American Journal of Medicine and Medical Sciences 2024, 14(7): 1945-1947
DOI: 10.5923/j.ajmms.20241407.45

Advantages of Hybrid Minimally Invasive Interventions in the Treatment of Patients with Complicated Forms of Cholelithiasis

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Abstract The article discusses the technique of surgical treatment of patients with complicated forms of cholelithiasis, using hybrid minimally invasive technologies (laparoscopic and endoscopic method in an X-ray surgical operating room). In the period from 2018, 1175 patients with acute cholecystitis were operated on. Of these, 155 (13.1%) patients had a combination of acute cholecystitis with the presence of stones in the extrahepatic bile ducts with mechanical jaundice and cholangitis. Hybrid minimally invasive technologies for bile duct sanitation in this group were used in 79 patients. The conversion rate to open access was 15% (12 patients), postoperative complications in the early postoperative period were noted in 11.4% (9) of patients. Postoperative mortality was 5.06%. Hybrid minimally invasive operations on the gallbladder and bile ducts in complicated forms of cholelithiasis are a low-traumatic intervention with a minimum number of postoperative complications. In the absence of contraindications, this technology can be widely used in institutions providing emergency surgical care.

Keywords Cholelithiasis, Choledocholithiasis, Cholangitis, Hybrid minimally invasive interventions, Endoscopic Pancreatic sphincterotomy, Indications and complications

1. Objective

Improving the treatment results for patients with complicated forms of cholelithiasis by using hybrid technologies (laparoscopic, endoscopic, in an X-ray surgical operating room).

2. Relevance of the Problem

Up to 85 thousand patients with acute surgical diseases of the abdominal cavity are hospitalized annually in Uzbekistan [4,6]. In percentage terms, about 0.5% of the country's population annually require emergency surgical care. This group of diseases includes: acute cholecystitis, acute appendicitis, acute pancreatitis, perforated ulcer, acute intestinal obstruction, strangulated hernia and ulcerative gastroduodenal bleeding. Surgical activity in this pathology is high, averaging 60% [5,7]. In recent years, the leader in the number of operations in general surgical departments has become patients with acute cholecystitis due to cholelithiasis [2,9]. In Uzbekistan, laparoscopic cholecystectomy has become the "gold standard" for the treatment of calculous cholecystitis (with isolated cholecystolithiasis) [1,10]. However, complicated forms of cholelithiasis in the presence of stones not only in the gallbladder, but also in the extrahepatic bile ducts remain the cornerstone of surgery, prompting surgeons to search for the most optimal solutions to this most important problem of abdominal surgery.

Received: Jul. 3, 2024; Accepted: Jul. 23, 2024; Published: Jul. 26, 2024
Published online at http://journal.sapub.org/ajmms

3. Materials and Methods

From 2022, 1,175 patients with acute cholecystitis aged 18 to 86 years were operated on, among them laparoscopic cholecystectomy was performed in 1,102 patients (93.7%). The combination of acute cholecystitis with stones in the extrahepatic bile ducts with mechanical jaundice and cholangitis was detected in 155 (13.1%) patients. To relieve jaundice and cholangitis in 79 cases, we used hybrid-minimally invasive technologies for sanitation of the bile ducts. The essence of the technique is the one-stage use of a laparoscopic approach to the common bile duct, with revision of the lumen of the latter using a flexible endoscope-choledochoscope. In an operating room equipped with a mobile X-ray surgical system of the C-arm type.

