

Male gender and sonographic gall bladder wall thickness: important predictable factors for empyema and gangrene in acute cholecystitis

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Abstract

Objective: To underline the status of male gender and gall bladder wall thickness as significant risk factors for acute cholecystitis complications.

Methods: The retrospective study, with purposive sampling of the patients of acute cholecystitis in age above 18 years, who were operated within 10 days of onset of symptoms, was conducted at the Department of Surgery, Dow University Hospital, Karachi, by reviewing the patients' medical record from March 2010 to August 2012. Correlation of incidence of acute cholecystitis complications (empyema and gangrene) to male gender and to the sonographic gall bladder wall thickness more than 4.5mm was analysed using SPSS 16.

Result: Out of 62 patients, 8 (13%) patients had gangrene while 10 (16.12%) had empyema. Overall, there were 21 (33.87%) males in the study. Ten (47.6%) of the male patients developed empyema or gangrene of the gall bladder as a complication of acute cholecystitis. Of the 41 (66.12%) female patients, only 8 (19.5%) developed these complications. There were 22 (35.48%) cases of gall bladders with sonographic wall thickness more than 4.5mm who were operated for acute cholecystitis. Of them, 16 (72.7%) had empyema or gangrene.

Conclusion: Male gender and sonographic gall bladder wall thickness more than 4.5mm were statistically significant risk factors for suspicion of complicated acute cholecystitis (empyema/gangrene) and by using these risk factors, we can prioritise patients for surgery in the emergency room.

Keywords: Risk factors, Empyema gall bladder, Gangrene of gall bladder, Complicated acute cholecystitis, Male gender, Gall bladder wall thickness. (JPMA 64: 159; 2014)

Introduction

Gall stones disease is a common problem and its incidence is 5% to 15% in the west,^{1,2} while in Asian countries is low.³ In majority of these patients stones remain asymptomatic and only 10-20% develop symptoms.^{1,2,4} The average risk of developing symptomatic disease is 2 to 2.6% per year.⁴ Laparoscopic cholecystectomy is the standard procedure for the treatment of this condition and the demand of this procedure has exceeded the capacity of available resources in public hospitals and patients have to wait for definitive treatment. Waiting for laparoscopic cholecystectomy keeps patients at risk for development of complications of acute cholecystitis which may require re-admissions and emergency surgeries.² Empyema and gangrene of the gall bladder are serious consequences of acute inflammation of gall bladder and to prevent these complications early cholecystectomy should be performed for acute gall bladder diseases.^{5,6} The incidence of empyema reported in the literature is in a range of 2.0 to

11% and of gangrenous gall bladder 15 to 18% in acute cholecystitis.^{6,7} Early cholecystectomy is advisable for all forms of acute cholecystitis, but in large busy medical centres and in public hospitals where this disease is frequently dealt with, it is not possible for every case of acute cholecystitis to be operated early on admission because of the limited number of operating rooms and available resources. This delays the surgical treatment.⁷ It is necessary to prioritise the patients for cholecystectomy, who are at more risk to develop empyema or gangrene of the gall bladder if the surgical treatment is delayed. Clinically, pre-operative diagnosis of acute inflammation and empyema or gangrene is often difficult because of the similarity of symptoms with biliary colic due to uncomplicated acute cholecystitis.⁷⁻⁹ Biliary colic is a self-limiting transient obstruction of the gall bladder and its repeated attacks can lead to chronic cholecystitis, while acute calculus cholecystitis results from unrelieved obstruction and can lead to empyema or gangrene if not treated.^{7,8} It is observed that these complications are more preponderant in males with acute cholecystitis compared to females, and ultrasound shows gall bladder wall more thickened in these patients. The current study was conducted to underline these observations of predictive risk factors for the incidence of acute cholecystitis

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complications in our population. Although some studies^{6,7} have been performed in different countries dealing with different risk factors for gangrenous gall bladder, but no locally conducted study was found during online search for these predictive risk factors of complications in acute cholecystitis in our population.

Patients and Methods

The retrospective study, with purposive sampling of the patients of acute cholecystitis in age above 18 years, who were operated within 10 days of the onset of symptoms, was conducted at the Department of Surgery, Dow University Hospital, Karachi, by reviewing the patients' medical record from March 2010 to August 2012.

