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Original Article

Surgical and non-surgical treatment of non-traumatic gallbladder perforation

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ABSTRACT

Objective: Our aim was to present a single-center experience in the management of gallbladder perforation (GBP).
Patients and methods: Adult patients who had GBP were managed surgically and percutaneously. Patients who were high risk surgical candidates or who refused surgery were managed by image guided percutaneous drainage.
Results: Thirty-seven patients (21 males, 16 females) with an average age of 64 ± 14 years had GBP. The number of patients with GBP type I, II, and III were 13, 21, and 3, respectively. All GBP types I and III patients were treated surgically. Eleven of GBP type II patients were treated surgically, and 10 were treated by percutaneous catheter drainage. The overall mortality rate was 27% (10/37). No procedure-related mortality rate among those patients who were treated percutaneously; however, 30 days post procedure, the mortality rate was 30%. All of these deaths were related to the patients' comorbidities; none of them was due to septicemia but conversely in surgically treated patients, 5 died due to septicemia (3 in GBP type I and 2 in GBP type II) in the postoperative period and one patient died because of severe internal hemorrhage complicating acute pancreatitis and one patient died few months later because of myocardial infarction.
Conclusion: Surgery is the cornerstone of treatment for all types of GBP. Percutaneous catheter drainage is a safe and effective option for treating patients with localized disease with favorable outcome.

1. Introduction

Gallbladder perforation (GBP) is a rare but serious complication of cholecystitis which needs to be managed promptly. GBP incidence ranges from 2% to 11% [1,2]. Gallbladder stones are the most common cause of acute cholecystitis, and a calculus cholecystitis is seen in only 5–10% of cases [3]. The fundus is the most common site of GBP followed by the body, and this may be due to poor blood supply in the fundus [1,4].

Historically, GBP has been associated with high mortality rate, which ranges from 11% to 26% [5]. Niemeier, in 1934, classified GBPs into three types: type I (acute) that was associated with generalized biliary peritonitis; type II (subacute) that consisted of the localized collection of fluid at the site of perforation, and it also featured pericholecystic abscess and localized peritonitis; and type III (chronic) that represented the formation of internal or external fistulae [6]. Preoperative diagnosis is challenging and many cases may be diagnosed during surgery [7,8].

The ultrasonographic picture of GBP is diverse and non-specific. Findings include wall thickening (>3 mm), distension (largest diameter: >3.5–4.0 cm), gallstones, coarse intracholecystic echogenic debris, and bile duct dilatation. Distension of the gallbladder and edema of its wall may be the earliest detectable signs of impending perforation. The "hole sign" (a defect in the gallbladder wall) is the most specific finding. In study by Stood et al, ultrasound (US) detected perforation in 61% (11/18) of cases and computed tomography (CT) detected it in 78% (14/18) [9]. Early diagnosis of GBP and immediate surgical intervention is of crucial importance [10].

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The aim of this study was to present single-center experience in the management of GBP by using surgical or percutaneous non-surgical techniques. The later technique was applied in selected patients.

2. Patients and methods

This is a retrospective study of adult patients from the University Hospital who had GBP from August 2003 until June 2014. Cases of traumatic, iatrogenic GBP or perforation that occurred in children were excluded. Institutional review board approved this study. The patients' informed consent for the research was waived due to the investigation's retrospective design. Patients' informed consent for the procedure – either for surgical or percutaneous intervention – was obtained from each patient. Clinical presentations and investigations were reviewed from the patients' medical records.

Patients who presented with acute abdominal pain, fever, tenderness, rebound tenderness, and those who were positive for Murphy's signs were subjected to US and CT examinations, as well as for a laboratory workup for acute abdomen. Surgical treatment was the first line of treatment for cases of perforated viscous complicated by acute peritonitis. The CT and US diagnostic criteria for GBP were as follows: a thick edematous, distended gallbladder wall with or without stones; pericholecystic collection or localized perihepatic collection; and free intraperitoneal fluid collection.

Liver and renal function tests, complete blood count (CBC), total leukocytic count and the differential count, C reactive protein (CRP), as well as a surgical fitness examination (including echocardiography and chest radiography) were performed. Patients surgical risk was evaluated by using American Society of Anesthesiology (ASA) physical status classification system [11]. Surgically-fit patients were subjected to laparoscopic cholecystectomy as soon as possible following good hydration and the correction of electrolyte imbalances in addition to empiric broad spectrum antibiotics. When laparoscopic cholecystectomy was not technically feasible, the procedure was converted to an open cholecystectomy, where peritoneal lavage was carried out and a tubal drain was inserted.