The average age of patients with choledocholithiasis was 72 years. The diagnostic minimum before surgery is an "expert" ultrasound of the abdominal cavity and a comprehensive laboratory study. In isolated, complex cases, multispiral computed tomography or magnetic resonance cholangiopancreatography was performed before surgery. The following preoperative criteria were used as indications for the hybrid technology: the presence of single stones in the common bile duct with a diameter over 10 mm; low probability of successful retrograde endoscopy with papillosphincterotomy and lithoextraction; absence of contraindications for laparoscopy. All surgeries were performed in an operating room equipped with a mobile X-ray system with the ability to perform intraoperative cholangiography in real time. In addition to the laparoscopic stand, a flexible endoscopy stand was additionally used with the output of the choledochoscope image to a separate monitor. For the laparoscopic cholecystectomy, four trocars were utilised at standard sites. In addition, one to two trocars with a diameter of five millimetres were inserted for the choledochoscope and to suture the common bile duct. The first stage of the operation was cholangiography by cannulation of the cystic duct with the introduction of a water-soluble contrast agent. If obstruction of the bile ducts by a stone was confirmed, the supraduodenal part of the common bile duct was mobilized. The gallbladder was used for cranial traction of the liver and creation of a working space. The common bile duct was opened in the supraduodenal part longitudinally. A choledochoscope was inserted through this incision. Under its control, the distal part and proximal parts of the bile ducts, including lobar and segmental ones, were examined. Stones were removed from the lumen of the bile ducts using a trap basket, under direct visual control of the choledochoscope. After extraction of all stones and sanitation of the bile ducts, drainage of the common bile duct was performed using a T-shaped drain and suturing of the choledochotomy opening with an atraumatic 4/0 thread. Then, standard laparoscopic cholecystectomy was performed.

In the postoperative period, the drainage from the common bile duct was blocked on the 5th-7th day. The choledochostomy drainage was either withdrawn within the first month of hospitalisation, or it was removed sooner. When the choledochostomy drainage was removed, the patient was discharged for outpatient treatment after a month, followed by short-term hospitalization.

4. Result

Laparoscopic cholecystectomy in combination with laparoscopic choledochotomy with subsequent revision and lithoextraction from the bile ducts under the control of a choledochoscope or under the control of fluoroscopy using a C-arm was performed in 61 patients, which amounted to 77%. In 58 patients, the operation was completed with drainage of the common bile duct according to Kehr. In 12 patients (15%), access conversion was performed due to technical difficulties and the impossibility of laparoscopic lithoextraction, with most conversions recorded during the first 20 operations.

In 3 cases, after lithoextraction, a precision suture was placed on the common bile duct, without drainage of the duct. Before the operation, these patients underwent EPST (Endoscopic pancreatic sphincterotomy) but endoscopic lithoextraction was unsuccessful. In 6 patients (7.5%), when small stones were detected in the hepaticocholedochus (1–3 mm) and its diameter was less than 8 mm. Subsequently, retrograde endoscopic interventions on the common bile duct were performed in the patients with good results.

All complications that arose in the postoperative period can be conditionally divided into early and late. In the early postoperative period, 9 (11.4%) complications were registered. In most cases (7 people), they manifested themselves in the form of bile leakage through the safety drainage, in four cases they stopped on their own after 5-6 days, in 3 patients, relaparoscopy was performed, with additional suturing of the choledochotomy opening.

In one patient, operated on for Mirizi syndrome, purulent cholangitis, perforation of the colon occurred, which required laparotomy, right-sided hemicolectomy with subsequent recovery of the patient.

In one case, acute edematous pancreatitis occurred in a patient during lithoextraction through the stump of the cystic duct, without drainage of the bile ducts. This complication was stopped by conservative measures.

In the late postoperative period, complications developed in 4 patients (5%). All of them were associated with the removal of the Ker drainage from the duct with the development of biliary peritonitis. To relieve this complication, Laparoscopy is a surgical procedure used to examine the organs in the belly (abdomen). with suturing of the biliary fistula, sanitation and drainage of the abdominal cavity was performed in all cases. Such a high frequency of this complication can be explained by the minimal cicatricial-adhesive process in the subhepatic space after laparoscopic intervention. To reduce the frequency of this complication, the drainage was removed after a month, while the patients underwent short-term hospitalization to remove the cholecystotome.

A fatal outcome in the hybrid intervention group was noted in four cases (5.06%). The immediate cause of death is not associated with a defect in surgical intervention. An unfavorable outcome in these cases was predetermined by the picture of acute purulent cholangitis in combination with severe concomitant pathology.

5. Conclusions

In the treatment of patients with complicated forms of cholelithiasis (a combination of calculous cholecystitis and choledocholithiasis), preference in surgery should be given to minimally invasive hybrid technologies. Open surgical interventions on the gallbladder and bile ducts should be performed only in the presence of contraindications or

technical impossibility of laparoendoscopic removal of gallstones. Most postoperative complications after laparoscopic intervention on the duct can be eliminated by repeated endovideosurgical intervention.

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