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Percutaneous Cholecystostomy in High Risk Patients with Acute Cholecystitis

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Abstract

Aims and Objectives: To assess efficacy and safety of percutaneous cholecystostomy (PC) in high risk patients with acute cholecystitis. **Materials and Methods**: The study was carried out in high risk patients with acute calculous or acalculous cholecystitis. Patients qualifying for the study were subjected to PC under ultrasound (USG) guidance. A cholecystogram was done postoperatively, to help establish satisfactory catheter position. **Results**: 24 (70.59%) patients had empyema-gallbladder, 8 (23.53%) had acute calcular cholecystitis and 2 (5.9%) patients were diagnosed as acalcular cholecystitis. None of the patients was fit for general anesthesia at the time of admission. Median hospital-stay after performing procedure was 4 days. Clinical success rate was reported 100% in our study. Bile cultures yielded growth of E Coli in 10 (29.41%), klebsela in 8 (23.53%), pseudomonas aeruginosa in 6 (17.65%) and Proteus mirabilis in 4 (11.8%) of patients. 6 (17.65%) patients did not grow any organism in their bile. Growth noted was sensitive to imipenem 29.41% (10), ciprofloxacin 17.65% (6), levofloxacin 17.65% % (6) and cefuroxime 11.76% (4). No major complication was recorded in our study. No procedure related death was observed. Tube displacement occurred in one patient and minor bleeding was reported in 2 patients. Catheter was removed after a mean of 25.25 days. All patients underwent definitive surgical intervention during the follow up period of 3 months. **Conclusion**: USG guided PC is a safe and effective procedure for treating high-risk patients who present with acute cholecystitis. Once the acute symptoms diminish or resolve, it should be followed by elective surgery.

Keywords

Percutaneous Cholecystostomy, Cholecystitis, Ultrasound, High Risk, Cholecystogram

1. Introduction

Cholecystitis is a common condition that in selected patients, carries significant risk for morbidity and mortality. The treatment of severe acute biliary inflammation/infection still results in fatalities and increased hospital costs. The treatment of acute cholecystitis is early cholecystectomy [1]. Laparoscopic cholecystectomy is now the Gold standard for the management of symptomatic cholelithiasis and acute cholecystities [2]. Although cholecystectomy is generally safe, the mortality rate of cholecystectomy in patients at high risk for surgery from comorbid conditions ranges between 14% and 30% [3] [4]. Factors contributing to the high surgical mortality in this setting include the presence of sepsis, poor general condition of the patient, immunosuppression and diminished liver function. As a temporizing measure, high-risk patients are treated with a regimen consisting of decompression of the gallbladder combined with broad-spectrum antibiotics.

Percutaneous cholecystostomy (PC) is a technique that consists of percutaneous placement of a catheter under imaging guidance in the gallbladder lumen. [5] [6] PC is indicated in poor surgical candidate/high risk patients with acute calculous or acalculous cholecystitis, unexplained sepsis in critically ill patients (diagnostic for cholecystitis as etiology of sepsis if clinical improvement after cholecystostomy), cholangitis, biliary obstruction for drainage of biliary tree following failed endoscopic retrograde cholangiopancreaticography (ERCP) and percutaneous transhepatic cholangiography (PTC). This minimally invasive procedure can aid stabilization of a patient to enable a more measured surgical approach with time for therapeutic planning.

2. Aims and Objectives

To assess efficacy and safety of percutaneous cholecystostomy in high risk patients with acute cholecystitis in terms of clinical improvement and complications respectively following the procedure.

3. Materials and Methods

The study was conducted in Post-graduate Department of General Surgery, Govt Medical College Srinagar, over a period of three years (2013-2015). The study was prospective, observational and was carried out in high risk patients, not fit for general anaesthesia because of underlying co-morbidities with acute calculous or acalculous cholecystitis. Patients having un-optimised coagulopathies, suspected gallbladder malignancy, gallbladder packed with calculi preventing catheter insertion or patients with massive ascites were excluded from the study.

The selection of patients was made preoperatively on the basis of detailed history, general physical and systemic examination with biochemical and radiological evidence of acute calculous or calculus cholecystitis. USG was utilised to determine size, contents and wall-thickness of gallbladder and status of HBS. Patients qualifying for the study were subjected to Percutaneous cholecystostomy under radiological guidance. Following Investigations were done before the

procedure in every patient: Complete blood count, complete urine examination, Serum urea and creatinine, Blood sugar (Random/Fasting), Serum Sodium and Potassium, Liver function tests, X-Ray Chest (P/A View), ECG-12 leads, PT/INR, HIV and Hepatitis serology.

