Evaluation of the surgical management and remote outcomes in patients with postoperative biliary strictures in the Republic of Moldova

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Abstract

Objectives. Surgical management of patients with benign biliary strictures and biliary lesions is a current issue for discussion and raises many scientific research directions. The purpose of this study was to systematize our experience in the treatment of benign biliary strictures, analyzing both immediate and remote complex results.
Material and methods. Between 1989-2015 years, there were 203 hospitalized patients with benign biliary strictures in Surgery Department no. 2 of Public Institution, State Medical, and Pharmaceutical University (PI SMPhU) "Nicolae Testemitanu". The study is conducted as part of postdoctoral research; thesis/dissertation title is *Clinical-functional efficiency of modern surgical treatment of benign biliary strictures according to immediate and remote clinical results* and was approved by the Science Council of PI SMPhU "Nicolae Testemiţanu" and Ethical Committee (EC) of Ministry of Health (MoH). Clinical evaluation included several consecutive steps: 1) setting the etiopathogenic diagnosis; 2) pre-operatory decompression of the biliary tree; 3) reconstructive surgical act. In the case of biliary strictures, after the initial assessment, biliodigestive derivations were performed according to the level of the obstacle, preferring the bilio-jejunal anastomosis with a Roux-en-Y excluded loop. The post-operatory mortality was 2.63%.
Conclusions. The iatrogenic stricture of bile duct has a complicated evolution, with many surgeries, requiring many hospitalizations. It should be endeavored to detect them in a timely manner and to prevent septic complications. In the first phase, biliary tree decompression will be used, and after decreasing the inflammatory process biliary-digestive reconstruction will be performed. These patients require a complex remote monitoring and analysis of health status.

Keywords: biliary strictures; etiopathogenic diagnosis; hepaticojejunostomy; reconstructive surgery act; biliary duct.

Introduction

Bile duct lesions that occur most often after a cholecystectomy, present a formidable challenge for surgical services that require a complex approach for optimal management. If the injury is not recognized in time or has been poorly managed, then serious complications can occur, such as cholangitis, biliary cirrhosis or portal hypertension. These complications involve

considerable a cost for treatment, loss of employment and long-term disability (Sadiq, et al., 2012; DeSantibanes, et al., 2008).

The incidence of biliary injuries during open cholecystectomy is reported to be about 0.1-0.2% (Sadiq, et al., 2012; Laura, et al., 2013). The incidence of biliary injuries during laparoscopic cholecystectomy is certainly greater than the one following open cholecystectomy and according to published data varies between 0.4-0.6% (Turcu, et al., 2011; Laura, et al., 2013; DeSantibanes, et al., 2008). It is also noteworthy that after laparoscopic cholecystectomy bile injuries are more severe and complex than those encountered during an open cholecystectomy (Lau, et al., 2007).

In order to define the types of biliary lesions (BL), there have been proposed several classifications of BL, but none is universally accepted because each has its own limitations. Among them, a fundamental role is played by Bismuth's classification and Strasberg's classification, which are most commonly used by practitioners. Bismuth's classification addresses the group of patients presenting an established biliary stricture and distributes patients based on the level of damage, which is a determining factor of the evolutionary result (Bismuth, et al., 2001). Dr. Sikora amended type III strictures in type IIIa / IIIb, according to Bismuth, depending on the level of confluence of hepatic ducts, being intact or destroyed (Sikora, et al., 2003). Strasberg's classification applies to acute injury with bile leaks, lateral damage and sectioning (Strasberg, et al., 1995). A subgroup of transections (type E according to Strasberg) incorporates Bismuth classification. The major disadvantage of these classifications is that some important factors affecting the result are not presented, such as the vascular lesions, time until recognition of the damage, the presence of biliary fistula (internal/external), portal hypertension, liver function, and the presence or absence of previous reparatory operations. The Hannover classification is the most refined in terms of the combination of classification of Strasberg and Bismuth and is addressed directly to the assessment of biliary-vascular lesions (Bektas, et al., 2007). Hopefully a comprehensive classification system, universally accepted at all levels of surgical services, will be proposed in the near future and will mandatorily include all the relevant parameters that influence long-term outcome (Lau, et al., 2007).

A detailed clinical evaluation and a thorough preoperative preparation are important factors for a successful management of a patient with BL. The major preoperative aim is to document the degree of liver dysfunction, to establish the exact level and type of stricture, the presence or absence of biliary infection, and to investigate possible complications such as secondary biliary cirrhosis and portal hypertension or possible biliary fistula. Besides BL diagnosis, it is also equally important to detect the associated medical risk factors, especially liver disease coexistence, electrolyte dysfunction, coagulation, metabolic or in association with infection disorders.

