

BILIARY SURGICAL PATHOLOGY

Part II

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Abstract: „Post biliary surgery syndrome” combines the signs and symptoms which appear after the surgery, involving the gall bladder and/or the biliary ducts for biliary lithiasis. They occur after surgery and have multiple causes.

Keywords: iatrogenic bile duct stenosis, cystic duct stump

Rezumat: „Sindromul biliarelor operați” reunește semnele și simptomele care apar în urma intervenției chirurgicale pe veziculă și/sau căile biliare pentru litiază. Acestea se manifestă la intervale variabile de timp de la actul operator și au cauze multiple.

Cuvinte cheie: stenoză iatrogenă a căii biliare, bont cistic lung

- Difficult cholecystectomy with pediculitis;
- String between the hepatic duct and/or the right hepatic artery;
- Drainage with Kehr tube, improperly placed;
- Tearing into pieces the main biliary duct during the extraction of a large calculus that exceeds choledochotomy;
- Not recognizing the bilio- biliary fistula (6,7).

Post-surgery stenosis

Most frequently, stenosis of the main biliary duct intersects the hepatic duct and the cysticohepatic junction. The most complete classification of stenosis belongs to BISMUTH (2):

Type 1: Low stricture (pedicular), with the upper biliary stump longer than 2 cm.

Type 2: Medium stricture (subhilar), with proximal biliary stump shorter than 2 cm.

Type 3: High stricture (hilar) without biliary stump but with a link between the hepatic ducts.

These three types are pedicular lesions of the main biliary ducts.

Type 4: Stricture of the biliary convergence due to the radiculotruncular lesions, the communication between the hepatic ducts being interrupted through the development of fibrous tissue. Type 4 presents two variants:

- a) Hepatic ducts are close to one another by their extremities, when sclerosis is placed on the convergence area;
- b) Hepatic ducts are removed when sclerosis extends to the hepatic ducts.

Type 5: In case of anomalies of the biliary ducts, the right segmentary branch may be separated by the rest of the biliary tree, through stricture (4).

Stenosis of the biliary duct represents the most frequent iatrogenic lesion, after the laparoscopic cholecystectomy (8), the injures being mostly hilar (Bismuth 3) and placed at the level of the hilar convergence (Bismuth 4) (17,21).

Post-surgery stenosis morphology

The form and the extension of stenosis depend on the level and type of the initial lesion. As a result of a ligature or section, the sclero-inflammatory lesions are less extended. In case sclerosis is the consequence of

2.2 Iatrogenic stenosis of the main biliary ducts

Iatrogenic stenosis is the result of certain unknown accidental lesions or the result of the improper treatment of the lesions at the level of the extrahepatic biliary ducts. Surgery trauma intersects the morphological integrity and implicitly, the functional integrity of the main biliary ducts. Although, benign from the histological point of view, stenosis tends to progress and may determine severe complications.

In 90% of cases, the traumas of the biliary ducts occur as a result of cholecystectomy and rarely after the interventions on the main biliary ducts.

Conditions in which traumas on the main biliary ducts may occur.

- Improper access ways for the intervention on the main biliary duct (6);
- Confusion between the cystic duct and the small main biliary duct placed under tension, secondarily after the transportation of the bottom of the gall bladder in cholecystectomy;
- String of the cystic duct and the small main biliary duct;
- Desinsertion of the cystic duct at the level of its insertion in the main biliary duct;
- Improper dissection of the cystic duct wriggled to the main biliary duct;
- Intra-surgery bleeding: from the cystic artery, juxtacholedocian vessels, when the cystic duct is removed from the main biliary duct, or through the injury of the right hepatic artery;

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certain biliary fistulae, or subhepatic abscesses, the process will intersect the main biliary duct on a longer distance.

The partial or total obstruction of the biliary lumen, retraction of the biliary stump and the suprastrictural dilatation represent the most important morphologic features of the biliary stenosis.

Incomplete stenosis (uncircumferential) maintains a limited degree of permeability; the most complex form is developed circumferentially and suppresses the permeability of the biliary ducts.

