

R.A. Prykhidko, M.O. Dudchenko, M.I. Kravtsov, S.M. Zaiets, D.M. Ivashchenko,
A.L. Chelishvili, M.P. Shevchuk
Poltava State Medical University, Poltava

A THREE-STAGE THERAPEUTIC AND DIAGNOSTIC ALGORITHM IN MECHANICAL JAUNDICE OF DIFFERENT GENESIS AND THE MOST EFFECTIVE MINI-INVASIVE METHOD OF ITS TREATMENT

e-mail: romanprihidko@gmail.com

The paper analyzes the experience of treatment of mechanical jaundice with the use of minimally invasive surgical interventions in 176 patients. It has been found that the clinical presentation, laboratory parameters are of secondary importance in determining the etiology and level of biliary obstruction. For the differential diagnosis of etiological factors of obstructive jaundice, we used non-invasive and minimally invasive radiological methods: ultrasound – 203, magnetic resonance cholangiopancreatography – 98, multislice computed tomography – 74, endoscopic retrograde cholangiopancreatography – 138, percutaneous transhepatic cholangiography – 27. In order to determine the informativeness, we evaluated the detection of concretions, strictures of the bile ducts, mass lesions, dilation of intra- and extrahepatic bile ducts. Methods of elimination of biliary hypertension were various types of endoscopic decompression, which were performed in combination with endoscopic retrograde cholangiopancreatography and percutaneous transhepatic cholangiography. We compared the following aspects: the possibility of performing these types of decompression of the bile ducts, their effectiveness in eliminating jaundice and complications. Based on our results, we developed a 3-stage diagnostic and treatment algorithm, whose efficiency in the elimination of mechanical jaundice was 96.0 %.

Key words: mechanical jaundice, biliary decompression, percutaneous transhepatic cholangiography, magnetic resonance cholangiopancreatography, endoscopic retrograde cholangiopancreatography.

Р.А. Прихідько, М.О. Дудченко, М.І. Кравців, С.М. Засць, Д.М. Івашенко,
А.Л. Челішвілі, М.П. Шевчук

ТРЬОХЕТАПНИЙ ЛІКУВАЛЬНО-ДІАГНОСТИЧНИЙ АЛГОРИТМ ПРИ МЕХАНІЧНІЙ ЖОВТЯНИЦІ РІЗНОГО ГЕНЕЗУ ТА НАЙБІЛЬШ ЕФЕКТИВНИЙ МІНІІНВАЗИВНИЙ МЕТОД ЇЇ УСУНЕННЯ

Проаналізований досвід лікування механічної жовтяниці із застосуванням мініінвазивних хірургічних втручань у 176 пацієнтів. Встановлено, що клінічна картина, лабораторні показники мають другорядне значення у визначенні етіології та рівня біліарної обструкції. Для диференційної діагностики етіологічних факторів обтураційної жовтяниці застосовували неінвазивні та мініінвазивні променеві методи дослідження: ультразвукове – 203, магнітно-резонансну холангіопанкреатографію – 98, мультиспіральну комп'ютерну томографію – 74, ендоскопічну ретроградну холангіопанкреатографію – 138, черезшкірно черезпечнікову холангіографію – 27. З метою визначення інформативності оцінювали виявлення конкрементів, стриктур жовчних протоків, об'ємних утворень, розширення внутрішньо- та позапечінокових жовчних протоків. Методами ліквідації біліарної гіпертензії були різні види ендоскопічної декомпресії, які виконувались в комбінації із ендоскопічною ретроградною холангіопанкреатографією та черезшкірно черезпечніковою холангіографією. Порівнювались: можливість виконання цих видів декомпресії жовчовивідних протоків, їх ефективність ліквідації жовтяниці та ускладнень. На основі отриманих нами результатів розроблений 3-етапний діагностичний та лікувальний алгоритм, ефективність якого в ліквідації механічної жовтяниці склала 96,0 %.

Ключові слова: механічна жовтяниця, біліарна декомпресія, черезшкірно черезпечнікова холангіографія, магнітно-резонансна холангіопанкреатографія, ендоскопічна ретроградна холангіопанкреатографія.

