

# Improving reconstructive operations for “fresh” injuries and scar strictures of the main bile ducts

**The aim of the work:** prevention of hepaticocholedochal stricture in the long-term postoperative period after reconstructive surgery.

**Materials and Methods.** The study is based on data from a clinical examination of 41 patients with injuries to the main bile ducts, who were operated on in the surgical department of the multidisciplinary clinic of Samarkand State Medical University for the period from 2010 to 2022. Depending on the choice of treatment tactics, the patients were divided into two groups. The first group, the comparison group, consisted of 18 (43.9%) patients who underwent biliobiliary anastomosis in the traditional way. The second group, the main group, consisted of 23 (56.1%) patients who underwent reconstructive surgery using our improved method.

**Results and Discussion.** Of the 18 patients in the comparison group, 13 (72.2%) had a cicatricial stricture of the hepaticocholedochus in the long-term postoperative period after 1–3 years, requiring repeated operations. Of these, 9 patients underwent reconstructive hepaticojuno- and hepaticoduodenoanastomosis, 4 patients underwent X-ray endobiliary interventions with the installation of a stent into the lumen of the hepaticocholedochus.

**Key words:** hepaticocholedochus; biliobiliary anastomosis; cicatricial stricture.

**The relevance of research.** Treatment of bile duct injury is extremely difficult, requires expensive medical and diagnostic manipulations, and leads to serious disability of patients. The mortality rate is 8–17%, complications during operations occur up to 47% of cases, the development of post-traumatic strictures of the bile ducts – up to 35–55% [2].

In the literature and patent sources, there are a number of methods of restorative and reconstructive operations for damage to the bile ducts.

The well-known method of hepaticocholedochoplasty by stitching its ends with an end-to-end anastomosis, despite its obvious physiology, according to most authors [2, 3] is applicable only in a small number of cases. This is due to the technical difficulties of isolating and comparing the ends of the bile ducts without tension along the line of the anastomosis sutures.

Thus, the development of new methods of plastic surgery of extrahepatic bile ducts is an urgent task of surgery.

Hepaticojunostomy is known according to A.A. Shalimov [3]. After excision of scar tissue and release of the distal end of the common hepatic duct, it is mobilized in the proximal direction. The loop of the jejunum, necessary for anastomosis, is turned off by Roux or Shalimov, brought to the back surface of the duct so that the latter lies across the intestine along the length of its entire free part. With a small diameter of the duct (5 mm or less), a longitudinal incision with a length of 5–8 mm is made along the back surface. Immediately before the stump of the duct, the lumen of the jejunum is opened longitudinally in accordance with the diameter of the duct and its incision. Separate 3–4 sutures with

an interval between them of 1.5 mm with a thread of non-absorbable tissue fix the lateral walls of the duct to the intestinal wall across it. Also, the edges of the duct and intestine are sewn together with separate sutures with a thread of absorbable material on an atraumatic needle with an accurate comparison of the mucous membranes. Then, with gray-serous sutures, the anastomosis is invaginated into the fold of the intestine to reduce regurgitation reflux from the intestine.

**Disadvantages:** The duodenum is turned off from the passage of bile, which significantly affects the quality of digestion.

Hepatic (choledocho) duodenostomy is known according to V. V. Vinogradov [1]. The supraduodenal part of the common bile duct is isolated and the duodenum is widely mobilized along the Kocher, which are then opened longitudinally (duct) and transversely (intestine). In this case, the duct is opened at the intestinal wall, and the latter is dissected at the level of its postbulbar sphincter. Such an opening of the intestine allows you to prevent intestinal contents from being thrown into the bile ducts during its peristalsis. The lumen of the duct and intestine is opened for 3–4 cm to create a wide mouth and avoid its subsequent narrowing. Anastomosis is formed by nodular sutures on atraumatic needles with nodules outward, producing a needle injection from the outside, and its injection from the inside. The stitches are taken on clips, between which gauze napkins are placed. After the application, all the stitches are sequentially tied, which greatly simplifies the execution of the anastomosis. If necessary, the suture line can be peritonized or reinforced with biological glue.

