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Original Research Article

ASSESSMENT OF PERICHOLECYSTIC ADHESIONS IN GALLSTONE DISEASE USING ULTRASONOGRAPHY: A TEACHING HOSPITAL BASED STUDY

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ABSTRACT

Background: Laparoscopic cholecystectomy is the preferred surgical treatment for symptomatic cholelithiasis. Preoperative identification of pericholecystic adhesions may help anticipate operative difficulty and facilitate surgical planning. The aim is to assess the role of ultrasonography in identifying pericholecystic adhesions in patients with cholelithiasis. **Materials and Methods:** This hospital-based study included 78 patients with ultrasonographically detected cholelithiasis who were referred to the Department of Radiology, World College of Medical Sciences Research and Hospital, Jhajjar, for evaluation. Patients with a history of partial cholecystectomy, those younger than 15 years, and those unable to provide informed consent were excluded. Ultrasonography was performed following at least eight hours of fasting to assess pericholecystic adhesions. The collected data were compiled and analysed using SPSS version 20. **Results:** Among the 78 patients, 30 (38.46%) were female and 48 (61.54%) were male. The largest age group was 45–55 years, comprising 28 patients (35.9%). Ultrasonography suggested the presence of pericholecystic adhesions in 29 patients (37.2%), while adhesions were not identified in 49 patients (62.8%). Regarding surgical management, 27 patients (34.6%) underwent open cholecystectomy and 51 (65.4%) underwent laparoscopic cholecystectomy. **Conclusion:** Ultrasonography identified findings suggestive of pericholecystic adhesions in 37.2% of patients with cholelithiasis in this study. Further assessment with clearly defined sonographic criteria and correlation with intraoperative findings is necessary to establish its diagnostic performance in detecting pericholecystic adhesions.

INTRODUCTION

Gallstone disease is a common condition affecting the gallbladder and may present with abdominal pain, inflammation, and other biliary complications. Acute cholecystitis commonly occurs when a gallstone obstructs the cystic duct, leading to gallbladder inflammation.[1] Gallstone disease affects a considerable proportion of the population worldwide and remains an important cause of hospital visits and surgical intervention.[2]

Laparoscopic cholecystectomy is widely accepted as the preferred surgical treatment for symptomatic cholelithiasis. Compared with open surgery, it offers advantages such as shorter hospital stay, faster recovery, and better cosmetic results.[4] However, the procedure may become difficult in the presence of severe inflammation, a thickened gallbladder wall, or distorted anatomy. Assessment of gallbladder wall thickness on ultrasonography is useful in the evaluation of gallbladder disease.[3]

Ultrasonography is the primary imaging modality for evaluating gallbladder disease because it is readily available, non-invasive, and provides information about gallbladder wall thickness, distension, gallstone mobility, and pericholecystic changes. Magnetic resonance cholangiography and ultrasonography have also been compared in the assessment of acute cholecystitis.[5] These imaging findings can assist in evaluating gallbladder pathology before surgery, although they do not necessarily establish the presence of adhesions.

Pericholecystic adhesions may develop following recurrent or chronic inflammation and can make dissection of the gallbladder from adjacent tissues difficult. Dense adhesions and distorted anatomy around Calot's triangle may impair the identification of normal anatomical structures and increase the likelihood of conversion from laparoscopic to open

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cholecystectomy. Niemeier's classification of gallbladder perforation also described the role of surrounding adhesions in containing perforation and limiting the spread of inflammation.[6]

Previous studies have examined the role of preoperative ultrasonography in predicting difficult laparoscopic cholecystectomy and the need for conversion to open surgery.[7,8] Other studies have investigated factors associated with conversion, including severe inflammation and extensive adhesions.[9,10] These findings highlight the importance of preoperative assessment in anticipating potential surgical difficulties.

The present study was undertaken to assess the role of ultrasonography in detecting pericholecystic adhesions in patients with cholelithiasis, using intraoperative findings as the reference standard. The study also aimed to evaluate the diagnostic performance of ultrasonography in identifying these adhesions.

MATERIALS AND METHODS

The study included 78 patients with cholelithiasis who were referred to the Department of Radiology, World College of Medical Sciences Research and Hospital, Jhajjar, for ultrasonographic evaluation. Patients with a history of partial cholecystectomy, those younger than 15 years, and those unable to provide informed consent were excluded.

After obtaining informed consent and institutional ethics committee approval, all patients were asked to fast for at least eight hours before ultrasonography. Examinations were performed using a GE Healthcare ultrasound system, with a 3.5 MHz transducer for patients with an average body habitus and a 5 MHz transducer for thinner patients. The gallbladder was examined in longitudinal and transverse planes in supine and left lateral decubitus positions.

The gallbladder and surrounding tissues were assessed for findings suggestive of pericholecystic adhesions, including loss of the normal interface with the liver, apparent fixation to adjacent tissues, and restricted mobility. Associated findings, such as gallbladder wall thickening, contraction, and pericholecystic inflammatory changes, were also recorded.

The collected data were analysed using SPSS version 20. Categorical variables were expressed as frequencies and percentages.

RESULTS

A total of 78 patients with ultrasonographically detected cholelithiasis were included in the study. The demographic characteristics, ultrasonographic findings, and surgical findings of the patients were recorded and analysed.

Age Distribution

The age distribution of the study population is presented in figure 1. The largest number of patients belonged to the 45–55-year age group, comprising 28 (35.9%) patients.

Ultrasonographic Assessment of Pericholecystic Adhesions

On ultrasonographic evaluation, pericholecystic adhesions were reported in 29 (37.2%) patients, whereas no adhesions were identified in 49 (62.8%) patients.