Demographic data along with laboratory, imaging, operative and histopathological findings were recorded on a self-structured proforma. Empyema was labelled on the basis of operative findings, while gangrenous gall bladder was taken as shown in the histology report. Descriptive statistics were used to present the result in frequencies and percentages. Correlation of acute cholecystitis complications (Empyema and gangrene) to these factors, male gender and ultrasonographic gall bladder wall thickness >4.5mm, was analysed using SPSS version 16.

Results

Medical records of 71 patients of acute cholecystitis were reviewed, and 62 (87.32%) fulfilled the inclusion criteria. Nine (12.67%) patients, who had choledocholithiasis or pancreatitis with cholecystitis, had to be excluded.

Demographic and clinical data of the patients with acute cholecystitis were noted (Table-1). The average age of male patients was 40.4±12 years, while it was 37.2±10

Table-1: Clinical data.

| Gender | |
|-----------------------------------|----------|
| Male | 21 (34) |
| Female | 41 (66) |
| Age | |
| 20-40 | 32 (52) |
| 40-60 | 19 (30) |
| >60 | 11 (18) |
| Duration of acute symptoms | |
| 1-2 days | 37 (60) |
| 2-4 days | 16 (26) |
| > 4 days | 09 (14) |
| Pain | 62 (100) |
| Vomiting | 27 (43) |
| Nausea | 16 (26) |
| Fever | 27 (43) |
| Palpable Mass | 05 (08) |

years in female patients. Most of the patients were operated within three days of the onset of symptoms with average time of 2.8 ±1.3 days.

Of the 62 patients, 18 (29%) developed complications (empyema/ gangrene) of acute cholecystitis. There were 21 (34%) male patients among whom 10 (48%) developed empyema or gangrene of the gall bladder as complication of acute cholecystitis. Among the 41 (66%) female patients, 8 (20%) developed these complications. Male gender and the two complications showed significant correlation (Odds ratio= 3.7; relative risk= 2.4) (Table-2). There were 22 (35.48%) cases of gall bladders with sonographic wall thickness more than 4.5mm that were operated for acute cholecystitis. Among them 16 (72.7%) had empyema or gangrene and it also showed significant correlation (Odds ratio= 50.67; relative risk= 14.5) (Table-

Table-2: Relation of gender with incidence of complication.

| Gender | Gall bladder pathology in Acute cholecystitis | | Total | Odds ratio | Relative risk |
|---------------|---|--|--------------|-------------------|----------------------|
| | Complicated cholecystitis [Gangrene / Empyema] (%) | Non complicated acute cholecystitis (%) | | | |
| Male | 10 (48) | 11(52) | 21 | 3.7 | 2.4 |
| Female | 08 (24) | 33(76) | 41 | | |
| Total | 18 | 44 | 62 | | |

Table-3: Relation of Gall bladder wall thickness with incidence of complication.

| Ultrasonographic Gall bladder wall thickness | Gall bladder pathology in Acute cholecystitis | | Total | Odds ratio | Relative risk |
|---|---|--|--------------|-------------------|----------------------|
| | Complicated cholecystitis [Gangrene / Empyema] (%) | Non complicated acute cholecystitis (%) | | | |
| <4.5mm | 02 (5) | 38 (95) | 40 | 50.67 | 14.5 |
| >4.5mm | 16 (72) | 06 (28) | 22 | | |
| Total | 18 | 44 | 62 | | |

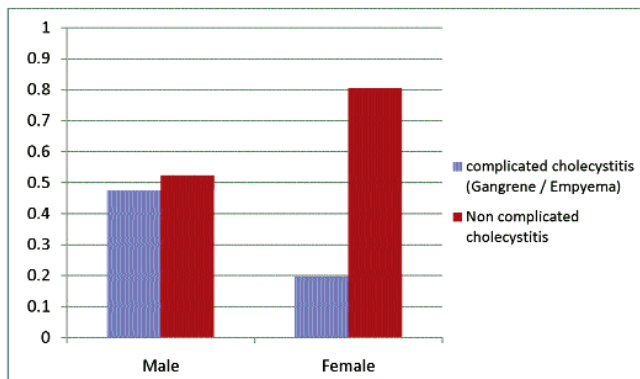


Figure-1: Effect of gender over incidence of acute cholecystitis complications.

