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# SURGICAL TACTICS IN IATROGENIC INJURIES OF THE HEPATICOCHOLEDOCHU

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## ГЕПАТИКОХОЛЕДОХНИНГ ЯТРОГЕН ЖАРОҲАТЛАРИДА ХИРУРГИК ТАКТИКА

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## ХИРУРГИЧЕСКАЯ ТАКТИКА ПРИ ЯТРОГЕННЫХ ПОВРЕЖДЕНИЙ ГЕПАТИКОХОЛЕДОХА

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***Резюме.*** *Магистрал ўт йўллари (МЎЙ)нинг холецистэктомиядан кейинги шикастланиши 41 (48,2%) беморда аниқланди. Уларнинг 20 тасида (48,9%) МЎЙ шикастланиши операция вақтида, 21 тасида (51,2%) эса эрта операциядан кейинги даврда аниқланган. Гепатикохоледохнинг (ГХ) интраоперацион кесилиш ҳолатида Ру бўйича юқори гепатикоеюноанастомоз амалга ошириш тавсия этилади, бу жараёнда прецизион техникадан фойдаланилади. ГХни тиклаш операциялари, яъни билиобилиар анастомоз (ББА) ГХ девор қиррасига шикаст етган ҳолларда кўрсатма бўлади, лекин ББА ва гепатикодуоденоанастомоз қўйиш аностомоз стриктураси ривожланишининг юқори хавфи сабабли тавсия этилмайди. Ўт йўлларининг шикастланиши интраоперацион аниқланганида яқин (10%) ва узоқ муддатли (25%) даврда асоратлар сони операциядан кейинги даврда аниқланган ҳолатга (38,1% ва 41,2% тегишли равишда, ўлим 14,3%) нисбатан анча кам кузатилади.*

***Калит сўзлар:*** *ўт йўллари шикастланиши, жарроҳлик даволаш, натижалар.*

***Abstract.*** *Damage to the main bile ducts (MBD) after cholecystectomy was detected in 41 (48.2%) patients. Of these, in 20 (48.9%), MBD damage was detected during surgery and in 21 (51.2%) in the early postoperative period. In case of intraoperative intersection and excision of the GC, the operation of choice is high Roux-en-Y GEA using precision technique. Reconstructive operations are indicated in case of marginal damage to the GC; the application of BBA and GDA is not recommended due to the high risk of developing anastomotic strictures. Correction of bile duct damage when detected intraoperatively is accompanied by a significantly lower number of complications in the immediate (10%) and remote (25%) periods of treatment than when detected in the postoperative period (38.1% and 41.2%, respectively, with a mortality rate of 14.3%).*

***Key words:*** *bile duct injury, surgical treatment, results.*

**Relevance.** Damage to the bile ducts is one of the most formidable complications of biliary surgery and does not tend to decrease despite the constantly improving technique of cholecystectomy. Authors dealing with the problem of reconstructive surgery of extrahepatic bile ducts note that, compared with traditional cholecystectomy, the introduction of laparoscopic cholecystectomy has entailed an increase in the incidence of bile duct damage by 2-4 times, and in percentage terms is 0.1-3% (Nazirov F.G. et al., 2019; Galperin E.I., 2009; Gassaniga G ., 2018; Schiano Di Visconte , 2012).

The consequences of iatrogenic damage to the bile ducts can cause catastrophic damage to the patient's health, and only a timely and competently performed operation can prevent the development of complications such as biliary cirrhosis, portal hypertension, purulent cholangitis, and liver failure (Nichitaylo M.E. et al., 2014). It follows that the diagnosis of bile duct damage should be early, but in reality, more than half of all damage is detected in the postoperative period. Thus, according to various authors, the frequency of intraoperative diagnostics is on average 28%, varying from 16 to 40% (Chernyshev V.N., 2020; Ahrendt S. & Pitt H. 2019).

**Objective of the study:** To improve the results of correction of intraoperative bile duct injuries by factor analysis of treatment results and optimization of surgical tactics.

**Material and methods of the study.** Damage to the main bile ducts (MSD) after cholecystectomy was detected in 41 (48.2%) patients. Of these, in 20 (48.9%), MSD damage was detected during surgery and in 21 (51.2%) in the early postoperative period. The total number of patients with MSD injuries after LCE was 35 (85.4%) patients, after mini-access cholecystectomy 2 (4.9%) patients, after open laparotomy interventions 4 (9.7%). The assessment of MSD injuries was carried out

according to the classification of E.I. Galperin (2009) and is presented in Table 2.5. Marginal or partial damage to the bile ducts was detected in 8 (19.5%) patients, clipping or ligation of the duct without its intersection was detected in 7 (17.1%) patients, intersection in 3 (7.3%) patients, excision of the bile duct in 11 (26.8%), excision and ligation in 12 (29.3%). In 12 (29.2%), the damage was detected at the level of "+2", in 18 (43.9%) - "+1", "0" - 7 (17.1%), "-1" - 2 (4.9%), "-2" - 2 (4.9%).