High risk surgical candidates, who were class IV or V, were subjected to Ultrasound guided percutaneous drainage by using 8.5 and 10 Fr multipurpose drainage catheter to decompress the gallbladder by a *trans*-hepatic approach in all cases with local infiltration anesthesia. One of two techniques was used to insert catheter: the single step trocar or modified Seldinger technique. The single step trocar is simple (Fig. 1a) in which multipurpose drainage catheter assembled over its metal stiffener and trocar. The set was inserted through the liver targeting the gallbladder and the sub-hepatic collection then the trocar is removed and catheter advanced over the metal stiffener to the collection and loop is formed while the metal stiffener was removed (Fig. 1b). Catheter position was confirmed by contrast injection through the catheter (Fig. 2c).

The other technique is modified Seldinger technique in which the catheter is introduced over guide wire in two steps. After injection of infiltration anesthesia, 18 gauge vascular access or Chiba needle was introduced to the gallbladder through the liver guided by Ultrasound and confirmation of needle position by injection of contrast (Fig. 2a) then stiff 035 guide wire was inserted in the gallbladder (Fig. 2b). The needle was removed leaving the guide wire, in place, over which catheter with its plastic stiffener was advanced over the guide wire under Fluoroscopy guidance. The guide wire and stiffener were removed, catheter loop was formed and position was confirmed by contrast injection (Fig. 2c).

Another catheter was used to drain the localized collection, and to drain the liver abscess. The detailed standard technique of percutaneous image guided catheter insertion was described in many previous articles [12]. Each catheter was connected to bag for gravity-assisted drainage and flushed with 10 ml of normal saline every 8 h to prevent catheter obstruction. Antibiotics were continued based on culture and sensitivity. Catheters were kept in place until the catheter output declined to about 10 ml/24 h, and clinical improvements were indicated by normalization of the leukocytic count and the disappearance of fever and tenderness. Those patients were followed up by Ultrasound examination every three days and CT scan was carried out when catheter removal was contemplated. Data were tabulated and Student's *t*-test was applied to compare quantitative data; *P*-values $\leqslant 0.05$ were considered statistically significant.

3. Results

Thirty-seven patients (21 males and 16 females) comprised the study population. The patients' mean age was 64 ± 14 years.

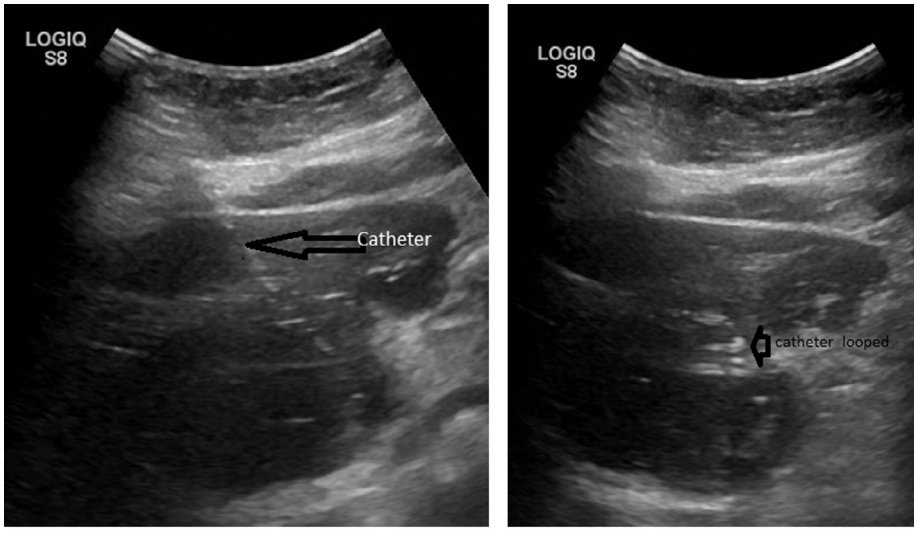

Fig. 1. 73 years old male patient was diagnosed gallbladder perforation type II and he refused surgical intervention. Percutaneous drainage was carried out by insertion of 8.5 Fr multipurpose drainage catheter inserted through the liver to the gallbladder (a). The stiffener was removed and catheter was looped in the collection (b).

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