Stenosis may be associated to fistulae that occur due to the storage of the bile in the suprastenotic biliary stump and as a result of the creation of a drainage line.

Retraction of the biliary stump occurs secondarily to the process of sclerosis. The distal stump retracts towards pancreas and the proximal one towards hilum (4).

At suprastenotic level, in most of the cases, the dilatation of the biliary ducts occurs. There are also situations in which dilatation above the obstacle is missing, as in the case of the incomplete stenosis, of the association of stenosis to the external biliary fistula, after subhepatic abscess, after angiocholitis or after respiratory reinterventions on the proximal stump (fibrosis of the biliary stump hinders its dilatation). After repeated inflammatory processes, sclerosis process advances to the intrahepatic ducts (6,7).

Regional changes in the biliary stenosis

Local-regional changes occur after the primary intervention, to which the extra factors are added, which modify the regional autonomy.

At the level of the incision previously practiced, an area of eventration or fixed evisceration may occur.

In case of subhepatic perivisceritis, adhesences between the neighbouring viscera are formed (the great epiploon, the hepatic angle and the right third of the colon, first part of duodenum).

Fibrosis pediculitis occurs as a result of the invasion of the hepatic pedicle by the sclerous tissue. If the proliferation of the pericanalicular fibrous tissue is associated, the proximal biliary stump increases. The lesion frequently occurs after cholecystectomy, followed by biliargy or infection.

Spontaneous biliodigestive fistulae occur in percentage of 20 - 40 % through the fistulization of the dilated suprastenotic segment. They may be accompanied by external biliary fistulae.

Fistula occurrence is correlated to the decrease in intensity of the icterus and the increase of angiocholitis risk. (4).

In complete stenosis, the accumulation of bile above the obstacle may be important, bringing about the dilatation of the intrahepatic biliary ducts and stasis, with partial or total hepatomegaly (with or without the atrophy of the other lobe).

Prolonged biliary stasis favours angiocholitis that may determine the occurrence of multiple hepatic

microabscesses or acute hepato-renal insufficiency. Biliary stasis represents a favouring factor for the secondary lithiasis as well, either in the proximal biliary stump or in the intrahepatic biliary ducts.

Secondary biliary cirrhosis occurs 3-7 years after the evolution of sclerosis, through the presence of chronic biliary obstruction, to which the frequent angiocholitis crises are added.

Death occurs through upper digestive bleedings (due to portal hypertension), hepato-renal insufficiency or through severe cholangitis with hepatic insufficiency (4).

Clinical forms

The intensity of the clinical manifestations, as well as the moment of their occurrence in relation to the primary intervention differs according to the type of stenosis. Three main clinical groups were described:

- a) First group: net icterus occurring immediately after the surgery; it is persistent and progressive and translates the obstruction of the main biliary ducts;
- b) Second group: tempestuously convalescence with intermittent icterus, biliary fistula or recurrent chyloperitoneum, free interval followed by intermittent more and more severe icterus;
- c) Third group: favorable evolution (months or years), when the fibrosis process evolves up to icterus occurrence. Initially, the iatrogenic lesion is small but it may increase up to the stenosis of the main biliary duct.

Laboratory and paraclinical investigations

- Laboratory tests allow the appreciation of the mechanical character of the icterus, evaluation of the hepatic and renal function, the establishment of the anemia level, biliculture with antibiogram (external fistula);
- Echography may assess the degree of dilatation of the biliary ducts, appreciation of hepatomegaly and the presence of the secondary lithiasis;
- Biliary scintigram with 99 mTc-IDA assesses the degree of dilation of the biliary ducts and may establish if the obstruction is complete or incomplete;
- Intravenous cholangiography may be practiced when bilirubinemia is below 3mg% and may establish the place of stenosis, degree of dilation of the proximal biliary stump but the accuracy of the exploitation is highly inferior to the other methods that use contact dye;
- Fistulography may be practiced only in the case of stenosis associated to external biliary fistula, 15 days after the formation of fistula;
- Transparietohepatic cholangiography, although it may increase the risk for angiocholitis or choleperitoneum, it may establish the place of stenosis, the length and the dilatation of the proximal biliary stump, the presence or the absence of the communication between the hepatic ducts, the degree of dilation of the intrahepatic biliary ducts, the presence of the recurrent lithiasis.