The diagnostic methods used were aimed at identifying, differentially and topically characterizing damage to the bile ducts and sources of bile leakage. Various special research methods were used: ultrasound, computed tomography (CT), magnetic resonance cholangiopancreatography (MRCP) (Fig. 2), intraoperative cholangiography (Fig. 1), PTC, ERCP, laparoscopy.

20 cases of interventricular septal injuries were diagnosed intraoperatively.

In 2 patients, the hepaticocholedochus was transected, in 11 patients, and in 7 patients, there was a parietal marginal injury. Localization of damage: common bile duct (CBD) in 6 patients, common hepatic duct (CHD) in 8 patients, CHD and bifurcation area in 4 patients, RA with confluence destruction in 2 patients.

All patients underwent restorative and reconstructive surgeries. Of these, 9 patients underwent restorative surgeries and 11 patients underwent reconstructive surgeries.

In case of marginal partial injury of the common bile duct (CH), sutures (5/0 prolene) were applied to the damaged wall of the duct using a Kehr drainage in 7 patients. Of these, 5 patients had small parietal injuries of the common bile duct with a diameter of no more than 5 mm. The defect was sutured in the transverse direction, making an additional opening in the bile duct below the injury site to leave a T-shaped tube in the lumen of the CBD.

A biliodigestive anastomosis (BDA) was applied to 11 patients. Of these, 2 patients underwent a HepDA (Fig. 3), 9 patients underwent a hepaticojejunostomy (HepEA) with a Roux-en-Y loop of the small intestine (Fig. 4).

In 5 patients with clipping or ligation of the bile duct without its intersection, the ligature or clips were removed and the hepatic duct was drained externally. In 2 patients, after removal of the ligature, BBA was applied.

During excision of the GC and ligation of the proximal stump of the duct (6 patients), BBA was performed in 2 patients. Reconstructive surgeries were performed in 4 patients: 2 - HepEA according to Roux on TPCD, 1 - without it, and 1 patient had HepDA applied.

In peritonitis with pronounced infiltrative changes in the subhepatic region, 3 patients with excision of the HC first underwent external drainage of the proximal stump of the duct, and then reconstructive surgeries were performed. Of these, 2 patients underwent HepEA, 1 patient refused the second stage of the operation.

**Fig. 1.** LCE. Intraoperative cholangiography. Intrahepatic bile ducts are contrasted. The distal part of the hepaticocholedochus is not contrasted

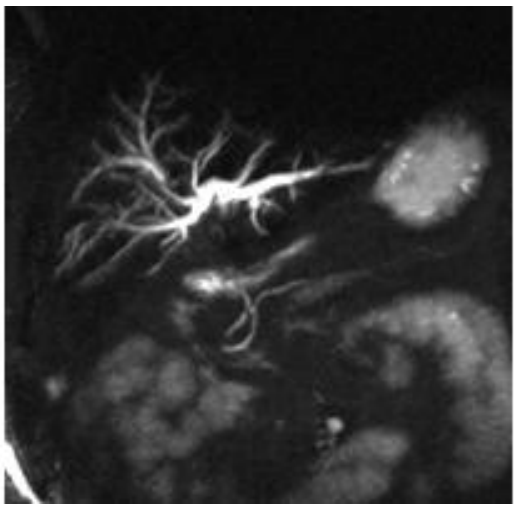

**Fig. 2.** MRPHG. Complete damage to the hepaticocholedochus in the region of the liver porta

**Fig. 3.** Formed hepatoduodenal anastomosis

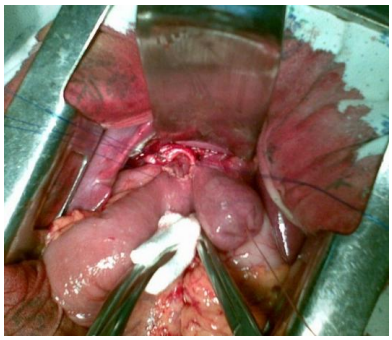

**Fig. 4.** Hepp-Couinaud HepEA application: formation of the posterior wall of the anastomosis

**Table 1.** Adverse outcomes depending on the type of surgery

| Operation type | | In the immediate postoperative period | | | In the late postoperative period | | |
|---|---|---|---|---|---|---|---|
| | | Quantity | Number of adverse outcomes | % | Quantity | Number of adverse outcomes | % |
| Duct suturing | | 7 | - | - | 7 | - | 0 |
| BBA | | 6 | 2 | 33.3 | 5 | 5 | 100 |
| HepDA | | 3 | 2 | 66.6 | 2 | 2 | 100 |
| HepEA | without TPKD | 10 | 2 | 20 | 10 | 1 | 10 |
| | with TPKD | 9 | 6 | 66.6 | 8 | 2 | 25 |
| Removing clips or ligatures | | 5 | - | 0 | 5 | 2 | 40 |
| External drainage | | 1 | 1 | 100 | - | - | - |
| Total | | 41 | 10 | 24.4 | 37 | 12 | 32.4 |

In the early postoperative period, damage to the interventricular septum in 5 patients manifested itself clinically bile leakage and mechanical jaundice. These patients underwent two-stage surgery: first, external drainage of the proximal stump of the duct, then 2-3 months after the inflammatory-infiltrative process of the subhepatic region had subsided. HepEA was applied to 5 patients (2 with TPDC, 2 without TPDC).

