PRACA ORYGINALNA
ORIGINAL ARTICLE

SELECTION OF BILIARY DECOMPRESSION METHOD FOR TREATMENT OF OBSTRUCTIVE JAUNDICE IN PATIENTS OF OLDER AGE GROUPS

WYBÓR METODY ODBARCZENIA DRÓG ŻÓŁCIOWYCH W LECZENIU ŻÓŁTACZKI MECHANICZNEJ U PACJENTÓW W STARSZYM WIEKU

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ABSTRACT

Introduction: The development of minimally invasive techniques allowed to expand the indications and possibility of performing surgeries in patients of elderly and old age with obstructive jaundice (OJ). However, the criteria for the selection of minimally invasive and open surgeries in patients with OJ remain undefined.

The aim: To study the efficacy of single or multiple-stage methods of biliary decompression for treatment of OJ in patients of older age groups.

Materials and methods: We have analyzed the results of surgical treatment in 140 patients with OJ of benign origin. The patients were divided in two groups: group I (n = 70) where two-stage minimally invasive methods were used and group II (n = 70) where single-stage minimally invasive and open surgeries were used. The average age was 75 ± 6.0 years. The average duration of OJ was 22 ± 3.7 days.

Results: The patients in group I were subjected to two-stage minimally invasive surgeries in 70 (50.0%) cases. The patients in group II were subjected to single-stage minimally invasive surgeries in 16 (11.4%) cases and to open surgeries in 54 (38.6%) cases. The average duration of hospital stay in patients of group I made 7.1 ± 1.5 days, and 11.2 ± 1.2 days in patients of group II. The patients of group I experienced complications in 5 (7.1%) cases and patients of group II experienced complications in 10 (14.3%) cases. 1 (1.4%) patient died.

Conclusions: Stepwise approach to minimally invasive surgeries in patients of elderly and old age with bile duct obstructions allows to reduce the frequency of postoperative complications down to 7.2% ($p < 0.05$). Single-stage correction is recommended for patients with hyperbilirubinemia of less than 100 mcmol/l and the duration of OJ of less than 14 days, with presence of compensated or subcompensated co-occurring pathology as well as in the absence of purulent cholangitis and biliary pancreatitis.

KEY WORDS: obstructive jaundice, endoscopic papillosphincterotomy, laparoscopic cholecystectomy, open cholecystectomy

Wiad Lek 2018, 71, 5, 996-1000

INTRODUCTION

The number of patients with OJ has been growing steadily over the past decades [1, 2]. The causes of bile duct obstructions can be either benign or malignant. The first group includes choledocholithiasis, stenosis papillitis, chronic indurative pancreatitis, bile duct strictures, papillary diverticula etc. The most frequent cause of OJ of nontumoral etiology is choledocholithiasis which is found in 30-85% of patients with cholelithiasis [3, 4]. The second place among the causes of OJ is occupied by neoplasms of pancreas, major duodenal papilla, bile ducts and gallbladder. [5]. Despite major successes in biliary surgery, the problem of restoration of bile duct permeability has not been fully solved. Today minimally invasive surgeries for correction of complicated biliary disorder are used alongside with traditional surgeries [6, 7]. The important benefits of minimally invasive surgeries are lower percentage of complications and fatalities, shorter length of hospital stay and fast medical and social rehabilitation of patients [8]. The development of minimally invasive techniques allowed to expand the indications and possibility of performing surgeries in patients of elderly and old age with OJ [9]. However, the criteria for the selection of minimally invasive and open surgeries in patients with OJ remain undefined [10].

THE AIM

To study the efficacy of single or multiple-stage biliary decompression for the treatment of OJ in patients of older age groups.

MATERIALS AND METHODS

In the period from 2002 to 2017 140 patients with OJ of benign origin were treated at the surgical clinic of the medical faculty No. 2 of National Pirogov Memorial Medical

University, Vinnytsya 83 (59.3%) patients were females and 57 (40.7%) patients were males. Age division was according to WHO guidelines. Most of the patients, i.e. 85 (60.7%), were of elderly age (60-75 years), 49 (35.0%) were patients of old age (75-90 years) and 6 (4.3%) were long-livers (more than 90 years). Average age was 75 ± 6.0 years. The duration of OJ for less than 14 days was diagnosed in 74 (52.8%), from 14 to 30 days in 46 (32.9%), for more than 30 days in 20 (14.3%) cases. The average duration of OJ was 22 ± 3.7 days.