Disadvantages: the method is not applicable for prolonged strictures and an extended defect of extrahepatic bile ducts. The possibility of duodenobiliary reflux persists, which contributes to the development of cholangitis, an inflammatory process in the anastomosis zone, which can lead to its scarring.

There is a known method of treating cicatricial strictures of the bile ducts, in which an anastomosis is formed on a drainage tube, which is inserted for a long time, carrying out frame drainage [2]. However, even long-term abandonment of drainage (up to 2 years) it does not always provide favorable results, because the diameter in the anastomosis will never be wider than the tube itself and will necessarily narrow after its removal.

There is a known method for the treatment of high cicatricial strictures of hepaticocholedoch, including the formation of a bile-intestinal anastomosis on a replaceable transhepatic drainage removed through a hepatostomy and herostomy on a disabled arm (auth. No. 1311718). Temporarily block the lumen of the bile duct above the anastomosis with a balloon obturator installed on the transhepatic drainage.

The disadvantages of the above methods are that the failure of sutures, anastomosis and recurrence of stricture are not excluded due to the unremitting tension of tissues along the line of anastomosis. A long postoperative rehabilitation period, due to a large surgical injury.

A method of plasty of extrahepatic bile ducts by creating a biliary anastomosis of the "end to end" type is known and chosen as a prototype [3].

First, the proximal end of the bile duct is isolated. After the discovery of the distal part of the common bile duct, it is opened for a short distance and convinced of the patency of the large papilla of the duodenum. Duodenal mobilization is performed according to Kocher. The distal stump of the common bile duct should be mobilized together with the pancreatoduodenal complex, and not try to isolate it from the pancreatic tissue. After that, they begin to create an end-to-end anastomosis. First of all, the back wall is sewn with separate stitches of thin threads made of absorbable material or synthetic threads on an atraumatic needle. Sutures are applied with nodules outward according to the type of vascular suture. After stitching the back wall, a frame drainage is installed into the lumen of the duct. After the installation of the frame drainage, a seam is applied to the anterior lip of the anastomosis, usually limited to one row of seams.

Disadvantages: the method is not applicable for prolonged strictures and large diastasis of the stitched ends (more than 30 mm). The failure of sutures, anastomosis and recurrence of stricture are not excluded due to the unremitting tension of tissues along the line of anastomosis and the eruption of sutures.

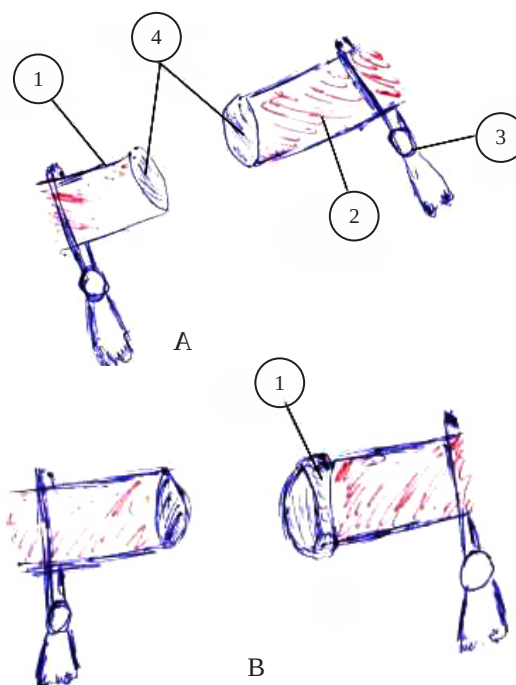
**The aim of the work:** to prevent hepaticocholedoch stricture in the long-term postoperative period after reconstructive surgery.