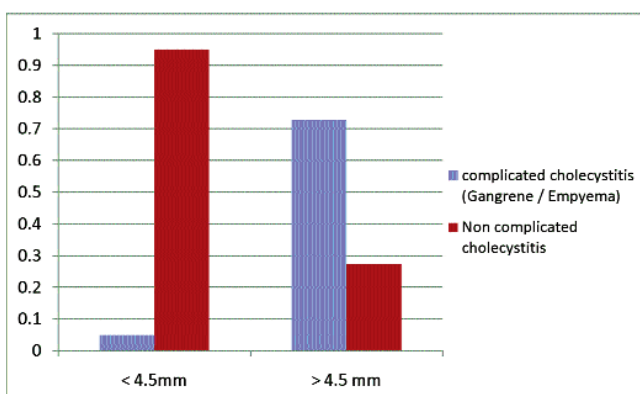


Figure-2: Effect of ultrasonographic gall bladder wall thickness over incidence of acute cholecystitis complications.

3). From among the 18 (29%) patients with complicated acute cholecystitis, empyema was found in 8 (44.4%) patients, while in 10 (55.5%) patients gall bladder histology showed gangrene. Ratio of complicated acute cholecystitis to non-complicated cholecystitis in male and female patients (Figure-1) and according to sonographic gall bladder wall thickness (Figure-2) were also noted. Out of 8 (13%) gangrenous gall bladder patients, 5 (62.3%) patients were male, while 5 (50%) of those patients who had empyema gall bladder were males.

Discussion

The results showed that 29% patients of acute cholecystitis, who fulfilled inclusion criteria, developed complications in the form of empyema or gangrene. Both complications require early cholecystectomy on a priority basis and there is increased risk of conversion of laparoscopic to open cholecystectomy. Therefore, we considered both complications as a single group of complications to compare with other group of non-complicated acute cholecystitis during the study. Eight of

our patients required conversion to open cholecystectomy from laparoscopic type because of distorted anatomy and adhesions in Calot's triangle.

The results also showed that 48% male patients developed empyema or gangrene of the gall bladder, while only 20% female patients developed these complications. It showed a significant correlation of the male gender with complications of acute cholecystitis. Yaccub WN et al showed gangrene of the gall bladder in acute cholecystitis 47% (33/65) in males with p value of 0.0001 in their study.⁷ The same preponderance was also reported by Al Jaber et al for empyema (p= 0.005) in a study conducted in Jordan.⁶ Stefanidis D et al and Merriam LT et al also reported male preponderance for gall bladder gangrene in their studies, which were conducted in New Orleans and Chicago, USA.^{10,11}

In our study, sonographic gall bladder wall thickness >4.5mm showed significant relation to gangrenous and empyema gall bladder. Yaccub et al. reported this relation statistically significant (p= 0.0001) in their study.⁷ Other studies also reported the significance of sonographic gall bladder wall thickness as major sign for gangrenous gall bladder in acute cholecystitis.^{12,13}

Clinical diagnosis to differentiate complicated acute cholecystitis (empyema/gangrene) from non-complicated acute cholecystitis is extremely difficult because often clinical features are the same as biliary colic⁷ and Murphy's sign is positive in only one-third of gangrenous gall bladder because of the denervation by necrosis.¹⁴ In a busy public-sector hospital, it has a great value to prioritise those patients who have empyema or gangrene for early operation to prevent progression to perforation resulting in biliary peritonitis, fistula and intraperitoneal abscesses formation.^{11,13,15} Chronic inflammation alone does not progress to necrosis.⁷ Therefore, there is no need of emergency cholecystectomy, but in acute cholecystitis we need to classify the patients according to the degree of inflammation on pre-operative assessment to prioritise the patients who require early cholecystectomy so that we can prevent more complications. On the basis of this study, male gender and sonographic gall bladder wall thickness more than 4.5mm are statistically significant factors for pre-operative suspicion of complicated acute cholecystitis for emergency cholecystectomy, and these patients are at more risk of conversion from laparoscopic to open cholecystectomy.

The limitation of the study was that it was a single-centre study and the results cannot be generalised. More multi-centre studies are required to correlate pre-

operative clinical assessment and pathological findings to classify the degree of inflammation in order to find out more predictors for early diagnosis of the complications.

Conclusion

Male gender and sonographic gall bladder wall thickness more than 4.5mm are statistically significant risk factors for suspicion of complicated acute cholecystitis (empyema/gangrene). By using these risk factors, patients can be prioritised for surgery in the emergency room.

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