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According to modern literature, in the next 10–15 years, the incidence of diseases of gastrointestinal organs in the world will have increased by 30–50 %, which is explained, for the most part, by lifestyle and nutrition, as well as hereditary factors [1, 3, 4]. Over the past few years, there has been a steady trend of increasing the number of diseases that are accompanied by impaired bile passage and as a consequence of biliary hypertension. Every year, the number of patients with mechanical jaundice (MJ) of various etiologies increases in Ukraine and around the world [1, 2]. The urgency of this problem is growing every year, which is especially important for residents of large cities. In Ukraine, the prevalence of diseases of the biliary system over the past 10 years has doubled and amounts to 41 per 1.000 population [2, 5, 7].

Despite the increasing incidence of diseases of the hepatopancreatoduodenal system, accompanied by MJ, their differential diagnosis remains difficult. This is due to the lack of pathognomonic clinical and laboratory signs, and the peculiarity of anatomical and physiological relationships [6, 9].

At the same time, in 10–42 % of patients, even modern examination methods do not allow to quickly establish the nature and cause of jaundice [8, 10]. Lack of opportunity to ensure timely

decompression of the bile ducts (BD), to conduct the necessary surgery is a prerequisite for the development of severe complications such as liver failure, purulent cholangitis, liver abscesses, biliary sepsis. The frequency of these complications remains at a fairly high level and does not have a noticeable downward trend and according to various authors is 35–54 % [12, 14].

Timely and sound preoperative diagnosis largely determines the prognosis of the disease, as it allows us to choose the optimal method of treatment and postoperative rehabilitation. Urgent surgery in patients with MJ is accompanied by a large number of complications, reaching 15-30 %, which is four times higher than in cases where jaundice can be eliminated before surgery [11].

Thus, the relevance of using the examination methods, which have high reliability, accuracy and allow us to quickly diagnose and initiate appropriate treatment, is obvious. Currently, the feasibility of a two-stage approach to surgical treatment of patients in this category is generally acknowledged. In the first stage, minimally invasive techniques are used, which allow us to achieve biliary decompression and resolution of MJ conditions with the lowest risk; in the second, surgeons perform a radical operation to eliminate etiological factors [13, 14].

The purpose of the study was to perform a comparative analysis of different methods of diagnosis and minimally invasive decompression of the bile ducts in order to identify the most effective treatment and diagnostic algorithm for mechanical jaundice of various origins.

Materials and methods. We analyzed the results of examination and decompression of BD by minimally invasive methods for MJ in 176 patients (women – 62.4 %, men – 37.6 %). The age of patients ranged from 21 to 87 years.

To assess the validity of the relationship between the etiological factor of MJ with the clinical presentation and the duration of the disease, a criterion was used, such as the period from the occurrence