Causes of OJ were: choledolithiasis in 78 (55.7%) of the patients, Mirizzi syndrome in 11 (7,9%), common bile duct strictures (CBD) in 5 (3.6%), stenosing papillitis in 18 (12.9%), chronic indurative pancreatitis in 10 (7.1%), cyst in the head of the pancreas in 3 (2.1%), duodenal ulcer (DU) penetrating into the hepatoduodenal ligament (HDL) in 1 (0.7%) and postcholecystectomy syndrome (PCS) in 14 (10.0%). PCS was caused by recurrent coledolithiasis in 4 (2.9%) cases, by residual choledolithiasis in 6 (4.3%) and by stenosing papillitis in 4 (2.9%).

Co-occurring pathologies were diagnosed in 140 of the patients, and namely: coronary heart diseases in 33 (23.6%), hypertension in 28 (20.0%), chronic obstructive pulmonary diseases in 24 (17.1%), atherosclerotic discirculatory encephalopathy in 20 (14.3%), diabetes mellitus in 18 (12.9%), peptic ulcer of stomach and duodenum in 12 (8.6%), varicose veins of the lower extremities in 32 (22.9%) and obliterating atherosclerosis of the lower extremities in 23 (16.4%). A combination of two and more of co-occurring disorders was observed in 50 (35.7%) cases.

General clinical, laboratory and instrumental research methods were used to diagnose bile duct obstruction. The indicators of cholestasis included: increase mainly in the direct fraction of bilirubin, cholesterol and alkaline phosphatase.

Instrumental research methods included: transabdominal ultrasonography (TUS), endoscopic ultrasonography (EUS), fibrogastroduodenoscopy (FGDS), endoscopic retrograde cholangiopancreatography (ERCP), intraoperative cholangiography (IOC), intraoperative cholangiometry and magnetic resonance imaging (MRI). A screening method for diagnostics of gallbladder and bile duct disorders was TUS performed on all the patients. Ecography was performed by means of the diagnostic apparatus Lodgiq-500 PRO Series GE. In all the patients with bile duct obstruction FGDS was performed by means of fibrogastroduodenoscope Pentax-290V. In order to inject contrast material directly into bile ducts, ERCP was performed using 10-20 ml of the water-soluble contrast agent and 3-5 ml for contrasting the main pancreatic duct. For contrasting bile ducts during the operation, IOC was performed by injecting 10-20 ml of 30% contrast agent through the cystic duct stump or during the puncture of bile ducts. If the cannulation of the major duodenal papilla was impossible, then EUS was performed by means of the diagnostic apparatus Olympus Exera EU M 60. MRI was performed on patients with pancreatic disorders by means of the computer tomograph Somatom-CR.

RESULTS AND DISCUSSION

TUS helped to diagnose bile duct dilatation (CBD diameter of more than 9 mm was evidence of biliary hypertension) and the presence of stones in bile ducts. At the same time, the exact number of stones in the CBD was determined in the course ERCP. The informativity of TUS in diagnosing the causes of OJ made 90 (64.3%). In 15 (10.7%) cases the unsatisfactory TUS results were caused: by marked meteorism in 6 (4.3%), obesity in 3 (2.1%), presence of multiple small stones (of less than 3 mm) in the terminal CBD in 4 (2.9%) and aerocholia in 2 (1.4%). In such cases EUS was used.

All the patients with OJ were subjected to FGDS which allowed to evaluate the form, dimensions of the major duodenal papilla, type and amount of bile secreted and to determine the possibility of performing further ERCP. FDGS was also used to perform a differential diagnostics of OJ between a stone wedged in the distal CBD and a pathology of the major duodenal papilla in 16 (11.4%) of the patients.