In this context, our study focuses on what happens after the damage has already been produced and the surgical modality for solving the existing problems. The moment of BL repairs is critical, especially when we realize that the first attempt to repair is the best in terms of long-term outcome. The outcome of main bile duct injury is an increase of diameter, wall thickening, an increase in proliferative connective cells and an increase in elastic fibers. One important relevant aspect is the presence of inflammatory infiltrate in the wall of bile duct wall. In an elective situation, a minimum period of 3 months after the injury and reconstruction is optimal for the resolution of edema and tissue inflammation from the biliary-hepatic region and for a proximal dilatation of the biliary tree (DeSantibanes, et al., 2008; Keith, et al., 2000). In patients with an total external biliary fistula, the interval from injury to reconstruction can be extended to six months, in order to provide the appropriate surgical management, which will ensure the return of externalized bile in the digestive tract, avoiding electrolyte disturbances and development of acholia (Hotineanu, Ferdohleb, et al., 2005). Unjustified haste in trying to solve an injury at an early stage by reconstruction is

associated with a high risk of bile leak postoperatively - 30%, forming a distant stricture - 25% and a high mortality - 30% (Sadiq, et al., 2012; Jacques, et al., 2001).

The aim of the management of bile stricture is to restore the flow of bile in the gastrointestinal tract through a bypass that prevents reflux cholangitis, biliary sludge duct which is formed due to stasis and the formation of gallstones, re-stricture of the bile duct or chronic progressive liver injury. The surgical reconstruction is superior to other techniques, such as percutaneous or endoscopic (balloon dilation or stenting). Hepaticojejunostomy (HJA) is the gold standard in the treatment of biliary strictures. The key surgical principles associated with a successful reconstruction of biliary stricture are the exposure of healthy, well-vascularized stump bile that drains the entire liver, and preparation of a corresponding segment of intestine (usually a loop Roux-en-Y of jejunum> 80 cm) to make close edges and tension free anastomosis – mucosa to mucosa (Han Liu, et al., 2015; Nagino, et al., 2002). Hepp-Couinaud technique for accessing the left hepatic duct under the base of the quadratus lobe enables repair of high lesions, performing a bypass with reliable results. A side-to-side HJA, performed through a longitudinal incision of the left hepatic duct, produces a large anastomosis, minimizes the dissection behind the biliary tract and reduces the risk of excessive devascularization of liver ducts (Winslow, et al., 2009; Bachellier, et al., 2001).

The data from a few tertiary centers presents the postoperative mortality ranging from 5% to 8% (Leslie, et al., 2012). In the last decade, with perfected surgical techniques and management of biliary strictures addressed, there is a considerable decrease in operative mortality with many consistent series reporting *zero* perioperative deaths (Mercado, et al., 2011). Risk factors adversely affecting the survival rate are age, repeated reconstructive surgery, significant comorbid medical condition, sepsis, bile, and secondary biliary cirrhosis.

Several factors must be considered when discussing the long-term outcomes after reconstruction addressed to biliary strictures. Several tertiary care centers reported a satisfactory result in 80-90% of patients. Important factors, presented at scientific forums, underline that predictors of adverse outcome typically include proximal strictures (Bismuth type 3 and 4), multiple previous attempts of reconstruction, presence of parenchymal liver disease, portal hypertension, difficult biliary anastomosis, biliary sepsis, lack of experience of the surgeon (Sadiq, et al., 2012; Sikora, et al., 2008).

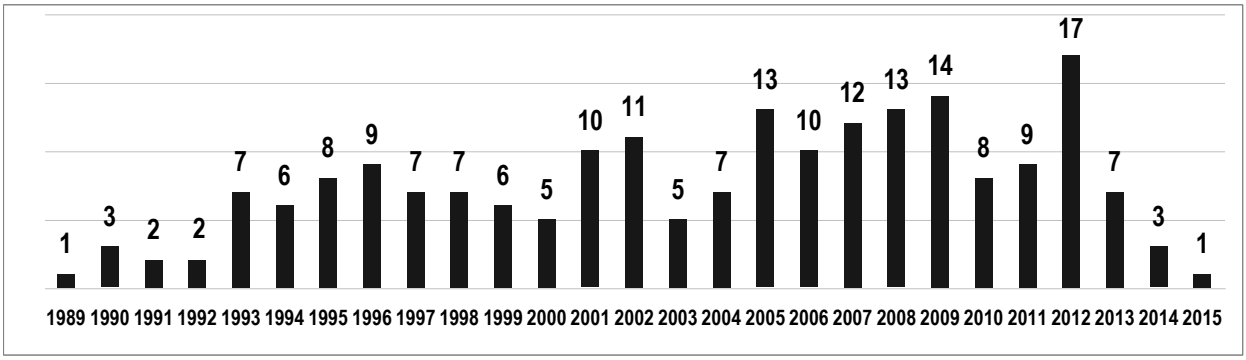
Psychosocial repercussions of BL are high; most patients are in the most productive years of their lives. When faced with a serious post-operative complication, requiring major surgical reconstruction carried out by several specialists, a program with integrity assessment and rehabilitation is needed, being a major cost to the health system. Despite the excellent results in long-term reconstructive surgery, Quality of life (QoL) is modest and not well documented. Current studies are often incomplete and do not allow these goals to be established on this difficult issue.

