DAMAGE TO THE MAIN BILE DUCTS: THE FREQUENCY AND CAUSES OF THEIR OCCURRENCE, RISK FACTORS, CLASSIFICATION, DIAGNOSIS AND SURGICAL TACTICS (LITERATURE REVIEW)

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Abstract: *treatment of injuries to the main bile ducts (MBD) is becoming an increasingly important problem. This is due to the increase in the number of patients with diseases of the biliary tract and operations for them, which is due to improved diagnosis of cholelithiasis. The article presents a review of the literature on the current state of the problem of surgical treatment of iatrogenic injuries of the main bile ducts. The classification and modern methods of diagnostics are presented, the evolution of views and modern methods of reconstructive interventions are given. Despite certain successes achieved in this most complicated area of surgery, unsatisfactory results are observed in even the most experienced surgeons on average in 10% of cases.*
Keywords: *main biliary tract, damage, diagnosis, treatment, complication.*

ПОВРЕЖДЕНИЯ МАГИСТРАЛЬНЫХ ЖЕЛЧНЫХ ПРОТОКОВ: ЧАСТОТА И ПРИЧИНЫ ИХ ВОЗНИКНОВЕНИЯ, ФАКТОРЫ РИСКА, КЛАССИФИКАЦИЯ, ДИАГНОСТИКА И ХИРУРГИЧЕСКАЯ ТАКТИКА (ОБЗОР ЛИТЕРАТУРЫ)

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Аннотация: *лечение повреждений магистральных желчных протоков (МЖП) становится все более важной проблемой. Это связано с увеличением числа больных с заболеваниями желчевыводящих путей и операциями на них, что связано с улучшением диагноза желчнокаменной болезни. В статье представлен обзор литературы по современному состоянию проблемы хирургического лечения ятрогенных повреждений магистральных желчных протоков. Представлена классификация и современные методы диагностики, дана эволюция взглядов и современное методы реконструктивных вмешательств. Несмотря на определенные успехи, достигнутые в этой сложнейшей области хирургии, неудовлетворительные результаты даже у самых опытных хирургов отмечаются в среднем в 10% наблюдений.*
Ключевые слова: *магистральные желчные пути, повреждение, диагностика, лечение, осложнение.*

Treatment of injuries to the main bile ducts (MBD) is becoming an increasingly important problem. This is due to the increase in the number of patients with diseases of the biliary tract and operations for them, which is due to improved diagnosis of cholelithiasis. More than 100 thousand are performed annually in Russia, about 700 thousand in the USA, and more than 20 thousand cholecystectomies in Uzbekistan [6,7,11,12,14,17,22,24,32]. Iatrogenic lesions of the extrahepatic bile ducts (EHBD) during cholecystectomy occur quite often, as evidenced by reports in various medical publications and average statistical data. With open cholecystectomy, they are 0.1-1.0% [4,5,9,12,17,24], with laparoscopic operations - 0.4-3.5% and even 7% [2,7,8,9,14,22,28]. Thus, laparoscopic surgery did not rule out the risk of damage to the extrahepatic bile ducts. A characteristic feature is that the duct wall during laparoscopic intervention is subjected to electric shock, that is, a thermal burn [2,7, 9, 13, 14,24]. S.I. Yemelyanov et al. The following data is given: the frequency of damage to EHBD during traditional cholecystectomy was 0.06%, with laparoscopic - 0.6% [12].

F.G. Nazyrov et al. (2005) presented an analysis of the surgical treatment of 336 patients with cicatricial strictures and external fistulas of IHP of iatrogenic origin. The reasons for the formation of cicatricial strictures and external fistulas

were intraoperative injuries during cholecystectomy, gastrectomy and echinococcectomy [23, 32]. The question of the causes and prevention of iatrogenic damage to EHBD is very important, of great and understandable interest. It is proposed to distinguish between causes and predisposing circumstances of iatrogenic damage [30].