ERCP was performed in 60 (42.9%) cases. Choledolithiasis was diagnosed in 42 (30.0%) and stenosing papillitis in 18 (12.9%) of the patients. ERCP was unsuccesful in 25 (17.9%) of the patients due to a stone in the ampulla of the major duodenal papilla in 16 (11.4%), papillary diverticula in 7 (5.0%) and the state after the Billroth II stomach resection in 2 (1.4%). In such cases if the cannulation of the major duodenal papilla was impossible, then EUS was performed. EUS also allowed to objectively evaluate the ratio of a stone diameter and the terminal CBD. Complications after ERCP occurred in 6 (4.3%) of the patients: acute pancreatitis in 3 (2.1%), acute cholangitis in 1 (0.7%) and haemorrhage from the major duodenal papilla in 2 (1.4%) if ERCP was combined with EPS.

IOC was performed on 36 (25.7%) of the patients. In order to do it, contrast agent was injected into bile ducts trough the cystic duct stump in 19 (13.6%) and during the puncture of the CBD in 11 (7.9%) cases while performing open cholecystectomy (OC). During laparascopic cholecystectomy (LC) IOC was performed by way of cystic duct catheterization in 6 (4.3%) of the patients. Choledolithiasis was diagnosed in 20 (14.3%), Mirizzi's syndrome in 11 (7.9%) and the CBD stricture in 5 (3.6%). In 4 (2.9%) cases the patients experienced complications after the injection of the contrast agent into bile ducts: acute pancreatitis in 3 (2.1%) and acute cholangitis in 1 (0.7%).

MRI was used on 14 (10.0%) of the patients. In case of a pancreatic pathology MRI was performed to diagnose chronic indurative pancreatitis in 10 (7.1%) and a cyst in the head of the pancreas in 3 (2.1%), as well as to diagnose duodenal ulcer penetrating into the hepatoduodenal ligament in 1 (0.7%) patient.

In the course of the study the patients were divided into two groups: group I, where two-stage minimally invasive surgeries were performed, included 70 persons and group II, where single-stage minimally invasive and open surgeries were performed, included 70 of the patients.

Two-stage minimally invasive surgeries due to bile duct

obstruction were performed on 70 (50.0%) of the patients with hyperbilirubinemia of more than 100 mcmol/l, with the duration of OJ for more than 14 days, in the presence of purulent cholangitis and biliary pancreatitis caused by a stone in the ampulla of the major duodenal papilla and decompensated co-occurring pathology.

At the first stage in 3 (2.1%) cases in the presence of solitary stones of up to 5 mm in diameter localized in the distal CBD, endoscopic hydrostatic papillary balloon dilatation was performed. In another 40 (28.6%) of the patients with choledolithiasis EPS was performed. Spontaneous passage of stones of up to 10 mm in diameter occurred in 19 (13.6%) of the cases. Lithoextraction by means of Dormia basket (Olympus FG-22Q, Boston scientific trapezoid RX) was performed on 10 (7.1%) of the patients. In case of multiple stones, lithoextractors with a guide wire were used (Boston scientific trapezoid RX with guidewire PT2). Mechanical lithotripsy was performed by means of the lithotripter Olympus BML-201Q in 11 (7.9%) of cases with stones having the dimensions of 10-20 mm. Then the fragmented stones were removed by means of Dormia basket.

EPS was also performed on 18 (12.9%) of the patients with stenosing papillitis. Due to the presence of OJ, repeated gradual EPS were performed because rapid biliary decompression led to the progression of the liver failure. In 9 (6.4%) cases in the presence of purulent cholangitis, EPS was performed as well as nasobiliary drainage with a possibility of the CBD compression which allowed to perform stepwise decompression and bile duct sanitation. LC was performed at the second stage after liquidation of OJ and purulent cholangitis.