Materials and methods

The study is conducted as part of postdoctoral research; thesis/dissertation title is *Clinical-functional efficiency of modern surgical treatment of benign-biliary strictures according to immediate and remote clinical results* and was approved by the Science Council of Public Institution, Stat Medical and Pharmaceutical University (PI SMPhU) "Nicolae Testemiţanu" and Ethical Committee (EC) of Ministry of Health (MoH).

The sample was composed by 203 patients with iatrogenic biliary lesions secondary to laparoscopic or open cholecystectomy, gastric resections, admitted at the Surgery Clinic no. 2 between the 1989-2015 years, were looked after (Figure 1).

Figure 1. Distribution of the evaluated cases over the years, no. abs.



Most patients came from other surgical services though also from Surgery Clinic no.2. The author noticed the stage of immediate detection of biliary tree lesion, followed by the reparatory stage, aimed to restore the integrity of the biliary tree with plastic elements (external drainage) of bile duct wall and bile duct drainage on the outside and inside. The first stage followed by the period of elimination of infection foci of local septic complications, of biliary sepsis, jaundice, correction of liver function. This lesional period was followed by a period of 3 months, which in some difficult cases extending up to 6 and even 12 months when patients received care at their residence and preparatory treatment for the reconstructive stage.

According to the sex of the patients, a preponderance of biliary lesions in women was established, with a ratio of M/F = 1/4.49 that corresponds proportionately to the number of cholecystectomies performed. Conversely, male patients frequently present cholecystitis of greater difficulty, gangrenous cholecystitis, destructive cholecystitis with per-vesical abscesses, generating a ratio of 76 M to 40 F. In the study group, 93 (45.8%) of the patients with biliary lesions underwent surgery for acute cholecystitis. Inflammation and swelling made the tissues more friable, vascular and biliary elements more difficult to identify and thus the entire area of the triangle Calot more vulnerable.

The average age of patients was 49.13±0.89 years, showing the prevalence of working population, which obviously had a significant social impact. The age varied between 21-78 years. The patients aged under 50 years represent about 50% of the cases; 91 cases (44.8%) were iatrogenic injuries secondary to open cholecystectomy - usually, cases of acute cholecystitis or situations of major fibrosis with deformation of the report of the gallbladder and bile vascular-complex. The complexity of the majority of cases required their resolution in open access, often during night hours with inadequate anesthetic relaxing, with inaccessible space under the liver, and adding to that a possible inadequate sized incision. In 107 cases (52.7%), lesions were secondary to laparoscopic cholecystectomy. Often these situations are generated by sclera-atrophic cholecystitis, anatomical abnormalities, intraoperative bleeding. Gastric resections for complicated ulcers with penetration caused iatrogenic lesions in only 5 cases (2.5%). The studied cases were classified according to the injury of the biliary tree. Statistical evaluation of time when the lesions took place, helped to elucidate the presence of unexpected injuries and another phenomenon that facilitated the emergence of a possible injury. We called this the human factor, namely the periodic fatigue. It is cumulative and precedes the traditional holidays, reaching the maximum before winter or spring vacations. Certainly, fatigue phenomenon could only facilitate but is not a decisive factor for bile duct injury. This phenomenon does not show any significant gender difference. It is generally a unique phenomenon due to its ethiology.

Injuries included full or partial transections of the main bile duct and damage of right and left liver channels. According to Strasberg's classification, 98% of the lesions were major ones, belonging to the D-E classes. One group of lesions was represented by those with complete bile duct injury, essentially by clamping, suturing or transection of the main biliary duct (MBD). Another group was composed by those where injury of MBD was partial, leaving the possibility of communication with the distal part of MBD. This is of particular importance for the eventual possibility of setting the block through minimally invasive methods.

Major injuries of E type according to Strasberg classification occurred as a result of a misinterpretation of the local anatomy and given the infundibular fibrosis and bleeding motivated by variations of the cystic artery and its report with the cystic duct.

Usually, in these cases, the surgeons were experienced, proficient in laparoscopic techniques. Scenarios of lesions E type were that main bile duct was mistaken for the cystic duct and then clamped and transectioned. D type lesions were usually a destructed cholecyst with major edema in the region of the hepatic pedicle, with modified anatomy or the presence of a scleroatrophic cholecystitis with an intrahepatic location, presenting severe changes of the anatomic pattern in the region of Calot triangle. Often in these situations there was the need for excessive electrocautery, even when manipulating on MBD wall, favoring the formation of bedsores in the future with any bile leaks.

At this stage, the moment of BL detection is very important in the surgical strategy. The most interesting observation is that the remote result is directly proportional to the time of lesion detection and the type of injury. Diagnosis within 24 hours can avoid local septic complications, the progression of mechanical jaundice and liver failure. We received an immediate assessment of lesions in 16 cases (7.9%) and a delayed diagnosis in 187 cases (92.1%). Immediate appreciation in 16 cases (7.9%) allowed us to avoid septic complications, cholangitis in the postoperative period. Late diagnoses were usually established in the surgical departments from the territory when the consulting specialist was invited from university clinics.