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- Endoscopic retrograde cholangiography may reveal the substenotic common bile duct and the condition of the biliary ducts and the presence of the esophageal varices;
- Selective arteriography of the celiac trunk may reveal an interruption of the arterial circulation (in case of ischemic stenosis).

Treatment of post-surgery stenosis

The treatment of post-surgery stenosis is exclusively surgical, the best results being obtained through bilio-digestive anastomoses on exclusive loop in Y à la Roux (14,18). Satisfactory results were obtained after the endoscopic insertion regarding the patients with biliary strictures, secondarily to the laparoscopic cholecystectomy (11).

2.3. Long cystic stump

The length of the cystic stump remained after cholecystectomy does not exceed 5 mm (15). The term of "long cystic stump syndrome" was introduced in 1951 by GARLOCK and HURWITT for the situations in which its length exceeds 6 mm. The cystic stump does not represent a cause of sufferance. The lithiasis of the cystic stump, the neuroma of the cystic stump and the pielic-cystico stump brings about clinical manifestations and represent indications for the reintervention (4).

Factors that favour the long cystic stump

a) The anatomic variants of the cystic-hepatic junction.

It is important to know that the apparent junction does not always correspond to the junction of the lumens of the two biliary ducts. The junction of the lumen is placed more distally; the cystic stump is actually longer than it appears. It is considered sufficient the ligature of the cystic at a distance of 2-3 mm from the main biliary duct, on condition that the remaining stump should not contain calculi. There are four anatomic junctions of the cystic-hepatic junction:

- a) The junction in sharp angle;
- b) The curved junction, in which the cystic opens on the left side, on the front and back side of the main biliary duct;
- c) The parallel junction, the real confluence being distal as against the apparent one;
- d) The high junction, closer to the hepatic hilum;
- e) Reasons for the surgical technique:

When cholecystectomy is made on the spot, without knowing the anatomic variants, this implies the risks for certain errors of surgery technique. In the case of chronic scleroatrophic cholecystitis, the cystic duct may be dilated and thickened, being extended towards the gall bladder without demarcation.

When cholecystectomy is newly made, the inflammation may hide the cystic-hepatic junction, determining a longer cystic stump, as well as an incomplete cholecystectomy with a pielic-cystic or cystic-vesicular stump (4).

Long cystic stump and the clinical manifestations

2.3.1 Long cystic stump associated to a residual choledocian sufferance

Frequently, the dilatation of the hepatico-common bile duct is associated to ectasia of a long cystic stump, brought about by the existence of a hypertension in the main biliary duct (due to the presence of the remaining calculi, to the residual oddian stenosis, cephalic chronic pancreatitis, or to the duodeno-biliary reflux, secondarily to the oddian hypotonia). Ablation of the cystic stump in this case does not represent a therapeutic gesture.

2.3.2 Cystic stump neuroma

Cystic stump neuroma is a relatively frequent lesion, occurring in quite equal proportions, both after the conventional cholecystectomy and after the laparoscopic one (3). Two variants are described:

- a) Paracystic neuroma that occurs in the case of a conjoint ligature of the cystic duct and of the vegetative small fibres of the pericystic plexus, so that the nervous fibres proliferate the fibrous tissue (5,10), generating an amputation neuroma. The nervous proliferation maintain the spasms of the Oddi sphincter, bringing about pains and certain small tumours that compress the main biliary duct, perturbing the biliary flux (3,4,13,23).
- b) The intraparietal cystic neuroma consists in the proliferation of the intramural nervous elements. The lesion may exist previously to cholecystectomy, explaining the existence of pains even after the surgery (4,24).

2.3.3 Lithiasic cystic stump

Cystic stump lithiasis may be residual or recurrent.