After analyzing a sufficiently large clinical material of several hospitals, AR Moossa et al. (1990) concluded that damage to EHBD can occur in any surgical institution, at any time of the day and, most interestingly, the surgeon of any qualification [53]. A similar opinion N.N. Artemyeva (1996), neither the duration of the disease, the nature of the operation (urgent or planned), the diameter of the duct or even the surgeon's professional experience does not affect the probability of damage to the bile ducts [1].

It is fundamentally wrong to interpret such circumstances as causes of unintentional damage to the ducts during an operation, as reported by N.A. Maistrenko et al. (2005) [18]. They write about this and N.A. Mizurov et al. (2010), a specialist, professional should bear in mind various circumstances, both related to the structural features of particular anatomical structures and to changes in the usual topographic-anatomical relationships due to the inflammatory process [21].

In accordance with the foregoing, it is appropriate to single out the work of I.V. Fedorov et al. (2003) on bile duct damage during laparoscopic cholecystectomy (LCE) [30]. The authors caution surgeons against possible damage to the bile ducts and identify risk factors for this complication according to R. Martin et R. Rossi [51]: dangerous anatomy, dangerous pathological changes, and dangerous surgery (insufficient exposure, incorrect direction of gallbladder traction, electrocoagulative damage, and others).

Dangerous anatomy:

- Anatomical variants and abnormalities of the development of EHBD

fatty tissue in the gate of the liver.

Dangerous pathological changes:

acute cholecystitis

relenting attack of acute cholecystitis

scleroatrophic gallbladder

Mirizzi syndrome

liver tumors and cysts

cirrhosis

pancreatic tumors and pancreatitis

duodenal ulcer.

Dangerous surgery:

improper traction

local bleeding or bile leakage

Incorrect gallbladder mobilization sequence

thermal and laser damage

stage of learning and technology development

cholangiography and choledochotomy.

At the risk of damage to the bile ducts during cholecystectomy and how to prevent it, E.I. Halperin (2003). The author recommends to achieve a good exposure in case of difficulties during cholecystectomy, primarily due to increased access and clearly identify the common bile duct, indicating the impermissibility of imposing a hemostat blindly [9].

According to F.G. Nazyrov (2006), there are hardly any other operations involving such a risk, many surprises, like operations on the biliary tract. A technical error and the minute inattention of the surgeon can bring so much harm to the patient that it cannot be eliminated by the end of his life. However, most errors can be prevented by carefully following a number of technical and tactical rules [21].

Damage classification. Many classifications of bile duct damage have been proposed. Domestic and foreign surgeons have repeatedly attempted to create a classification of damage to the bile ducts in order to unify research and evaluate the results. The nature of damage was taken as a basis, as a rule [9,10,11,30,31].

The nature of damage EHBD most accurately reflected in the classification of the S. M. Strasberg - H. Bismuth (1995) [4], in which 5 types are distinguished:

Type A. Small bile duct bleeding

bed of the gallbladder (moves Lyushko)

cystic duct.

Type B. Partial or complete occlusion (clipping) of the biliary tree.

In this type of damage, the right accessory incremental canal is often affected.

Type C. Bile bleeding from one additional lobar duct.

Often the intersection of the right aberrant duct.

Type D. Lateral (parietal) damage to the bile ducts.

Damage to the alveolar ducts, common hepatic duct (CHD) or common bile duct (OBD).

E type. Full intersection or excision of the section of the MHD or MBD

E1. Low damage with preservation stump MHD more than 2cm.

E2. The average level of damage - stump MHD less2 cm.

E3. High (confluence) damage, preserved fusion of lobar ducts.

E4. In contrast to type 3, confluence was destroyed, and lobar ducts were separated.

E5. Combined damage to the hepatic and right aberrant or lobar duct with one of the listed options E1 E4.

This classification distinguishes between “fresh” injuries and their consequences, is built on topographic - anatomical signs, reflects the nature of the damage, which ultimately determines the treatment tactics.