Analyzing the data, we can assert that there is no correlation between total or partial damage when immediate detected. We examined a group with a prevalence of biliary lesions detection within 4-7 days. During this period, local septic complications, biliary peritonitis, and eminent jaundice were already recorded. There are patients where postoperative clinical evolution was examined and detection was made when severe septic complications were already present. This is due to the evolutionary specificity of biliary peritonitis, for which hyperdynamic septic shock is clinically unlikely. The group where the lesion was detected during a period exceeding eight days was formed by patients who developed external biliary fistulas, a reason for transferring them to a tertiary center for diagnosis. Their postoperative clinical evolution was satisfactory, with only a drain on safety bilious discharges. As a side note, the postoperative septic complications were not evaluated in these patients.

Laparoscopic surgery has changed the whole mechanism of injury. We found such type of damage as total or partial clipping, total transection of MBD, or excessive electrocautery. The direct assessment can be made only by the surgeon who performs the correction operation. Often, the procedure is performed during night hours, in local hospitals. The details of the mechanism are hidden by the medical staff for ethical reasons, often disregarding the gravity of local septic process, which makes it difficult to observe the real statistics of this complication frequency. We classified the lesion types grouping them into total and partial lesions, which could be achieved through analysis of patient charts, surgical protocols, etc.

In the study group, 187 cases (92.12%) were transferred to the clinic from other surgical services. The rest was represented by the clinic's own patients - 16 cases (7.88%), which constituted

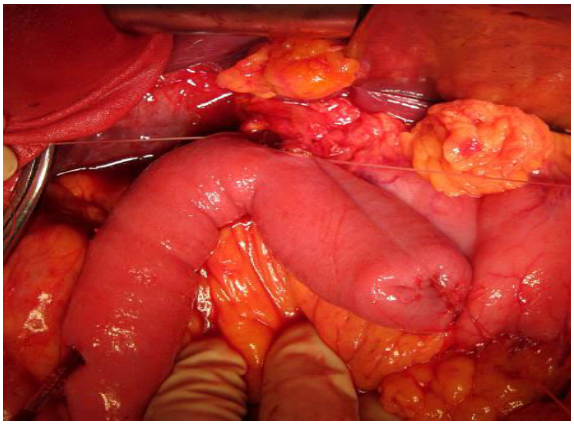
0.05% of all cases of cholecystectomies performed during that period in the clinic. Once the suspected lesion was confirmed, an indication for emergency reconstructive surgery was made, aiming to restore the bile flow and biliary tree drainage, as well as to prevent major septic complications. Usually, in the clinic, there is a 24 hours evaluation period for the lesion. The range of immediate interventions included both classic operations such as MBD plasty CBP with Robson or Kehr drainage, external hepaticostomy with micro-jejunostomy type Delany, minimally invasive endoscopic interventions - stricture dilation with a balloon, endoscopic stents in stages.

For the diagnostic of biliary lesions, a series of investigations were carried out: blood samples analysis, instrumental examinations (sonography, ERCP, CT, MRI, relaparoscopy). In laboratory tests, cholestasis indicators of liver function such as bilirubin, AlkalinePhosphatase (AP), GammaGlutamylTransPeptidase (GGTP), ALanineTransaminase (ALT) and ASpartateTransaminase (AST) are the most useful. In patients with lesions, cholestasis and biliary stenosis, changes are recorded for the following parameters: serum bilirubin, AP, GGT are raised; transaminases indicators will not be modified if the liver is not affected and there is no cytolysis; elevated transaminases indicate damage to the liver parenchyma and secondary development of hypoalbuminemia or biliary cirrhosis; prolonged prothrombin time occurs due to impaired liver synthetic function.

Any reconstruction of bile duct must meet the following requirements: a) fibrous tissue excision of proximal bile; b) providing a broad anastomosis; c) the presence of intact mucosa with no inflammatory processes at all 360^0 of the anastomosis line; d) a good vascularization of the suture line; e) lack of tension on the anastomosis line. Any surgeon should aim to respect completely these principles. Definitely, there are difficult cases where it is practically impossible to achieve all the criteria. It is undisputed that scar tissue excision and exclusion of tension on the anastomosis level can be obtained almost always.

In situations when these principles are not respected, due to the complexity of the case, it is recommended to use Hepp-Couinaud or Smith Marlow techniques. Application of the anastomosis suture line will be made termino-lateral to the intestinal loop. Atraumatic sutures will allow the installation of a qualitative biliojejunal anastomosis in a single plane. After finishing the posterior lip, if the bile duct is less than 15 mm, it is required to drain the mouth of the anastomosis. The experience of recent decades has allowed refusal from drainages in “U”, because these drainages are very traumatic and keeping them long in the biliary tree promotes chronic cholangitis and facilitates biliary cirrhosis. Their use is very limited and concerns cases where it is impossible to apply a functional anastomosis due to a high risk of stenosis at distance. Currently, draining of the anastomosis mouth with good hydrodynamic effects and with minimally traumatic to the biliary tree is popular. Based on our experience, we give priority to Veolker process. Typically, a silicone tubing size 16 Fr is used. Duration of keeping the drain tube is individual, usually not exceeding six weeks (Figure 2).