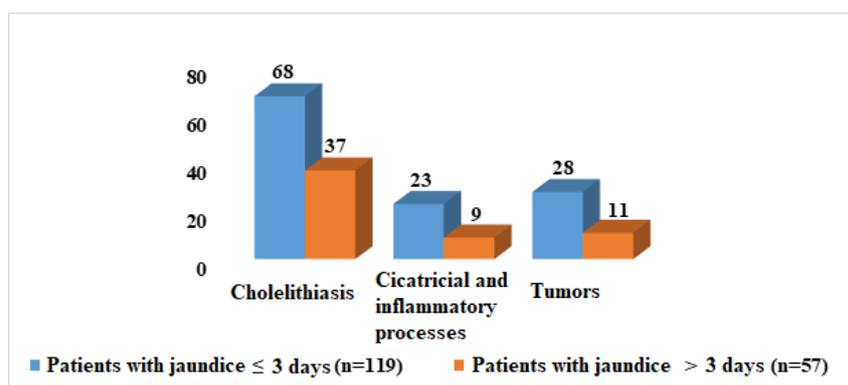


Fig. 1. The etiology of jaundice depending on the duration of the disease

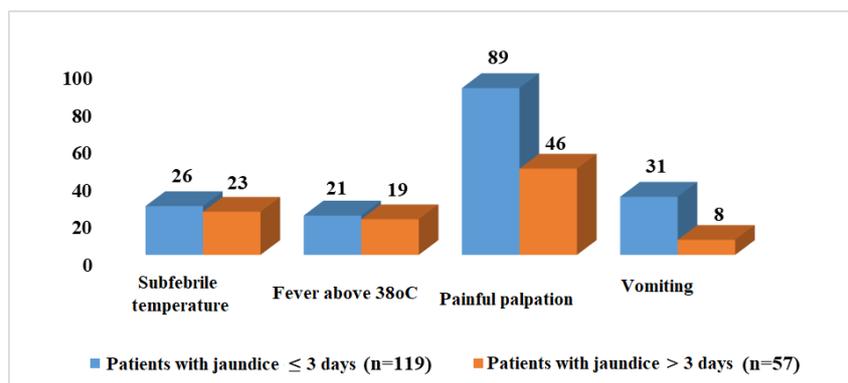


Fig. 2. Clinical symptoms depending on the duration of jaundice

The diagnostic algorithm used by us did not change depending on the clinical presentation and anamnesis data.

We conducted the analysis of MJ complications depending on the duration of the disease. Complicated MJ was observed in 67 (38.01 %) patients. Purulent cholangitis was diagnosed in 42 patients. Cholangiogenic liver abscesses as a consequence of purulent cholangitis occurred in 5 patients. Liver failure developed quite often (in 10 patients), the criteria for which were a decrease in albumin and prothrombin in combination with signs of encephalopathy. Acute ulcers of the upper gastrointestinal tract (GIT) were diagnosed with esophagogastroduodenoscopy in 11 patients (fig. 3).

of icteric sclera and/or skin to the time of hospitalization in a surgical hospital. In the first 72 hours (3 days) 119 (67.6 %) patients were hospitalized, and in 57 (32.4 %) patients, jaundice occurred more than 3 days ago.

In the course of our research, no clinical symptoms were found that were pathognomonic for a certain etiology of jaundice or the level of external obstructive obstruction. The dependence of the frequency of pain on the timing of hospitalization was found, but in a comprehensive analysis, no significant relationship between the clinical presentation, duration of the disease and etiological factors of MJ was detected (fig.1, 2).

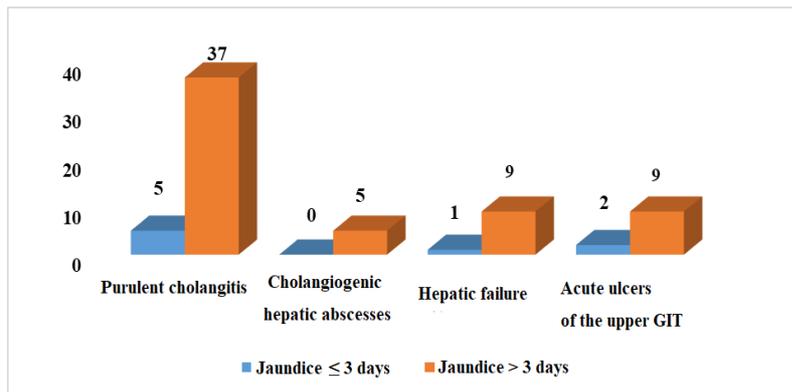


Fig. 3 Complications of mechanical jaundice

Screening methods of laboratory and instrumental diagnostics were clinical and biochemical analysis of blood, examination of the hemostasis system, ultrasound (USD), esophagogastroduodenoscopy (EGD).

An increase in total bilirubin in the biochemical analysis of blood to 100 $\mu\text{mol/l}$ was observed in 124 patients, up to 200 $\mu\text{mol/l}$ – in 38, more than 200 $\mu\text{mol/l}$ – in 14 patients. Increased levels of indirect bilirubin were observed in 73 % of patients with jaundice lasting less than 3 days and in 96 % of patients with jaundice lasting more than 3 days, indicating the development of cholestasis syndrome in long-term MJ. Analysis of the obtained laboratory data indicates the absence of pathognomonity of these changes.

EGD was performed in 174 patients to assess the passage of bile into the duodenum, the possibility of performing Endoscopic retrograde cholangiopancreatography (ERCP), examination of the major duodenal papilla (MDP).

Visible bile passage was not observed in 147 patients, parafaternal diverticulum was diagnosed in 7 cases, tissue tumors in the MDP area, available for biopsy, – in 4 patients. Acute upper gastrointestinal ulcers were found in 11 patients.