**Materials and Methods.** The analysis of the results of surgical treatment of 41 patients with injuries of the main bile ducts in the period 2010-2022 was carried out. All patients had complete damage to the hepaticocholedoch excision and intersection at the level of +2 and +1 according to E.I. Halperin. All patients underwent reconstructive surgery.

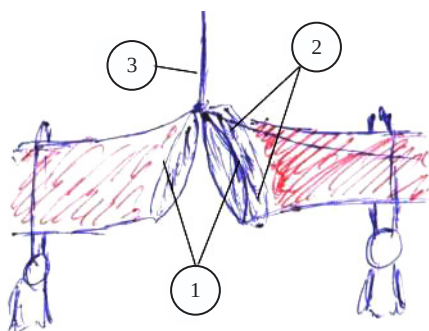
Of 41 patients with biliary anastomosis, 18 (43.9 %) patients with biliary anastomosis were imposed by the traditional end-to-end method, they formed a comparison group. 23 (56.1 %) patients underwent the improved method of biliary anastomosis, they were included in the main group.

Our improved method of reconstructive surgery of hepaticocholedoch differed from analogues in that to form a biliobiliary anastomosis, the edge of the distal end of the choledochus is turned from the inside to the outside by 2–3 mm from the edge (Fig. 1).

The anastomosis between the distal and proximal ends of the hepaticocholedoch was formed by a single-row precision submucosal suture without entrapment of the mucous membrane. If possible, all sutures were applied with nodes outside the lumen of the duct (Fig. 2).

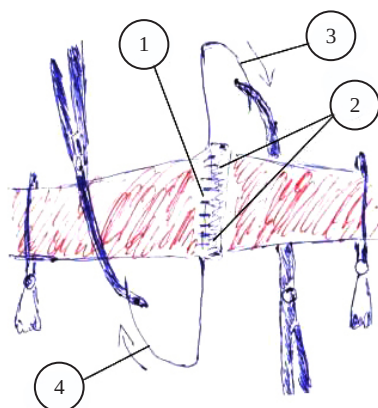


**Fig. 1.** Our proposed method of restoring the outflow of bile: A. 1 – proximal part of hepaticocholedoch; 2 – distal part of hepaticocholedoch; 3 – temporary clamping terminal; 4 – lumen of hepaticocholedoch; B. 1 – the edge of the distal part of the hepaticocholedoch is turned from the inside out (inside out) 2–3 mm.

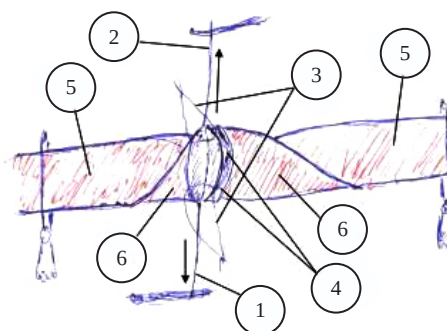


**Fig. 2.** 1 – the edge of the capture of the nodal sutures; 2 – the inside-out part of the distal part of the hepaticocolic duct; 3 – the first nodular suture along the anterior wall of the hepaticocolic duct

In a difficult technical situation, the number of stitches with nodes inside should be minimal. Before suturing the anterior wall of the anastomosis, in some cases, to ensure an unobstructed bile duct in the immediate postoperative period, a "hidden" drainage of thin silicone (diameter 3–4 mm) was installed in the duct, one end of which was carried above the anastomosis into the right or left lobe duct, the second into the duodenum. Biliobiliary anastomosis was applied with nodular sutures (Prolene 8/0) with atraumatic needles in the transverse direction on a thin drainage. A distinctive feature is that the edge of the distal part was turned from the inside to the outside by 2–3 mm from the edge. In order for the nodes not to remain in the lumen of the bile duct, nodular sutures were first applied to the anterior wall, then, having performed traction of the hepaticocolic duct from left to right, nodular sutures were applied to the posterior wall (Fig. 3, 4). At the same time,