Surgical Management

Of the 78 patients, 27 (34.6%) underwent open cholecystectomy, while 51 (65.4%) underwent laparoscopic cholecystectomy. Intraoperative examination revealed pericholecystic adhesions in 33 patients, while adhesions were absent in 45 patients. Ultrasonography correctly identified adhesions in 23 patients and correctly ruled them out in 39 patients. False-positive findings were observed in 6 patients, in whom adhesions were suggested on ultrasonography but were absent at surgery. False-negative findings occurred in 10 patients, in whom adhesions were present at surgery but were not detected on ultrasonography.

The sensitivity of ultrasonography was 69.7%, while the specificity was 86.7%. The positive predictive value was 79.3%, and the negative predictive value was 79.6%. The overall diagnostic accuracy was 79.5%. The diagnostic performance of ultrasonography in detecting pericholecystic adhesions is presented in [Table 1].

These findings indicate that ultrasonography showed higher specificity than sensitivity for detecting pericholecystic adhesions in this study.

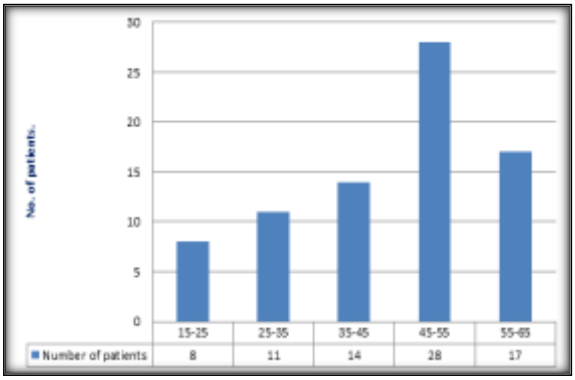


Figure 1: Shows the demographic profile according to age group

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Table1: Diagnostic performance of ultrasonography in detecting pericholecystic adhesions using surgical findings as gold standard

USG evaluation	Adhesions Present at surgery,n (%)	Adhesions absent at surgery, n (%)	Total (%)
Adhesion Present	23 (69.7%)	6 (13.3%)	29 (37.2%)
Adhesion absent	10 (30.3%)	39 (86.7%)	49 (62.8%)
Total	33 (100%)	45 (100%)	78 (100%)

DISCUSSION

Laparoscopic cholecystectomy is the preferred surgical treatment for symptomatic gallstone disease. However, pericholecystic adhesions and distorted anatomy can make dissection difficult and may increase the likelihood of conversion to open surgery. Preoperative ultrasonography may help identify features associated with operative difficulty and assist in surgical planning.[7,10]

In the present study, 78 patients with cholelithiasis were evaluated using ultrasonography, with intraoperative findings serving as the reference standard for detecting pericholecystic adhesions. Adhesions were found during surgery in 33 (42.3%) patients, while they were absent in 45 (57.7%) patients. Ultrasonography correctly identified adhesions in 23 patients and correctly excluded them in 39 patients.

The sensitivity of ultrasonography was 69.7%, while the specificity was 86.7%. The positive predictive value was 79.3%, the negative predictive value was 79.6%, and the overall diagnostic accuracy was 79.5%. The higher specificity compared with sensitivity suggests that ultrasonography was better at identifying patients without adhesions than at detecting all patients with adhesions. However, adhesions were missed in 10 patients, indicating that a negative ultrasound examination cannot reliably exclude their presence.

Previous studies have evaluated the role of preoperative ultrasonography in predicting difficult laparoscopic cholecystectomy. Lal et al. reported that preoperative ultrasonographic findings could help predict difficult laparoscopic cholecystectomy requiring conversion to an open procedure.[7]Daradkeh et al. also investigated the role of ultrasonography in predicting technical difficulties during laparoscopic cholecystectomy.[10] These studies support the clinical relevance of preoperative ultrasound assessment, although prediction of overall surgical difficulty is not equivalent to direct detection of pericholecystic adhesions.

Shapiro et al. examined factors associated with conversion of laparoscopic cholecystectomy in acute cholecystitis and discussed the importance of adhesions and poor visualization of Calot's triangle.[8] Similarly, Zhang et al. investigated risk factors for conversion from laparoscopic to open cholecystectomy.[9] These studies highlight the importance of anticipating operative difficulties, particularly when inflammation and adhesions interfere with the identification of normal anatomical structures.

In the present study, six patients had false-positive ultrasound findings, whereas 10 had false-negative findings when compared with intraoperative assessment. These discrepancies demonstrate the limitations of ultrasonography in detecting pericholecystic adhesions. Gallbladder wall thickening and other inflammatory changes may provide useful information about gallbladder disease, but they are not specific for adhesions.[3,5] Therefore, sonographic findings should be interpreted in conjunction with the overall clinical and imaging picture.

The study has certain limitations. It was conducted at a single centre and included 78 patients, which may limit the generalizability of the findings. Ultrasonographic assessment may also be influenced by operator experience and the visibility of the gallbladder and surrounding tissues. Further studies involving larger patient populations and standardized sonographic criteria are needed to evaluate the diagnostic performance of ultrasonography in detecting pericholecystic adhesions.

CONCLUSION

In this study, ultrasonography demonstrated a sensitivity of 69.7%, specificity of 86.7%, and overall diagnostic accuracy of 79.5% for detecting pericholecystic adhesions, using intraoperative findings as the reference standard. Although ultrasonography showed relatively high specificity, its moderate sensitivity indicates that a negative examination does not reliably exclude adhesions. Ultrasonography may therefore provide useful information during preoperative assessment, but its findings should be interpreted alongside the clinical presentation and other imaging features.

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