For differential diagnosis of MJ, we used non-invasive methods: ultrasound, EGD, magnetic resonance cholangiopancreatography (MRCP), multi-slice computed tomography (MSCT), as well as invasive methods: endoscopic retrograde cholangiopancreatography (ERCP), percutaneous transhepatic cholangiography (PTC). Direct X-ray contrast methods in all cases were used the last thing as the final stage of the diagnostic algorithm.

Ultrasound was performed as a screening method for all hospitalized patients within 2 hours from the moment of hospitalization. A total of 203 examinations were performed, 24 patients were re-examined during the day.

MRCP has additional advantages of three-dimensional visualization of all bile ducts and pancreatic duct. This study was performed on 98 patients once. MSCT was performed on 74 patients. Direct X-ray contrast methods (ERCP or PTC) were performed 165 times. The undoubted advantage of these methods is the possibility of their simultaneous combination with various decompression interventions.

Results of the study and their discussion. To determine the informativeness of radiological diagnostic methods, we evaluated the following criteria: 1. Dilation of intrahepatic ducts (4 mm or more). 2. Dilation of the external hepatic ducts (8 mm or more). The presence of concrements. 4. The presence of strictures of BD. 5. The presence of three-dimensional formations.

Ultrasound with high accuracy allowed us to determine the dilation of the hepatic and extrahepatic bile ducts, which in combination with hyperbilirubinemia was the main diagnostic criterion that confirmed the mechanical nature of jaundice. In terms of detection of concrements and mass lesions (tumors), ultrasound is significantly inferior to MRCP and direct X-ray contrast methods (Table 1).

Only in 52 % of patients, ultrasound permitted to identify the cause and level of the block in MJ, the data obtained were sufficient to select a method of minimally invasive decompression of BD. To visualize the structures that are often the main cause of MJ, determining their location and length, the method is considered uninformative. Thus, ultrasound, given its availability and ease of use, can be recommended as a screening diagnostic method that allows us to determine with high accuracy the mechanical nature of jaundice and a number of observations to make an accurate preoperative diagnosis.

Thus, we detected the dependence of the frequency of complications on the duration of jaundice, which was a confirmation of the need for rapid preoperative diagnosis.

Based on the above, the need for developing a universal diagnostic algorithm, independent of the clinical presentation and anamnestic data, which can be implemented in the shortest possible time, is obvious.

Comparative analysis of the informativeness of examination methods

| Index | USD (n=203) | | MRCP (n=98) | | MSCT (n=74) | | ERCP (n=138) | | PTC (n=27) | |
|---------------------------------|-------------|------|-------------|------|-------------|------|--------------|------|------------|------|
| | abs | % | abs | % | abs | % | abs | % | abs | % |
| Dilated intrahepatic bile ducts | 125 | 61.6 | 71 | 72.7 | 47 | 64.7 | 101 | 73.3 | 26 | 97.1 |
| Dilated extrahepatic bile ducts | 159 | 78.7 | 94 | 96.5 | 67 | 91.6 | 134 | 97.3 | 22 | 81.2 |
| Concrements | 56 | 28.0 | 41 | 42.7 | 26 | 35.3 | 59 | 42.8 | 1 | 5.8 |
| Strictures of BD | 12 | 6.0 | 46 | 46.9 | 15 | 21.0 | 65 | 47.1 | 5 | 20.3 |
| Mass lesions | 48 | 23.9 | 28 | 29.4 | 24 | 33.6 | 36 | 26.2 | 23 | 85.5 |

According to its diagnostic value, MRCP corresponds to a method of direct radiography under all investigated criteria. In most cases, it was possible to determine the level of biliary block, its cause and choose the optimal method of decompression of BD. MRCP clearly visualizes the gallbladder, intra- and extrahepatic bile ducts, choledocholithiasis regardless of the location of concrements, tumor processes localized in the area of the gastrointestinal tract, parenchyma of the liver and pancreas, one can also specify the spatial relationship between the common bile duct with the head of the pancreas and duodenum. The advantage of MRCP over ERCP and PTC along with its non-invasiveness, is the ability to contrast the ducts before and after the site of their obturation, as well as assessment of the structure of the hepatopancreatoduodenal area. In our opinion, MRCP is the method of choice in all cases where ultrasound does not allow us to make an accurate preoperative diagnosis.