**Fig. 3.** 1 – the suture line along the anterior wall of the hepaticocolic duct; 2 – the inside-out part of the distal part of the hepaticocolic duct; 3 – the first nodular suture along the anterior wall of the hepaticocolic duct with traction to the right; 4 – the last nodular suture along the anterior wall of the hepaticocolic duct with traction to the left



**Fig. 4.** 1 – the first nodular suture along the anterior wall of the hepaticocolic duct with traction to the right; 2 – the last nodular suture along the anterior wall of the hepaticocolic duct with traction to the left; 3 – nodular sutures along the posterior wall of the hepaticocolic duct; 4 – the inside-out part of the distal part of the hepaticocolic duct; 5 – the anterior wall of the hepaticocolic duct; 6 – the posterior wall of the hepaticocolic duct

the first nodular suture was applied along the front wall of the hepaticocolic duct with traction to the right, then nodular sutures were applied along the back wall of the hepaticocolic duct, the last nodular suture was applied along the front wall of the hepaticocolic duct with traction to the left. External drainage of the lumen of the bile ducts with a thin catheter is performed through a separate hole of the hepaticocolic duct.

**Results and Discussion.** Of the 18 patients in the comparison group, 13 (72.2 %) in the long-term postoperative period after 1–3 years observed cicatricial stricture of hepaticocolic ducts, who required repeated operations. Of these, 9 patients underwent reconstructive surgery of hepaticocolic and hepaticoduodenal anastomosis, 4 patients underwent X-ray endobiliary interventions with the installation of a stent in the lumen of hepaticocolic duct. Of the 23 patients in the main group, only 4 (17.4 %) had hepaticocolic duct stricture in the long-term postoperative period after 2–3 years, who also underwent repeated surgery with the imposition of hepaticocolic anastomosis according to Ru.

**Conclusion.** Thus, the proposed new method of reconstructive surgery, characterized in that for the formation of a biliobiliary anastomosis, the edge of the distal end of the hepaticocolic duct is turned from the inside out by 2–3 mm, then with the imposition of nodular sutures was a reliable way to minimize cicatricial strictures of the hepaticocolic duct in the long-term postoperative period.

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## З ДОСВІДУ РОБОТИ

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### ВДОСКОНАЛЕННЯ ВІДНОВЛЮВАЛЬНИХ ОПЕРАЦІЙ ПРИ “СВІЖИХ” УШКОДЖЕННЯХ І РУБЦЕВИХ СТРИКТУРАХ МАГІСТРАЛЬНИХ ЖОВЧНИХ ПРОТОК

**Мета роботи:** запобігання стриктурі гепатикохоледоха у віддаленому післяопераційному періоді після відновної операції.

**Матеріали і методи.** В дослідження включено дані клінічного обстеження 41 хворого з ушкодженнями магістральних жовчних проток, які були оперовані у хірургічному відділенні багатoproфільної клініки Самаркандського державного медичного університету за період з 2010 до 2022 р. Залежно від вибору тактики лікування хворих було поділено на дві групи. Першу групу, групу порівняння, становили 18 (43,9 %) хворих, яким накладено біліобіліарний анастомоз традиційним способом. Другу групу, основну групу, склали 23 (56,1 %) хворі, яким проведено відновлювальну операцію удосконаленим способом.

**Результати досліджень та їх обговорення.** З 18 хворих групи порівняння у 13 (72,2%) у віддаленому післяопераційному періоді через 1–3 роки спостерігали рубцеву стриктуру гепатикохоледоха, яким були необхідні повторні операції. З них 9 хворим проведено реконструктивну операцію гепатикосюно- та гепатикодуоденоанастомоз, 4 хворим виконали рентгендодобіліарні втручання із встановленням стенту в просвіт гепатикохоледоха.

**Ключові слова:** гепатикохоледох; біліобіліарний анастомоз; рубцева стриктура.