Single-stage minimally invasive surgeries were performed on 16 (11.4%) of the patients with the bilirubin level less than 100 mcmol/l, with the duration of OJ for less than 14 days, compensated or subcompensated co-occurring pathology as well as in the absence of purulent cholangitis and biliary pancreatitis. In the presence of stones of up to 5 mm located below the place where the cystic duct runs into the common bile duct, LC and lithoextraction were performed through cystic duct stump by means of Fogarty balloon catheter on 6 (4.3%) of the patients. In the presence of Mirizzi's syndrome type I in 7 (5.0%) of the cases LC was performed with external drainage of the CBD. 3 (2.1%) of the patients with stricture of the terminal CBD were subjected to endobiliary retrograde stenting (stent diameter was 7 Fr).

Single-stage open surgeries on bile ducts were performed in 54 (38.6%) cases. OC with choledocholithotomy was performed on 20 (14.3%) of the patients in the presence of stones of up to 20 mm which could not be removed by the transpapillary method. A probe-obturator for extrahepatic bile ducts (patent of Ukraine No. 104826) was used to perform lithoextraction with futher graduated decompression of bile ducts during the postoperative period. The probe-obturator is an elastic drainage tube 1 having a diameter of 2 mm. On the distal end of the probe there is an obturator balloon 2 of 2.0 cm in length and there are four openings 3 on the opposite walls of the probe. A fixator balloon 4 of 1.0 cm in length is located at a distance of 5.0 cm from the obturator balloon. The tube of the obturator balloon 5 and the tube of the fixator ballon 6 of 1 mm in diameter are connected with the respective balloons and their volume can be increased or decreased (fig. 1).

The probe-obturator was used in the following way: after OC the probe was extracted through the cystic duct stump in the CBD. Lithoextraction was performed by increasing the volume of the obturator balloon trough the respective tube. After liquidation of choledolithiasis and control of the completeness of choledolithotomy the probe was again inserted into bile ducts. The volume of balloons was increased through the respective tube by injecting physiological solution into them. The withdrawal of the probe from the cystic duct stump was prevented by means of balloon fixator. During the postoperative period, in order to prevent post-decompression liver dysfunction, the volume of the obturator balloon was gradually decreased which made it possible to perform a gradual decompression of bile ducts.

Due to obstruction of the distal CBD, choledochoduodenoanastomosis was formed by anti-reflux method and at the same time OC was performed on 28 (20.0%) of the patients: on 15 (10.7%) patients with choledolithiasis combined with stenosing papillitis, on 10 (7.1%) patients with chronic indurative pancreatitis and on 3 (2.1%) patients with a cist in the head of the pancreas. 6 (4.3%) of the patients were subjected to OC with Roux-en-Y hepaticojejunostomy on the excluded small bowel loop: with stricture of the CBD in 2 (1.4%) and Mirizzi's syndrome type II in 4 (2.9%).

Y-drainage (patent of Ukraine No. 101302) was used to prevent the leakage of bile into the abdominal cavity from the formed anastomosis. Y-drainage contains an elastic central drainage tube 1 having a diameter of 8 mm. On the distal end of the tube there are two lateral drainage tubes 2 having a diameter of 4 mm with openings 3 on their opposite walls. Lateral drainage tubes are connected with a central tube at a sharp angle (fig. 2).

After the formation of biliodigestive anastomosis, lateral drainage tubes were placed on the sides of the formed anastomosis and attached to the surrounding tissues with two ligatures in order to prevent their displacement. The drainage tube was exteriorized on the anterior abdominal wall through contraperture and connected to a permanent suction unit (5-10 water column cm). The use of vacuum device allowed to prevent the leakage of bile into the abdominal cavity.

Average indicators of the numerical score of acute physiological changes, age-related and chronic changes in state of health according to APACHE II system made 38.1 ± 3.0 in patients of group I and 24.3 ± 2.2 in patients of group II.

Average period of hospital stay for patients of group I made 7.1 ± 1.5 days. Average length of treatment in patients of group II made 11.2 ± 1.2 days.