MSCT demonstrated the highest informativeness in detecting and assessing the prevalence of tumors in the parenchymal organs of the hepatopancreatoduodenal area, but was less sensitive in the diagnosis of concrements, intraductal pathological alterations than MRCP and direct X-ray contrast methods. MSCT should be used as a clarifying method in the presence of tumor lesions.

Attempts to perform ERCP were performed 129 times in 121 patients, but BD contrasting was achieved in 123 cases, the diagnostic significance was 95.3 %. The reasons for the impossibility of cannulation of the common bile duct with subsequent contrasting were the presence of gross deforming stenosis, mainly tumor, in the papilla, anatomical features of the duct system, intradiverticular location of the MDP. In most of these cases, subsequently performed PTC. Repeated examinations were required to replace the non-functioning stent, re-lithoextraction, in all these observations, biliary hypertension persisted at the time of ERCP. When assessing the detection of dilated intrahepatic bile ducts, it should be kept in mind that in 12 patients they could not be contrasted due to complete block.

We attempted to conduct PTC 53 times in 44 patients. In 2 patients, we did not manage to perform a puncture of the bile ducts, the diagnostic value of the method was 95.5 %. The need for re-examinations was associated with replacement of the drainage, and in some cases, there were no signs of biliary hypertension, so the comparative analysis included only 44 PTC procedures, performed for the first time. It should also be taken into account that PTC was performed mainly in patients with tumors. This explains the low detection of concrements and strictures.

Analysis of the cholangiograms obtained by ERCP and PTC gives a fairly accurate pattern of changes in the biliary tract, allows us to detect concrements in the ducts with the smallest diameter of 2 mm. It is more difficult to determine with high probability the nature of extraductal mass lesions, which can be estimated only on the basis of indirect signs. These changes may be due to chronic indurative pancreatitis, cysts, tumors.

In order to resolve jaundice as quickly as possible, we used minimally invasive endoscopic or percutaneous transhepatic methods of biliary decompression, which combine high diagnostic and therapeutic value with minimal trauma. These are effective ways to restore the passage of bile in obstruction of the gastrointestinal tract, which allows us to quickly eliminate the MJ and its complications in the form of cholangitis. The second stage of surgical treatment, if necessary, was carried out under more favorable conditions, in a scheduled manner. Indications for the use of a method of decompression of BD were established individually, depending on the clinical situation, the nature, level and length of the bile duct, the prognosis of the disease.

After performing ERCP, various procedures were conducted to determine the cause and level of the block, which ensured the decompression of the BD. The latter included endoscopic papillosphincterotomy (EPS), revision of the bile ducts using Dormia basket forceps and Fogarty catheter with the possibility of contact lithotripsy and lithoextraction, stenting, nasobiliary drainage. EPS demonstrated high effectiveness in the elimination of jaundice caused by choledocholithiasis, cicatricial

and inflammatory strictures of the terminal choledochus, stenotic papillitis. In the presence of tumor stenosis, in most cases we performed papillosphincterotomy before stenting. When concretions were detected in hepaticocholodosis, EPS was always performed by revision of the latter, in case of need for contact lithotripsy and lithoextraction, the efficiency was 91.4 %. Transpapillary endoprosthesis replacement was performed in tumors of the pancreatobiliary area and long strictures with an efficiency of 72.3 %. The need for nasobiliary drainage arose in severe jaundice and cholangitis in conditions where the sanitation of hepaticocholodoch was incomplete and bile flow was not fully restored. Nasobiliary drainage allowed us to wash the bile ducts with solutions of antibiotics and antiseptics, which contributed to the rapid elimination of cholangitis.

It was not possible to perform decompression of BD in 8 patients, which was due to gross deformation and anatomical features in the papilla, intradiverticular location of MDP, technical difficulties. In these cases, biliary decompression was achieved by PTC in 3 cases, by repeated endoscopy in 2, and with open surgery in 3 cases.