The classification developed at the Academic Medical Center of Amsterdam (1996) was widespread, according to which 4 types of damage were

distinguished, taking into account along with the nature of the damage and the level of primary damage:

Type A - bile leakage from the cystic duct or peripheral hepatic branches.

Type B - large damage to the bile ducts with bile bleeding (from the MBD or aberrant segmental extrahepatic branches of the right hepatic duct) with or without concomitant biliary strictures.

Type C - violation of the patency of the MBD without bile elimination

Type D - the complete intersection of MBD with or without its partial excision.

The above classification is generally recognized for the use of everyday practice. All factors determining the choice of surgery for damage to the bile ducts are taken into account.

Diagnosis of damage MBD.

The immediate and long-term results of treatment of injuries of the MBD are unsatisfactory. Immediate mortality after reconstructive interventions is 8-10%, and in the later periods - 13 -17% [17,18,23]. The main causes of failures are the late diagnosis and the performance of complex reconstructive surgeries by physicians who do not have adequate experience in this field of surgery [12]. From the point of view of outcomes of treatment, the timing of detection of injuries of an IUP is decisive - during surgery or in the early postoperative period [1,4,7,9,10,11,16,29].

According to A.I. Nechay and K.V. Novikov (2006) in 30% of cases, iatrogenic damage to MST was recognized during surgery. Up to 20% of injuries were diagnosed in the early postoperative period against the background of the development and rapid growth of obstructive jaundice or the continued outflow of bile through a wound or drainage. In 37.5% of patients, damage to the bile ducts, which occurred during the operation, was recognized in the long-term on the basis of signs of an emerging stricture. In terms of observations (12.5%), damage to MHD or MBD was established only at autopsy, when patients died from progressive peritonitis, progressive jaundice, or other not recognized postoperative complications in a timely manner [24].

Intraoperative signs of damage to MLS:

The appearance of bile in the area of the operative field with an unclear source of its expiration.

The appearance of additional tubular structures in the neck of the gallbladder.

Expansion of the alleged stump cystic duct by the end of the operation.

Violation of the integrity of the ducts according to intraoperative cholangiography.

Intraoperative cholangiography (IHG).

IHG - an indispensable diagnostic technique for the early diagnosis of iatrogenic damage of EHBD. It provides valuable information on the structure, functional or organic changes of the bile ducts. Complications of intraoperative

cholangiography are extremely rare or absent when used to study techniques [2,12,28].

IHG is considered to be absolutely shown in anatomically difficult situations and in the case of suspected intraoperative damage to the FBM.

Conversion should also be considered as a measure of diagnosis and prevention of injuries of MBD. The main principles in the decision to convert are two cases: prudence and necessity. The transition by prudence is associated with the discovery of more complex anatomical and topographical relationships than was expected before the operation (marked inflammatory changes near the neck of the gallbladder, difficulties in differentiating EHBD).

Diagnosis of damage MBD in the early postoperative period. The wound ducts of the bile ducts not diagnosed for surgery in the postoperative period have the following clinical manifestations: a) drainage bile drainage, b) increasing jaundice with cholangitis, c) biliary peritonitis clinic. Injuries of EHBD manifest themselves in the form of pain and feelings of distention in the right hypochondrium, hyperthermia, jaundice, loss of appetite, nausea, vomiting, peritoneal signs, bile drainage. Complaints of severe abdominal pain the day after cholecystectomy are uncharacteristic of the smooth postoperative period and should alert the surgeon. If the pains are diffuse in nature or at least tend to spread, and are also accompanied by the appearance of protective tension of the muscles of the anterior abdominal wall, one should think about bile excretion or damage to the hollow organ. With the dull nature of pain, arching pain in the liver, more often there is a violation of bile drain. The appearance of jaundice and cholangitis finally confirms the diagnosis [5,25,29].

Ultrasound examination (ultrasound). The most accessible and simple method of research allows determining the presence of fluid in the free abdominal cavity, in the subhepatic space. However, ultrasound data should also be compared with the clinical picture, since the detection of the fluid itself does not indicate the development of a complication. The most informative during the progression of obstructive jaundice, the echographic picture of biliary hypertension can indirectly serve as confirmation of the clipping (ligation) of the IUP [5,13].