Figure 2. Hepaticojejunostomy anastomosis with Veolker drainage.



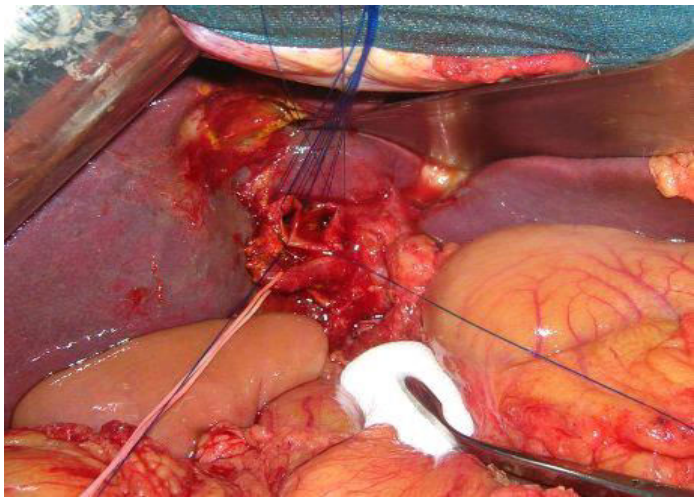
For type I and II Bismuth strictures, resorting to a choledochojejunostomy, creating a Roux-en-Y end-to-side anastomosis, it is already a recognized standard. Usually, in this situation we encounteres a pretty "long" stump, which adjusts well to the intestinal mucosa, thus consolidating the anastomosis. The surgeon has a choledoc of sufficient length for maneuvers of bile stump in order to apply the suture, only on healthy tissues. In 82 cases (40.4%) with the Type I and II strictures we used choledochojejunal anastomosis drained by means of a Völker drain. At 16 patients (7.9%) we observed a dilatation of the common bile duct over 2 cm and a local anatomy that was favorable, which allowed us to refrain from transanastomotic drainage.

For high Bismuth strictures, either type III and IV, hepaticojejunostomy has to overcome greater challenges such as a small bile stump and a major fibrosis process. For such situations, Hepp-Couinaud technique has been proposed. The edge of III liver segment and hepatogastric ligament will be prepared intraoperatively. In the place where hepatogastric ligament passes into Glisson's fascia, a hilar plaque is formed. The hilar plaque is prepared and through its intersection, the junction of liver channels will be reached. The dissection will continue on the left duct the latter being maximally denuded of tissue. The method is based on the fact that the left channel is usually outside the liver parenchyma. Fibrous tissue from the bottom of the common hepatic duct will be dissected. The hepatic stump will allow the Petersen method – introduction of a metal catheter into the duct.

The last step will ease to a maximum the exposure of the left channel. The anterior wall of the left duct will be incised – the incision starts from the junction up on the left channel. The maneuver will allow us to do a proper size anastomosis. We will resort to a lateral side stoma with ordinary sutures in a single layer. Typically this anastomosis requires intraluminal drainage for 6 months. Usually, Hepp-Couinaud technique allows an ideal mucosal confront and avoidance of anastomosis strictures at distance. During our research, this technique was used on a lot of 90 cases (44,3%).

From technical viewpoint, the most difficult cases, were type IV strictures – 15 cases (7.4%). The difficulties were increased by the postoperative cicatriceal process, by the lack of common bile duct and the involvement of junction of right and left hepatic duct in the scar. The applied technique allowed the individualization of hepatic pedicle, the identification and dissection of the hepatic artery to the hilum and section of the hilar plaque in order to indentify right and left hepatic ducts, and exploring CBD with the metal explorer.

Figure 3. Double hepaticojejunostomy



Double hepaticojejunostomy with a Roux-en-Y excluded loop and mandatory transanastomotic drainage of both ducts according to Voelker, was performed. A basic principle for these anastomoses was the use of atraumatic PDS type suture 5/0 or 6/0 - in a single layer with a thorough appropriation of mucosal tissue and total exclusion of original sclerotic tissue (Figure 3).

Results

Iatrogenic bile duct strictures are only histologically benign, otherwise they behave clinically as malignant diseases, presenting a tendency to progression, being severe through their general repercussions, and difficult to correct surgically, with a tendency to relapse, or developing severe postoperative complications. Therefore, we prefer the first reconstructive intervention to be radical, solving the stricture.