- **Residual lithiasis** is the most frequent, being secondary to an incomplete cholecystectomy that leaves an occupied cystic-pielic stump, or secondary to not recognizing the calculi or the cyst, abnormally placed.
- **Recurrent lithiasis** is exceptional. The recurrence occurs in the case of a vesicular-cystic stump, which represents a very small vesicle that favours the conditions for calculi formation; in the case of a long cystic stump with the presence of Heister's valves that entrains the stasis (1), or in case in which the ligature fibre of the cystic lumen represents a nucleus of precipitation for the biliary salts (4).

The existence of calculi in a long cystic stump may remain asymptomatic for a long period of time. The lithiasic cystic stump becomes symptomatic in the cases in which:

- The calculi were released in the main biliary duct, the sufferance being generated by the choledocian lithiasis;
- Multiple lithiasis of the cystic stump is accompanied by inflammation;

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- Cystic duct is attached to the main biliary duct and contains fixed and superposed calculi (7).
- The cystic stump suffers from a massive dilation that brings about a recurrent pain (16).

2.3.4 Pielic-cystic stump

Pielic-cystic stump is the variant with the most important implications in the post-cholecystectomy sufferance. The pielic-cystic stump is the consequence of an incomplete cholecystectomy. The vesicular region of the stump maintains the attributes of the gall bladder that may generate pathologic processes, common to the cholecyst ("residual cholecystitis after cholecystectomy" (15), or the occurrence of a granuloma of fibre that disturbs the bile passage.

Rarely, the pielic-cystic stump may determine hydrops through the strong angulation of the cystic duct (4).

2.3.5 Anatomic cystic stump associated to oddian dyskinesia

In many situations, the cystic stump does not present any pathological modifications, but the post-cholecystectomy sufferance is present.

The research made show that there are two types of long cystic stump: one "smooth", poor in muscular fibres and rich in glands that do not produce disorders, while the second is the stump that preserves the cervico-cystic junction without glands, but with a rich vascular and nervous network, which influences the bioelectrical activity of the biliary tree and the oddian reactivity that entertains the repeated and prolonged spasms, situation that may lead to papillary stenosis (6).

A rare complication of the cystic stump is represented by cholangiocarcinoma that may extend, both at the level of the biliary ducts and at the neighbouring organs through contiguity. Another rare complication is the fistulization of the dilated cystic stump in the small intestine that is frequently accompanied by angiocholitis (25).

Supple, permeable, long cystic stumps that are, without evident lesions and calculi are silent and do not require any surgery.

The symptomatology given by the long cystic stump belongs to two clinical forms:

- a) Painful form purely manifested through biliary colics with the irradiation of the pain in epigastrium or permanent, sound pain. The sublayer is represented by the stump neuroma (19,24);
- b) The form with choledocian syndrome is manifested through colics followed by icterus or subicterus, angiocholitis; the sublayer is presented by the migration of the calculi in the main biliary duct, the prolonged oddian spasms, the compression of the voluminous stumps (lithiasic or with neuroma) (6,12).

The length of the free interval between cholecystectomy and the occurrence of symptomatology is of weeks up to 20 years.

The paraclinical diagnosis of the long cystic stump

Until recently, the only method of investigation useful in diagnosis was the intravenous cholangiography, making possible the visualization of the stump in lithiasis. In the absence of lithiasis, its utility is disputed (4,12).

Transparieto-hepatic cholangiography and endoscopic retrograde cholangiography reveal the long cystic stump after the surgery, the establishment of its anatomic form and its responsibility in post-cholecystectomy syndrome (6,9,16). Very good results were obtained in the diagnosis of the lesions of cystic stump and through cholangiopancreatography with magnetic resonance or endoscopic echography (16,20).

Ecoendoscopy is useful in the diagnosis of the cystic stump neuroma through the possibility of guiding a needle that is used to press the cystic clips provoking pain or to the injection with bupivacaine or triamcinolon that suppresses the pain (22). The diagnosis of certitude of the cystic stump neuroma is the histologic one.

Long cystic stump treatment

The cystic stump neuroma, the lithiasic cystic stump and the pielic-cystic stump benefit from surgical treatment that consists in its resection. It is necessary to accomplish a complete and correct intrasurgery exploration of the main biliary duct, in order to precisely establish the reason of the sufferance.

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