duodenum was cut out slightly from the place of the common bile and pancreatic ducts penetration into its wall to the lower border of its longitudinal fold. Frozen cryo-stat sections of the material were impregnated with silver nitrate according to the method of Bilshovsky - Gross, according to Campos in the modification of our laboratory. Receptors were drawn from the preparations with the help of drawing apparatus RA-1. The preparations were viewed and

photographed in a Leica microscope using a digital camera and a microphoton attachment MFN-12.

Results and discussion. In early terms after cholecystectomy (up to 3 days) in the wall of common bile and hepatic ducts (mainly at the places of localisation of their sphincters) reactively changed nervous structures are found.

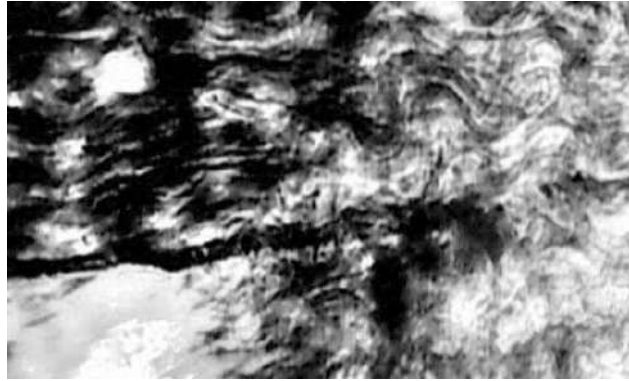


Figure 1. Hyperimpregnated and hypertrophied nerve fibre with varicose swelling, in a bundle of intact nerve fibres of the common bile duct of a cat on the 3rd day after cholecystectomy. Impregnation according to Bilshovsky - Gross. 06. 20, ca. 10.

A certain number of nerve fibres are hyperimpregnated and have varicose swellings (Fig. 1). A part of such fibres have dichotomous branching, which testify to their sensitive nature. Hypertrophied synaptic endings are found on the body of longaxonal neurocytes. Their neurofibrillary backbone is hyperimpregnated and homogenised, and the perifibrillar space is dilated. The preterminals of synaptic endings are also hyperimpregnated and have small varicose swellings. The bush-shaped receptors are also intensely impregnated and sharply distinguished from the rest of the tissue structures (Fig. 2).

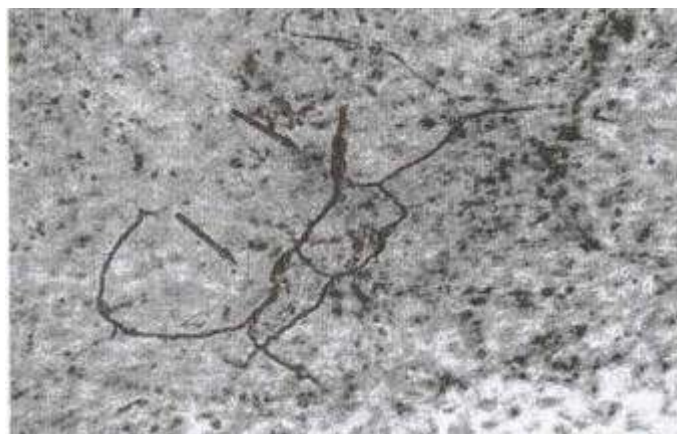


Figure 2. Hyperimpregnated bush-like receptor in the wall of the common bile duct on the 3rd day after cholecystectomy. The nucleus of lemmocytes is visible (indicated by arrows). Impregnation according to Campos. Ob. 20, ca. 10.

In relatively late terms (5 days) the change in nerve structures acquires a degenerative character. Some nerve fibres are fragmented, and some are subjected to granular decay. Separate synaptic endings are deformed, detached from preterminals. Receptor preterminals undergo fragmentation, causing them to dissociate. Receptor terminals having typical forms of "buttons" and "rings" hypertrophy and acquire different configurations. In later periods the number of altered nerve structures decreases. Single nerve fibres in the stage of deep degeneration (clumpy and granular decay) are detected. Growth flasks are detected in the area of the stump of the vesicular duct (Fig. 3).