Immediate postoperative complications were occurred in 27 cases (13.3%). Some patients had general/local complications, like postoperative pneumonia, wound infection, persistence bile leak after 72 hours postoperatively. They were generated by the presence of cholangitis, transient mechanical jaundice and technical difficulties in forming a biliodigestive anastomosis. Most often, we noticed complications in patients who had severe lesions and suffered from biliary peritonitis. The presence of excess local fibrous tissue and persistent cholangitis facilitated a severe clinical course with immediate complications. All cases of postoperative complications were managed conservatively and did not require repeated surgery. Postoperative mortality at the reconstructive stage was absent as a result of preoperative preparation, the proper decompression of the biliary tree and intensive therapy performed both preoperatively and postoperatively with antibacterial, liver and volume correction.

Postoperative outcomes consisted of clinical, biochemical and ultrasound control after 1 month, 3 months, 6 months and annually thereafter for detecting possible signs of anastomotic malfunction. Where there were suspicions, complex investigations like CT or MRCP were performed. Some patients were followed up at the regional district or city hospital. The most effective method was the direct contact with each patient in Surgery Clinic no. 2.

The main monitored parameters were: biochemical indexes of cholestasis and hepatic cytolysis, sonography for the permeability of the biliary tree, MRCP scan and dynamic functionality test assessed by sequential bilio-scintigraphy. Resort episodic confinement was signed to define the

clinical status of the patient and clinical functional certification of the bilio-digestive derivations. Social rehabilitation of these patients, who underwent some series of interventions after the BL lesion, was of our interest.

Remote complications occurred in 29 cases (14.3%). They occurred at an average of 29.32±3.28 months from the reconstructive surgery with Statistical Deviation (DS) of 17.37. In all these cases, there was an episodic clinical picture of cholangitis associated with transient jaundice, episodes of biliary colic, shivers. The establishment of an algorithm for diagnosis and treatment allowed to find in a timely manner the direct cause of occurring complications and to demonstrate the link between the applied bilio-digestive derivations and biliary strictures settled in the past.

The most common were cases of stricture of hepaticojejuno-anastomosis, observed in 24 cases (11.8%). The clinical situation was explained by a severe fibroblastic process on the anastomotic mouth, which took its course with the clinical aspect of obstructive jaundice, purulent cholangitis episodes, liver and renal failure. There were 3 cases (1.5%) that developed gallstones associated with partial stricture of the HJA. For these patients, we used 3/0 silk as suture material and the anastomosis was carried out in difficult technical conditions. A patient had the biliodigestive anastomosis performed with a Roux-en-Y loop with one arm of less than 50 cm long. The patient remotely developed a major entero-biliary reflux, associated with a reflux cholangitis with episodes of transient jaundice, shivers, and sepsis. There was a case of mixed, vascular-biliary biliary lesion during the correction phase and adequate drainage covered through the collaterals of the concerned hepatic lobe. One year after the reconstruction, the patient suffered an episode of haemobilia with jaundice. He was emergency hospitalized in the clinic, where during instrumental examinations (MRCP and angio-CT) a stricture of anastomosis and pseudo-aneurysm of the branch of the right hepatic artery erupting in the biliary tree were identified.

All these patients required multiple reconstructive surgeries. The following desideratum was considered when deciding the surgical strategy: fluid correction through the crystalloid infusions, amino acids, fresh frozen plasma; correction of liver function; antibiotic therapy; surgery only after a proper correction of all vital indices. Analysis of imaging data is valuable, cholangiograms received through MRCP, and cholangio - CT.

For us, the surgeons, the priority was to determine preoperatively the length of the biliary tree above the anastomosis and the jejunal loop, the absence or presence of gallstones, complete or partial stricture and, most importantly, the extension of the stricture from the anastomosis on the biliary tree.

Discussions

Iatrogenic strictures of main biliary ducts are characterized by a high degree of severity, with the tendency to a more proximal location, more frequently found in recent years. Most restorative and temporary drainage interventions on biliary ducts require a new biliary-digestive intervention (Sadiq, et al., 2012; Laura, et al., 2013; DeSantibanes, et al., 2008).

In surgery for benign biliary strictures, reconstruction of the biliary system through HJA has become a standard procedure. The anastomosis is performed through modern suture in a single layer mucosa-to-mucosa using a jejunal arm Roux-en-Y. It was proved to be safe and feasible, even in high reconstructions simultaneously applying on several bile ducts (DeSantibanes, et al., 2008; Hotineanu, Ferdohleb, et al., 2005; Nagino, et al., 2002).

When performing HJA, different types of sutures of bile stump are applied to the intestine. Particularly important is the distance of suture application, the depth and the type of the suture. In current practice, the anastomosis is performed with ordinary sutures that are passed through all

layers. PDS suture material, Vycril 4/0-5/0 are accepted. We focus on a good eremitism, using sutures with a 2-3 mm step. The posterior lip is performed with the nodes in the lumen, and the anterior one with the nodes outside. The suture line is strengthened with up to 5 anterior sero-serous sutures only when necessary (Pleass, et al., 1998; Satoshi, et al., 2012).