4. Operative Procedure

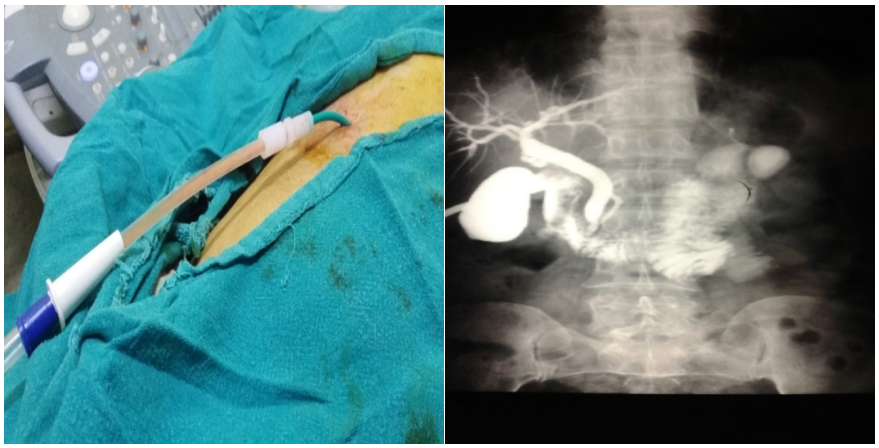
All the cases were done under local anesthesia. The procedure was performed with the patient in supine position after per urethral catheterization. Regular monitoring of the vital signs by a suitably trained staff member was done during the procedure. Procedure was performed using ultrasound guidance and 14-French locking pigtail catheter with trocar, under all aseptic precautions. Catheter was secured to skin after attaching a gravity drainage bag. (**Figure 1(a)**). Bile was sent for gram staining, culture and/or cell count.

Bed rest (for 2 - 4 hours) with regular monitoring vital signs, provision of adequate analgesia was routinely indicated in the first few hours following the procedure. Catheter was flushed and aspirated regularly with saline (6 to 8 hourly). A cholecystogram (injection of contrast into the indwelling catheter under fluoroscopy), was performed when the patient was stable, to help establish satisfactory catheter position and the state of the gallbladder (**Figure 1(b)**).

5. Results

The study included 34 patients with mean age of 70.11 years, minimum and maximum age was 40 and 98 years respectively. The male: female ratio was 2.4 in our study. The mean BMI of the patients in our study was 31.28. (SD = 3.001), shown in **Table 1**.

In our study most of the patients presented with chief complaints of pain in upper abdomen and/or right upper quadrant abdomen (88.2%), vomiting (82.3 %), and abdominal swelling/lump (88.2%). Fever and jaundice were present in 70.5% and 8.82% of patients respectively.



(a) (b)

Figure 1. (a) percutaneous cholecystostomy showing catheter draining pus; (b) Cholecystogram showing catheter in GB and a filling defect (likely) stone in CBD.

Majority of the patients enrolled in our study were having complicated cholecystitis. 24 (70.59%) had empyema-gallbladder, 8 (23.53%) had acute calcular cholecystitis and 2 (5.9%) patients were diagnosed as acalcular cholecystitis. All the patients had at-least one comorbidiy. The comorbidity profile of patients is shown in Table 2.

Median hospital stay after performing procedure was 4 days. None of the patients in our study required to stay admitted for more than a week after the procedure was performed. Maximum and minimum hospital-stay following procedures was 6 and 3 days respectively.

Clinical success is defined by the French Society of Interventional Radiology as the disappearance of fever and pain as well as reduction of leucocytosis. Visual analogue score was used to assess pain preoperatively and postoperatively (Table 3).

Pain relief after 48 hours following procedure was statistically significant ($P < 0.0001$) There was statistically significant reduction in total leukocyte count within 48 hours of procedure.

All of the procedures were done via trans-peritoneal route using tracer technique. Bile cultures yielded growth of E Coli in 10 (29.41%) of patients, klebsela

Table 1. Socio-demographic profile of patients.

S No	variables		No. of patients (n = 34)	Percentage
1	Age (years)	40 - 49	4	11.76
		50 - 59	2	5.9
		60 - 69	6	17.65
		70 - 79	17	50.0
		80 & above	5	14.7
2	SEX	Male	10	29.41
		Female	24	70.59
3	BMI (kg/m^2)	<30	8	14.7
		30 - 34.99	20	58.82
		35 and above	8	23.53

Table 2. Showing comorbidity profile of patients.

S.No	Comorbidity	No of patients (n = 34)	Percentage
1	Hypertension	26	76.47
2	Diabetes	22	64.70
3	COPD exacerbation	20	58.82
4	Hypothyroidism	16	47.06
5	Congestive heart failure	15	44.12
6	Chronic renal insufficiency	6	17.65
7	Cirrhosis	5	14.71
8	Atrial fibrillation	4	11.76

in 8 (23.53%), pseudomonas aeruginosa in 6 (17.65%) and Proteus mirabilis in 4 (11.8%) of patients. 6 (17.65%) patients did not grow any organism in their bile even after 48 hours of incubation. Most of the growth noted was sensitive to imepenem 29.41% (10), ciprofloxin 17.65% (6), levofloxin 17.65% (6) and cefuroxime 11.76% (4). Culture and sensitivity of two patients was not available and 6 bile cultures were sterile.