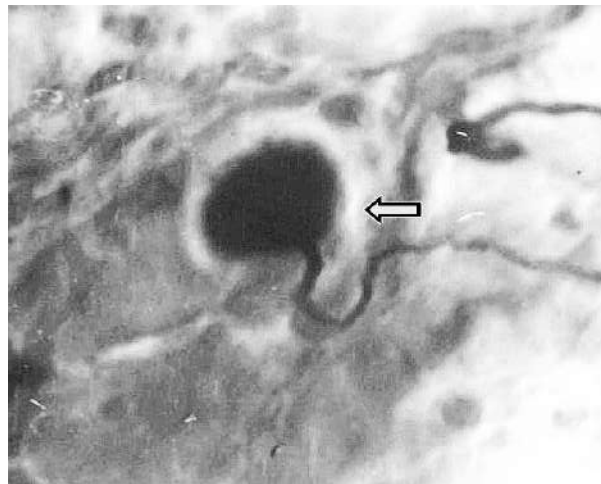


Figure 3 Growth flasks at the end of the nerve fibres of the stump of the dog's vesicular duct on the 4th day after cholecystectomy. Bilchowsky-Gross. Ob.40, ca. 10

Altered receptors are much more abundant in the area of the sphincter of Oddi and at the mouth of the ampulla of the phaternal papilla. Some of the receptors are polyvalent, with terminals of the same receptor located in the ampulla mucosa and on tissue structures of the duodenal wall. The changes in the nervous structures of cholecystectomy with leaving a short stump are significantly greater compared to cholecystectomy with leaving a long stump of the vesicular duct (when the sphincter of Luetkens and Geister's valves are preserved). The degree of changes in the nerve structures at the time of follow-up after cholecystectomy with the short and long stump is identical.

Conclusion (conclusions). Thus, the results of our investigations testify that the sphincters of the biliary system have direct extracentral innervation interrelations and work in a coordinated way as a single morphofunctional complex. Removal of one link of this complex can promote dysfunction of other links as a result of innervation interrelations disturbance. It is possible to assume that outgrowths of nerve cells of the gallbladder neck reach the area of other sphincters. Those nerve structures

that undergo degenerative changes are outgrowths of neurons of the gallbladder neck. Due to the removal of the gallbladder, they have lost their trophic centres (from the nerve cell body) and have undergone degeneration. Apparently, outgrowths of the equinoctial nerve cells of the neck (the place of localisation of the sphincter of Lutkens) of the gallbladder reach the place of localisation of other sphincters, and form afferent nerve endings there, closing the arcs of reflex influence of this sphincter on others. Our data obtained at comparison of cholecystectomy with leaving of short and long stump testify that cholecystectomy with leaving of long stump is less traumatic in the sense of disturbance of innervation connections in comparison with gallbladder removal with leaving of short stump. All this testifies that in the biliary system there are also local viscerovisceral reflexes closing within the limits of intramural nerve nodes. Appearance of growth flasks on membraneless nerve fibres at the stump of the vesicular duct testifies that outgrowths of nerve cells of extrahepatic bile ducts also reach the area of the sphincter of Lutkens. These growth flasks may be the central parts of nerve cell outgrowths, the peripheral part of which have been transected due to gallbladder removal. They may be substrates for the formation of amputation neuromas. All this testifies that in pathogenesis of postcholecystectomy syndrome, along with other factors, a certain place is occupied by disturbance of innervation connections of the gallbladder, coming as a consequence of its removal.

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ХРОНИЧЕСКАЯ СЕРДЕЧНАЯ НЕДОСТАТОЧНОСТЬ И ПРОГРЕССИРУЮЩАЯ СТЕНОКАРДИЯ

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Резюме. Ишемическая болезнь сердца (ИБС) остается одной из основных причин развития хронической сердечной недостаточности (ХСН). Всем пациентам с ХСН, особенно тем, кому нет возможности провести нагрузочные тесты для определения ФК, необходимо применять шкалу оценки клинического состояния ШОКС модификации Мареева В.Ю., что поможет избежать ошибок в диагностике и лечении данной категории больных.

Ключевые слова: одышка, вес, положение в постели, отёки нижних конечностей, уровень систолического артериального давления.

СУРУНКАЛИ ЮРАК ЕТИШМОВЧИЛИГИ ВА ПРОГРЕССИВ СТЕНОКАРДИЯ

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Резюме. Юрак ишемик касаллиги (ЮИК) сурункали юрак етишмовчилигининг (СЮЕ) асосий сабабларидан бири бўлиб қолмоқда. СЮЕ билан оғриган барча беморлар, айниқса ФС ни аниқлаш учун зўриқиш тестларини ўтказиш имконига эга бўлмаганлар, Мареев В.Ю. томонидан модификацияланган клиник ҳолатни баҳолаш шкаласи (КХБШ)дан фойдаланишлари керак. Клиник ҳолатни баҳолаш шкаласи ушбу тоифадаги беморларни