Of the complications of ERCP and various types of endoscopic decompression, only reactive pancreatitis was detected. Pancreatic necrosis with destruction of the pancreas occurred in 1 patient. PTC has always been combined with external drainage of BD. In 2 (7.4 %) cases after PTC, jaundice could not be resolved, there was a further increase in hyperbilirubinemia, one patient underwent re-drainage of BD with a positive result. The efficiency of the method was 96.3 %. One patient had a complication of intra-abdominal bleeding during PTC that required surgery. There were no fatalities related to the examination and drainage.

Based on the obtained data, a 3-stage medical-diagnostic algorithm has been developed, which can be quickly implemented.

At the first stage, all patients are screened by ultrasound and EGD, which allow us to reliably confirm the mechanical nature of jaundice, to detect tumors in the area of MDP, to assess the possibility of performing ERCP. In some cases, one can determine the cause and level of biliary block (choledocholithiasis, tumor lesions). Detection of choledocholithiasis is an indication for ERCP and endoscopic decompression of BD. However, in a large number of patients it is impossible to make an accurate diagnosis in the first stage. This is observed when MJ is caused by cicatricial strictures and cholangitis, intraductal tumors and small concretions, and in the absence of clear ultrasound imaging of the common bile duct and pancreatic head due to flatulence or other causes.

In the second, refining stage of the algorithm, which aims to determine the cause and level of biliary block in all cases, we used MRCP and MSCT. In the presence of a mass lesion similar to a tumor, detected by USD, we performed MSCT, in other patients – MRCP. If the MRCP revealed a tumor lesion, the examination was also supplemented with MSCT to assess the spread of the process. The data obtained at this stage are sufficient to select an adequate method of direct cholangiography and minimally invasive decompression [3].

The third stage is a combination of diagnostic X-ray contrast methods and drainage interventions. Performing ERCP followed by endoscopic decompression is indicated for choledocholithiasis, strictures of the terminal part of the common bile duct, stenotic papillitis, tumor lesions MDP [3]. PTC with drainage of BD should be used in severe biliary block, usually due to tumor lesions of the liver, as well as in the impossibility or ineffectiveness of endoscopic decompression [2]. In the case of tumor lesions in the head of the pancreas, common bile duct, the choice of direct cholangiography and decompression should be decided individually, taking into account the location, size, spread of the tumor, the possibility of radical surgery.

Conclusion

Thus, the effectiveness of treatment of patients with mechanical jaundice depends on many factors, among which the causes, duration and severity of the disease, as well as the presence of complications, are the most significant.

As a result of our research, it was proved that the clinical presentation and laboratory parameters are uninformative in determining the etiology of mechanical jaundice and the level of biliary block, and, accordingly, in the choice of optimal treatment.

The analysis of the feasibility, informativeness, effectiveness, frequency of complications of USD, EGD, MRCP, MSCT, ERCP, PTC, PTHC, methods of endoscopic restoration of bile passage allowed us to develop a 3-stage diagnostic and therapeutic algorithm that can be implemented in the shortest possible time the presence of mechanical jaundice and lack of indications for urgent surgical treatment. In the process of implementing this algorithm, it is possible to establish the location and nature of the bile duct

block, the prevalence of the pathological process on the surrounding organs and tissues, to perform decompression of BD, as the first stage of surgical treatment in an optimal way. The efficiency in the resolution of mechanical jaundice was 96.0 %.