Computed tomography (CT). In addition to ultrasound, CT can be used to detect fluid. CT differs from bile duct research methods with their direct contrast, since visualization of the enlarged bile ducts does not require hypertension in them, and bile with CT is a natural contrast agent that allows seeing the enlarged bile ducts against the background of the hepatic parenchyma, along the hepatoduodenal ligament and in the head of the pancreas. The purpose of CT examination is to establish the fact of obstructive jaundice, determining the level and causes of obstruction of the bile ducts. When biliary hypertension CT is a reliable method of research. The presence of external bile leakage in combination with obstructive jaundice reduces the sensitivity of the method.

CT is more objective than ultrasound, and its results are less dependent on the subjective assessment of the doctor, both of these methods have common drawbacks.

Nonspecific in relation to the qualitative composition of the detected liquid.

Do not allow to determine the source of fluid flow.

Do not give an answer to the question of whether the expiration continues or not.

The main advantage of these methods is non-invasive , however, for the final diagnosis, an additional procedure is required - percutaneous puncture of the fluid accumulation site under ultrasound or CT control. Diagnostic puncture allows you to determine the qualitative composition of the fluid, and in some cases - to conduct therapeutic drainage of the cavity [12,21].

Magnetic resonance imaging (MRI). Currently, MRI is of great importance, which gives a specific topical characteristic of damage, the level of damage and the condition of the surrounding tissues. Magnetic resonance cholangiography is a relatively new non-invasive method, used only in a few centers. Prospects for MRI are great, but its use can be significantly limited by the high cost, lack of accessibility and complexity of data interpretation [2,26].

Endoscopic retrograde cholangiopancreatography (ERPHG). The most common method of contrasting MBD recognized ERPHG. The study allows to determine the location and nature of damage to MBD When bile excretion using ERPHG can diagnose the failure of the stump of the cystic duct, regional injury of the main ducts, their complete intersection. The method may be uninformative when choleretic from the additional hepatic duct or the gallbladder bed. Very valuable and the fact that ERPHG in some cases becomes not only a diagnostic, but also a medical procedure. So, in case of bile-excretion from the cystic duct or marginal injury of the AKI, nasobiliary drainage of the biliary tract and stenting is performed for the purpose of decompression.. Most informative in the diagnosis of "fresh" damage in the early postoperative period [27].

Percutaneous transhepatic cholangiography (PTChG). PTChG and PTChS are valuable diagnostic and therapeutic measures. PTChG is also used to diagnose bile leakage. This method allows to detect bile leakage from the additional ducts, which flow into the gallbladder. [2]. Percutaneous transhepatic drainage of the bile tree can be used to eliminate biliary hypertension as a stage of preoperative preparation [3,14].

Treatment of damage to MBD. According to E.I. Galperin (2009) there are several factors that may affect the choice of operation and the method of its implementation: 1) the nature of the damage; 2) the possibility of endoscopic stenting; 3) damage localization; 4) the condition of the crossed duct: diameter and wall thickness; 5) time to diagnose damage: during cholecystectomy or in the early postoperative period; 6) the presence of peritonitis in the postoperative

period; 7) the presence of a surgeon with experience in reconstructive surgery of the biliary tract [10].

The nature of the damage is of great importance in determining the indications for various operations. M.E. Nichitailo et al. (2008) presented an analysis of the results of the surgical treatment of a complete ductus dissection by restoring the duct by an end-to-end anastomosis. The authors observed a high incidence of fistula scarring and the need for reoperation from 6 months to four years in 91% of patients [5].

The surgeon's desire to restore the continuity of the bile duct is quite understandable, however, this is undesirable: the probability of the formation of a scar stricture after a bilobiliary anastomosis is very high (70-100%) [9,10,44,45,55]. The main factors contributing to cicatrization of the bilobiliary anastomosis are tension due to diastasis of the duct ends, small diameter of the ducts (if there was no previous biliary hypertension), blood supply disturbance in the proximal segment of the ACE, since the hepaticoholedochus has an axillary ascending blood supply [9].