No major complication was recorded in any of the patients enrolled in our study. Tube displacement occurred in one patient which was removed on 4th day after the procedure and procedure was repeated. Minor bleeding was reported in 2 patients (Table 4).

Catheter was removed after a mean of 25.25 days (range 17 - 35 days). 28 (82.35%) patients underwent laparoscopic cholecystectomy, 2 (5.88%) open cholecystectomy and CBD exploration, 4 (11.76%) open cholecystectomy.

6. Discussion

All 34 patients enrolled in our study who underwent percutaneous cholecystostomy showed clinical improvement within 48 hours. This level of response suggests that this procedure is an effective alternative to surgery, whether used as a stopgap measure until the patient is clinically fit for an operation or as definitive management for those with serious comorbidity or terminal disease. If a patient is not well enough to be transferred to the radiology suite, this procedure can even be done at bedside in the intensive care unit under local anesthesia.

In our series of 34 patients the mean age of patients was 70.11 years. This was comparable to that in studies conducted by Gordon B. Werbel *et al*. [6], Van Steenbergen *et al*. [7] and Ozgur Bafiaran *et al*. [8]. Patients presentation was consistent with study conducted by Ozgur Bafiaran, *et al*. [8]. Majority of the patients enrolled in our study were having complicated cholecystitis. 24 (70.59%) had empyema-gallbladder, 8 (23.53%) had acute calcular cholecystitis and 2

Table 3. Showing improvement in pain after the procedure.

VAS Score of pain	Number of patients	
	At admission	48 hours after procedure
Absent (0)	0	15
Mild (1 - 3)	0	19
Moderate (4 - 6)	8	0
Severe (7 - 10)	26	0

Table 4. Showing complication profile of procedure.

Complications	No. of patients (n = 34)	Percent
No complications	31	91.20
Tube displacement	1	2.94
Hemorrhage	2	5.88

(5.9%) patients were diagnosed as acalcular cholecystitis. In study by Alexander M. Eggermont *et al.* [9] the procedure was performed in six critically ill patients who had acute acalculous cholecystitis. In study by Gordon B. Werbel *et al.* [6] and Van Steenbergen *et al.* [7], critically ill patients who had acute cholecystitis complicated by empyema formation were chosen as sample population. In study by Shaista Afzal Saeed *et al.* [10], 25 patients had acute calculus cholecystitis, 10 acalculous cholecystitis, 04 empyema and 2 patients had gallbladder perforation.

All of the patients (n = 34; 100%) had at least 1 comorbidity, with a mean number of 3.2 comorbidities (median 1). The maximum number of comorbidities was 5 (n = 2). Hypertension was most common 26 (76.50%), followed by diabetes mellitus 22 (64.70%) and exacerbation of COPD 20 (58.82%). The comorbidity profile of our patients was comparable with that of the patients studied by Nicole Cherng *et al.* [11].

The procedure was done under local anesthesia using trans-peritoneal approach in all patients. The procedure was technically successful in all (34) the patients studied, consistent with that in the study by Griniatsos John *et al.* [12]. The culture/sensitivity findings of drained fluid/bile were comparable with that reported by Ahmed Farouk Abdulaal *et al.* [13]. Clinical improvement was noticed in all patients within 48 hours. Statistically significant reduction in the values of white blood cells, axillary body temperature and visual analogue score of pain were observed within 48 hours. This is at par with studies by Asgaut Viste *et al.* [14], C. Codina *et al.* [15]. Median hospital stay after performing procedure was 4 days (range 3 - 6). Follow-up after drainage was with a median of 3 months (range 2 - 4 months). During that time definitive surgical intervention was done in all the patients after proper optimization.

No complication was seen during or after procedure in 31 (91.20%) patients. Complications occurred in 3 (8.82%) patients including hemorrhage in 2 patients which settled of its own after 2 days with no blood transfusion requirement and tube displacement in 1 patient which required removal and replacement of catheter 2 days after the initial procedure In literature complication rate of around 10% [16]: mainly bile leaks, nearly always after trans-peritoneal drainage [16], or bleeding requiring transfusion or not [16], drain migration (8.6%), and more rarely, digestive tract perforations or pneumothorax have been documented. There was no direct procedure-related mortality in our study.

All the cases were done via transperitoneal route using trocar technique in our study Complication rate may decrease if the procedure is done via transhepatic route and/or using Saldinger technique.

7. Conclusion

Ultrasound guided percutaneous cholecystostomy (USGPC) is a safe and effective procedure for treating elderly high-risk patients who present with acute cholecystitis. Once the acute symptoms diminish or resolve, USGPC should be followed by elective surgery, if possible, or by conservative management if the patient is inoperable due to systemic disease.

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