References

1. Dutka YaR, Chuklin SM. Suchasni metody khirurhichnoyi korektsiyi mekhanichnoyi zhovtianytsi u khvorykh na kholelitiaz. Shpytalna khirurhiia: Ukrainskyi naukovo-praktychnyi zhurnal. 2014; 2(66):23–26. [In Ukrainian]
2. Nechitaylo ME, Zakharash YuM, Ogorodnik PV, Zakharash MP. Mekhanicheskaya zheltukha i kholangit pri kholedokholitiazе (diagnostika i khirurgicheskaya taktika). Kiev; 2015. 6–7 [In Ukrainian]
3. Skrypnik IM, Maslova HS, Radionova TO, Yakymishyna LI. Funktsionalni rozlady zhovchnoho mikhura i sfinktera Oddi: patofiziologichni mekhanizmy, diahnostychni kryteriyi ta likuvannia: Visnyk problem biolohiyi i medytsyny. 2019; 2, 2 (151) 13–19. doi 10.29254/2077-4214-2019-2-2-151-13-19 [In Ukrainian]
4. Shevchuk MP, Dudchenko MO, Ivashchenko DM, Kravtsiv MI, Prykhidko RA. Suchasni aspekty vidnovlennia pasazhu zhovchi pry zhovchnokamianiy khvorobi uskladneniy mekhanichnoyi zhovtianytsiu. Aktualni problemy suchasnoyi medytsyny: Visnyk Ukrainskoyi medychnoyi stomatolohichnoyi akademiyi. 2021; 21, 2 (74). 93–96. doi.org/10.31718/2077–1096.21.2.93. [In Ukrainian]
5. Shevchuk MP, Dudchenko MO, Ivashchenko DM, Kravtsiv MI, Prykhidko RA. Syndrom “shvydkoi” biliarnoyi dekompresii pry obturatsiyi zahalnoyi zhovchnoyi protoky riznoho henezu. Aktualni problemy suchasnoyi medytsyny: Visnyk Ukrainskoyi medychnoyi stomatolohichnoyi akademiyi. 2021; 21, 4 (76). 94–97. doi.org/10.31718/2077–1096.21.4.94. [In Ukrainian]
6. Bergeron E, Desilets E, Maniere T, Bensoussan M. Same-day endoscopic ultrasound, retrograde cholangiopancreatography and stone extraction, followed by cholecystectomy: A case report and literature review. Int J Surg Case Rep. 2020; 70:115–118. doi: 10.1016/j.ijscr.2020.04.063. Epub 2020 May.
7. Bismuth H, Majno PE. Biliary strictures: classification based on the principles of surgical treatment. World J Surg. 2001; 25:1241–1244.
8. Dasari BVM, Tan CJ, Gurusamy KS, Martin DJ, Kirk G, McKie L, Daimond T, Taylor MA. Surgical versus endoscopic treatment of bile duct stones. The Cochrane Collaboration. Cochrane Hepato–Biliary Group; 2013. 238–239 p. doi: 10.1002/14651858.CD003327.pub3.
9. Garcés-Albir M, Martí-Fernández R, Martínez-Fernández G, Peña-Aldea A, Muñoz Forner E, Sanchiz-Soler V, et.al. The role of endoscopic retrograde cholangiopancreatography in the management of iatrogenic bile duct injury after cholecystectomy. Rev Esp Enferm Dig. 2019 Sep; 111(9):690–695. doi: 10.17235/reed.2019.6245/2019.
10. Hatzidakis A, Venetucci P, Krokidis M, Iaccarino V. Percutaneous biliary interventions through the gallbladder and the cystic duct: What radiologists need to know. Clin Radiol; 2014. 174–175 p. doi: 10.1016/j.crad.2014.07.016.
11. Hernández R, Pontillo M, Chinelli J, Rodríguez G. Cholangiography: Rare anatomical variation of the bile duct. Cir Esp. 2018 Dec; 96(10):654. doi: 10.1016/j.ciresp.2018.05.006.
12. Jain A, Mehta N, Secko M, Schechter J, Papanagnou D, Pandya S, Sinert R History, Physical Examination, Laboratory Testing, and Emergency Department Ultrasonography for the Diagnosis of Acute Cholecystitis. Acad Emerg Med. 2017 Mar; 24(3):281–297. doi: 10.1111/acem.13132.
13. Littlefield A, Lenahan C. Cholelithiasis: Presentation and Management. J Midwifery Womens Health. 2019 May; 64(3):289–297. doi: 10.1111/jmwh.12959.
14. Qayed E, Shah R, Haddad YK. Endoscopic Retrograde Cholangiopancreatography Decreases All–Cause and Pancreatitis Readmissions in Patients With Acute Gallstone Pancreatitis Who Do Not Undergo Cholecystectomy: A Nationwide 5–Year Analysis. Pancreas. 2018 Apr; 47(4):425–435. doi: 10.1097/MPA.0000000000001033.
15. Yildirim M, Dasiran F, Ozsoy U, Daldal E, Kocabay A, Okan I. The Efficiency of Laparoscopic Common Bile duct exploration in endoscopic retrograde–cholangiopancreatography–limited setting in a peripheral university hospital. J Laparoendosc Adv Surg Tech A. 2020 Sep 9; doi: 10.1089/lap.2020.0525.

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