E.I. Halperin and A.Yu. Chevokin (2009) presented an analysis of the treatment of 61 patients with “fresh” injuries of the main bile ducts and concluded that, in contrast to the marginal injury, patients with a complete intersection of the duct have poor results after restorative operations. Probably, the presence of a wide or even narrow “bridge” of the duct wall in case of marginal injury does not cause such a sharp violation of the local blood circulation, which explains the obtaining of good results even in peritonitis [10].

An alternative to surgical intervention in case of marginal injury or duct injury with a size not exceeding 1/2 of its diameter may be endoscopic stent duct placement, which ensures healing of the duct wound in the correct position and prevents further scar compression of the duct lumen. Endoscopic or transhepatic insertion of stents into the damaged duct undoubtedly marks progress in this area of surgery. The possibility of endoscopic removal of the stent, in contrast to the "lost" drainage, makes this manipulation acceptable and manageable [9,10].

In recent years, preference is given to anastomoses without the use of frame drainage, since prolonged standing of transhepatic drainage leads to the formation of strictures of the bile ducts or, at least, does not prevent their development [6,10,11,15]. Nichitailo M.E. et al. (2008) performed reconstructive operations for type II-III injuries at the level of the forks of the bile ducts, for diastasis between duct segments30 mmand more, as well as in cases of damage, when it was not possible to detect the distal common bile duct. With high injuries and strictures, an anastomosis was formed between the stump of the hepatic duct with the small intestine, turned off according to the method A. Shalimov or Roux , and at low fistula duct with the duodenum [25].

Performing bilioduodenoanastomosis is considered a simple and less traumatic operation. One of the major drawbacks hepaticoduodenostomy is constant duodeno -biliarny reflux helps to keep the chronic holangiogepatita and

often multiple occurrence of liver abscesses. Recurrent cholangitis and stenosis of the anastomosis was the cause of repeated operations in 30% of patients [9,18,20,25].

With a small diameter of the proximal segment of the duct and a high damage location, it is advisable to form a site by cutting the left hepatic duct after mobilizing it under the hepatic chili plate of Hepp-Couinaud [10,15,20,26,32].

The defining tactics in the treatment of "fresh" injuries of the bile ducts is the time it is detected - during surgery or in the early postoperative period [1,4,7,9,10,11,16].

The choice of surgical intervention, depending on the recognition of the time of damage to an IVS, is drawn to VN. Chernyshev et al. The authors observed that the best long-term results of treatment in patients with complete intersection, in whom the reconstruction of the biliary tract was performed immediately after the discovery of iatrogenic damage to the bile ducts on the operating table. Reconstructive operations on the bile ducts at the intersection identified in the post-operative period should be performed as soon as possible after the injury, after the elimination of biliary peritonitis and other suppurative complications, i.e. apply a two-step treatment [2]. N.N. Artemyeva et al. (2006) similarly adhere totreatment principle. Any restorative and reconstructive surgery in peritonitis ends with scarring of the anastomoses [7]. E.I. Halperin and A.Yu. Chevokin (2009) considers the main positive factor in the treatment of duct injuries is the presence of a surgeon who has experience in reconstructive surgery of the biliary tract. Which can successfully perform the operation with a narrow duct and a thin wall, with bifurcation and fractional damage to the hepatic ducts in peritonitis and in the presence of bile streaks [10].

Thus, even minor injuries of the MBD, but late diagnosed, can pose a threat to life and in the postoperative period lead to serious complications: widespread or limited peritonitis, the formation of subhepatic abscesses, external biliary fistulas, post-traumatic scar strictures. In severe bile duct injury, its treatment is extremely difficult, and the results, both immediate and distant, cannot be considered good. Mortality after reconstructive operations is 8-17% [6,17].

These circumstances testify in favor of the need to further improve the system of views on this problem.

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