**Results and discussion.** Among 41 operated patients with injuries of the interventricular septum, various complications in the immediate postoperative period were noted in 10 (24.4%) patients.

In the group patients where the damage to the interventricular septum was detected intraoperatively, in the immediate postoperative period specific complications were detected in 2 (10%) patients. In 1 patient, partial anastomotic failure was noted after the imposition of HepEA. Bile leakage was observed through the safety drainage, which stopped on its own on the 8th day. In 1 patient, after the imposition of HepEA on the TPCD in the postoperative period, bile leakage with an admixture of blood was observed through the frame drainage, which did not cause a catastrophic threat to the patient's life. Hemobilia was stopped after conservative treatment. In the group In patients where injuries were detected in the immediate postoperative period, complications were observed in 38.1% of cases in the early stages after repeated operations. Fatal outcome was observed in 3 (14.3%) patients: in 1 patient due to acute renal failure, 1 due to acute cardiovascular failure, 1 due to advanced peritonitis and multiple organ failure. In the immediate postoperative period, partial failure of the BDA was observed in 3 patients after the imposition of HepEA (2 patients) and HepDA (1 patient), which in 2 cases manifested itself as external bile leakage through the safety drainage and in 1 case as a biloma in the subhepatic region. Bile leakage stopped on its own on the 7th and 15th days after the operation, and the biloma was drained under ultrasound control. In 1 patient, after the application of HepEA, hemobilia was observed in the immediate postoperative period, which did not respond to conservative therapy and required relaparotomy.

Of the 41 operated patients, the remote results of surgical treatment were assessed in 32 (78.1%). The observation periods for patients ranged from 1 to 10 years. The average observation period was 6.45 ± 0.58 years.

In the group patients where damage to the interventricular septum was detected intraoperatively, in the late postoperative period, 15 (75%) patients had a satisfactory result and 5 (25%) patients were diagnosed with cicatricial strictures of the bile ducts and BDA.

In the group patients where damage was detected in the immediate postoperative period, a satisfactory result was noted in 9 (52.9%) patients out of 17 patients followed up in the remote period. In 7 (41.2%) observations, cicatricial strictures of the bile ducts and BDA were detected.

In the treatment of patients with intraoperative injuries of the main bile ducts, we have found that the most significant factors are the nature of the injury, the location of the injury, and the timing of the detection of the injury.

Adverse outcomes depending on the type of surgery are presented in table 1.

Analyzing the above data, we have developed a treatment and diagnostic algorithm for the surgeon's actions in case of damage to the main bile ducts.

**Conclusions:**

1. In intraoperative intersection and excision of the GC, the operation of choice is high Roux-en-Y GEA using precision technology. Reconstructive operations are indicated for marginal damage to the GC; the application of BBA and GDA is not recommended due to the high risk of developing anastomotic strictures.
2. Correction of bile duct damage when detected intraoperatively is accompanied by a significantly lower number of complications in the immediate (10%) and late (25%) periods of treatment than when detected in the postoperative period (38.1% and 41.2%, respectively, with a mortality rate of 14.3%).

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## *ХИРУРГИЧЕСКАЯ ТАКТИКА ПРИ ЯТРОГЕННЫХ ПОВРЕЖДЕНИЙ ГЕПАТИКОХОЛЕДОХА*

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***Резюме.*** *Повреждения магистральных желчных протоков (МЖП) после холецистэктомии выявлено у 41 (48,2%) больных. Из них у 20 (48,9%) повреждения МЖП выявлены во время операции и у 21 (51,2%) в раннем послеоперационном периоде. При интраоперационном пересечении и иссечении ГХ операцией выбора является высокий ГЕА по Ру с использованием прецизионной техники. Восстановительные операции показаны при краевом повреждении ГХ, наложение ББА и ГДА не рекомендуются из за высокого риска развития стриктур анастомоза. Коррекция повреждений желчных протоков при их интраоперационном выявлении сопровождаются значительно меньшим числом осложнений в ближайшем (10%) и отдаленном (25%) периодах лечения, нежели при выявлении их в послеоперационном периоде (38,1% и 41,2% соответственно с летальностью 14,3%).*

***Ключевые слова:*** *повреждение желчных протоков, хирургическое лечение, результаты.*