Patients of group I experienced complications in 5 (7.1%) cases: in the form of clipped common bile duct in 1 (1.4%), cystic duct stump inefficiency in 1 (1.4%), acute pancreatitis in 1 (1.4%) and haemorrhage from the major duodenal papilla

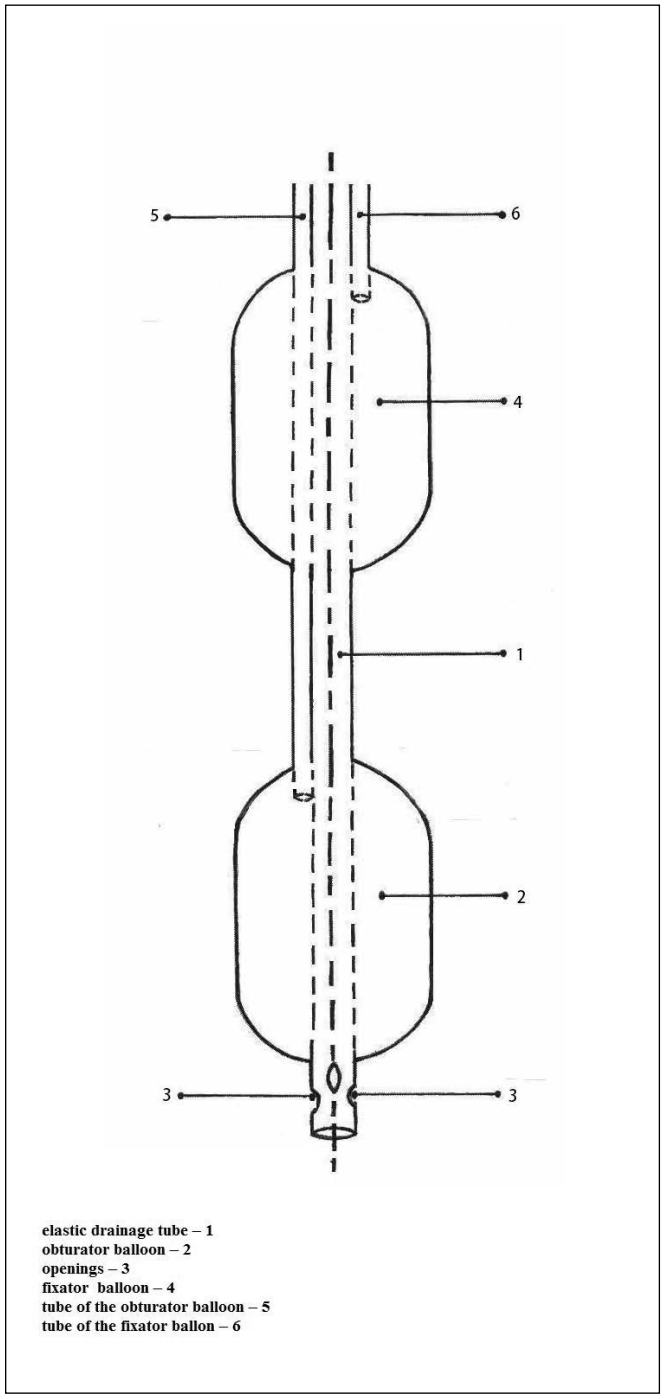

Fig 1. Probe-obturator for extrahepatic bile ducts.