Regardless of the biliary stump level, the precise mucosa-to-mucosa suture in a single plan of discontinued sutures and the placement of transanastomotic drainage tubes ensured a sufficient anastomosis with bile flow or remote strictures. It is quite important during high anastomosis, on the hilum level to drain each bile duct separately. Long-term outcome of these cases was reported as being comparable to low hepatico-jejuno-anastomosis (Sadiq, et al., 2012; Winslow, et al. 2009; Satoshi, et al., 2012; José, et al., 2010).

Hepp-Couinaud technique relies on the left extrahepatic hepatic duct. Fascia incision concentrated around the hepatic artery, portal vein and represents the "hilarium plaque", which allows easy exposure of the extrahepatic left hepatic duct. The left hepatic duct is an excellent choice for repairing proximal strictures because it is located under 4th segment and makes an optimal access to the stoma. In addition, it has a rich blood supply that is not affected by iatrogenic lesions, unlike the fragile blood supply of the common hepatic duct.

Remote results of HJA on Roux- en-Y loop are reported as very good by the majority of publications in the field, with excellent results in 85% of cases.

At least 5 years after the reconstruction are considered an optimal period of postoperative evaluation of the results. A series of studies underlines that two-thirds of complications occur within 2 years, 80% within 5 years, while 20% of failures may occur 5 years after the operation. According to L.H. Blumgart, 40% of re-strictures were identified after more than five years since the reconstructive surgery. Therefore, monitoring during the first five years or more is necessary for evaluating the results. In choosing the critical length of time, the professionals should consider comparing the results from different series of treatments (Leslie, et al., 2012).

Large international experience in studying the quality of life (QoL) presents promising opportunities of this method for all branches of clinical medicine and can be used with traditional indicators for monitoring the effectiveness of surgical treatment. There is currently no data on the level of disability and postoperative rehabilitation after reconstructive surgery. Therefore, we consider it important to study the future quality of life of patients with iatrogenic lesions and scar biliary strictures. The effectiveness of biliodigestive anastomoses should be evaluated in the immediate postoperative period and in time. Research of QoL can help solving the problem of patients' rehabilitation and their return to normal life.

Conclusions

The diagnosis and management of benign biliary strictures remain a challenge. Given the risks of septic biliary complications, the costs and the high associated morbidity due to repeated surgeries, an accurate diagnosis is crucial. Factors such as the detailed knowledge of the patient's medical history or embracing a multidisciplinary approach in managing treatment objectives have an important contribution to a satisfactory and lasting outcome. (Singh, et al., 2015).

The definitive goal of surgical management is to restore bile flow in the proximal gastrointestinal tract that prevents any reflux cholangitis, re-strictures of the biliary tree and chronic hepatobiliary pain.

Choosing the appropriate reconstructive surgical method to address iatrogenic biliary strictures depends on their localization. For type I strictures, an end-to-side choledochojejunostomy with a Roux-en-Y excluded loop is optimal. For the type II, the solution consists of a

choledochojejunostomy with a Roux-en-Y single loop, and in the case of a high upper extension of the stricture, we proceeded to hepaticojejunostomy with a Roux-en-Y excluded loop. For type III stenosis, an end-to-side hepaticojejunostomy with a Roux-en-Y excluded loop and transanastomotic drainage of the right and left hepatic ducts is applied. For type IV, a double hepaticojejunostomy with a Roux-en-Y excluded loop and mandatory transanastomotic drainage of both ducts is preferred.

A unified method for remote assessment of patients with postoperative biliary stricture would make possible a good estimation of the occurring complications and quality of life (QoL). Curently, it is important to know and evaluate the impact of biliary strictures and reconstructive operations on the patient's health and rehabilitation based on biomedical, physiological and socio-economic indices. Study of QoL, among the multitude of factors related to health, would allow a deeper analysis of multifactorial components of human health according to WHO criteria, namely the medical-physiological, psychological and social problems of the patient.

Bibliography:

1. Bachellier, P., Nakano, H., Weber, J.C., Lemarque, P., Oussoultzoglou, E., Candau, C., Wolf, P., Jaeck, D., 2001. Surgical repair after bile duct and vascular injuries during laparoscopic cholecystectomy: when and how? *World Journal of Surgery*, 25(10), pp.1335-1345.
2. Bektas, H., Schrem, H., Winny, M., Klempnauer, J., 2007. Surgical treatment and outcome of iatrogenic bile duct lesions after cholecystectomy and the impact of different clinical classification systems. *British Journal of Surgery*, 94(9), pp. 1119–1127.
3. Bergman, J.J., Burgemeister, L., Bruno, M.J., et al, 2001. Long-term follow-up after biliary stent placement for postoperative bile duct stenosis. *Gastrointestinal Endoscopy*, 54(2), pp. 154-161.
4. Bismuth, H., Majno P.E., 2001. Biliary stryctures: classification based on the principles of surgical treatment. *World Journal Surgery*, 25(10), pp.1241-1244.
5. Jarnagin, W.R., Belghiti J., Blumgart, L.H., 2012. *Blumgart's surgery of the liver, biliary tract, and pancreas*. Philadelphia: Elsevier Saunders.
6. De Santibáñes, E., Ardiles, V., Pekolj, J., 2008. Complex bile duct injures management. *HPB (Oxford)*, 10(1), pp. 4–12.
7. Hirano S., Tanaka, E., Tsuchikawa, T., Matsumoto, J., Shichinohe, T., Kato, K., 2012. Techniques of biliary reconstruction following bile duct resection. *Journal of Hepato-Biliary-Pancreatic Sciences*, 19(3), pp. 203–209.
8. Hotineanu, V., Ferdohleb, A., Hotineanu, A., 2005. Strategia chirurgicală în rezolvarea icterului obstructiv benign. *Chirurgia* (Revista Societatii Romane de Chirurgie), 100(3), pp. 241-250.
9. José, A., Sampaio, C. Kist K., Th., Passarin, L., 2010. Benign biliary strictures: repair and outcome with the use of silastic Trans-hepatic Trans-anastomotic stents. *ABCD. Arquivos Brasileiros de Cirurgia Digestiva*, 23(4), pp. 259-265.
10. Keith, D., Lillemoe, M.D., Genevieve, B., Melton, John, L., Cameron, M.D., et al., 2000, Postoperative Bile Duct Strictures: Management and Outcome in the 1990s. *Annals of Surgery*, 232(3), pp. 430–441.
11. Lau, W.Y., Lai, E.C., 2007. Classification of iatrogenic bile duct injury. *Hepatobiliary & Pancreatic Diseases International (HBPD INT)*, 6(5), pp. 459–463.
12. Alseidi, A., Wiebusch, A., Smith, R.K. and Helton, W.S., 2013. Bile Duct Injury. In: L.J. Moore, K.L. Turner, S.R. Todd, eds. *Common problems in acute care surgery.* London: Springer, pp. 273-292

13. Liu, H., Shen, Sh., Wang, Y., Liu, H., 2015. Biliary reconstruction and Roux-en-Y hepatico-jejunostomy for the management of complicated biliary strictures after bile duct injury. *International Surgery Journal*, 2(2), pp.179-186.
14. Mercado, M.A., Domínguez, I., 2011. Classification and management of bile duct injuries. *World Journal of Gastrointestinal Surgery (WJGS)*, 3(4), pp. 43–48.
15. Nagino, M., Kamiya, J., Kanai, M., Uesaka, K., Sano, T., Arai, T., Nimura, Y., 2002. Hepatico-jejunostomy using a Roux-en-Y jejunal limb via the retrocolic retrogastricroute. Langenbecks Archives of *Surgery*, 387(3-4), pp.188-189.
16. Patraşcu Tr., Burcoş Tr., Doran, H., Vereanu I., 2006. Injuries of the extrahepatic bile ducts in laparoscopic cholecystectomy. Chirurgia (Revista Societatii Romane de Chirurgie), 101(4), pp. 385-390.
17. Pleas, H.C.C. and Garden, O.J., 1998. Bile duct injury: prevention and management. In: C.D. Johnson and I. Taylor, eds. *Recent Advances in Surgery 21*. Edinburgh: Churchill Livingston, pp. 1-16.
18. Sikora, S.S., 2012. Management of Post-Cholecystectomy Benign Bile Duct Strictures. *Indian Journal of Surgery*, 74(1), pp. 22–28.
19. Sikora, S.S., Srikanth, G., Agrawal, V., Gupta, R.K., Kumar, A., Saxena, R., Kapoor, V.K., 2008. Liver histology in benign biliary stricture: fibrosis to cirrhosis … and reversal? *Journal of Gastroenterology and Hepatology*, 23(12), pp. 1879-1884. [online] Available at: <http://dx.doi.org/10.1111/j.1440-1746.2007.04901.x> [Accessed 30 October 2015].
20. Sikora, S.S., Srikanth, G., Sarkari, A., Kumar, A., Saxena, R., Kapoor, V.K., 2003. Hilar benign biliary strictures: need for sub classification. *ANZ Journal of Surgery* (Royal Australasian College of Surgeons), 73(7), pp. 484-488.
21. Strasberg, S.M., Hertl, M., Soper, N.J., 1995. An analysis of the problem of biliary injury during laparoscopic cholecystectomy. *Journal of the American College of Surgeons (JACS)*, 180 (1), pp.101–125.
22. Turcu, F., Dragomirescu, C., Pletea, S., Banescu, B., 2011. Problematica leziunilor iatrogene de cale biliară principală, sau o imagine a unui vârf de aisberg. *Chirurgia* (Revista Societatii Romane de Chirurgie), 106(2), pp.187-194.
23. Winslow, E.R., Fialkowski, E.A., Linehan, D.C., Hawkins, W.G., Picus, D.D., Strasberg, S.M., 2009. "Sideways": results of repair of biliary injuries using a policy of side-to-side hepatico-jejunostomy. *Annals of Surgery*, 249(3), pp.426–434.