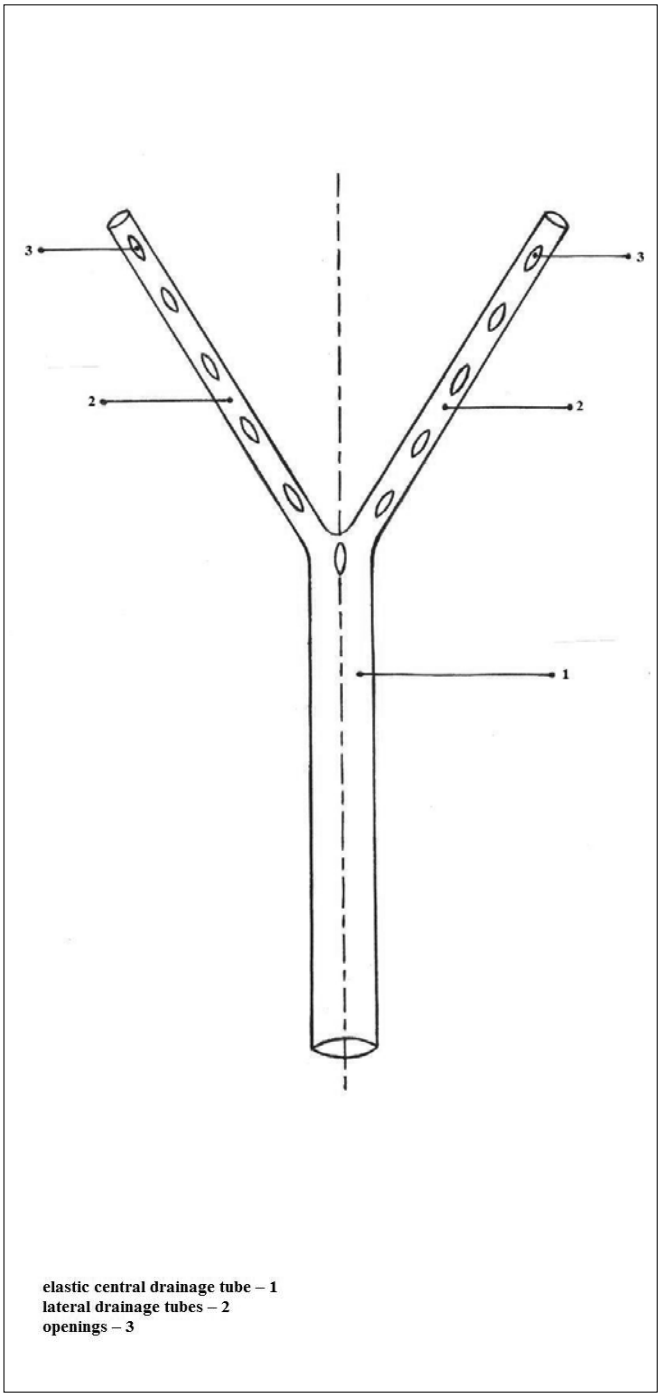

Fig 2. Y-drainage

after EPS in 2 (2.9%). There were no fatalities. Patients in group II experienced complications in 10 (14.3%) cases: injury of the CBD in 1 (1.4%), cystic duct stump inefficiency in 2 (2.9%), bile leakage from the CBD in 3 (4.3%), biliodigestive anastomosis insufficiency in 2 (2.9%) and cholemic bleeding during the postoperative period in 2 (2.9%). 1 (1.4%) patient with OJ died, cause of death was transmural myocardial infarction.

The statistical data analysis showed a statistically significant difference of the frequency of complications after two-stage and single-stage interventions ($p<0.05$) and the duration of hospital stay in patients of groups I and II ($p< 0.05$). The evaluation of long-term results based on the questionnaire SF-36 (Short Form-36) showed no real difference in the studied groups of patients.

CONCLUSIONS

1. Stepwise approach to minimally invasive surgeries in patients of elderly and old age with bile duct obstructions allows to reduce the frequency of postoperative complications down to 7.2% ($p< 0.05$).

2. Priority is given to two-stage surgical tactics in patients of elderly and old age with OJ. Single-stage correction is recommended for patients with hyperbilirubinemia of less than 100 mcmol/l and the duration of OJ for less than 14 days, in the presence of compensated or subcompensated co-occurring pathology as well as in the absence of purulent cholangitis and biliary pancreatitis.
3. Endoscopic transpapillary interventions are advisable when the patients have the following indications: papillary balloon dilatation with solitary stones of up to 5 mm in diameter, endoscopic PST in case of 5-10 mm stones, mechanical lithotripsy in case of 10-20 mm stones and transpapillary endobiliary stenting for prolonged biliary decompression in case of strictures of the terminal CBD.
4. In case of OJ, it is advisable to combine lithoextraction with a method of gradual decompression of bile ducts during the postoperative period in order to prevent post-decompression hepatic dysfunction.

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Authors' contributions:
According to the order of the Authorship.

Conflicts of interest:
The Authors declare no confict of interest.

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Received: 09.03.2018
Accepted: 22.05.2018