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Research Article

Assessing Visualization Quality of Bile Duct Stones: Supine Vs Semi-Prone Position

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Abstract

Objectives: This study aimed to compare the visualization quality of bile duct stones between the supine and semi-prone positions using ultrasound.

Study design: It is a cross-sectional prospective study carried out in the Radiology department of CMH Peshawar for a span of five months from January 2024-May 2024.

Setting: Radiology department of CMH Peshawar.

Study duration: 1st January 2024- 15th May 2024.

Methodology: A total of 100 patients with suspected choledocholithiasis were included using a non-probability purposive sampling method for this study. Each patient underwent a comprehensive assessment including medical history and physical examination. Subsequently each patient underwent ultrasound in both the supine and semi-prone positions. The visualization quality of bile duct stones was assessed by experienced radiologist (5 years post specialization experience). Comparative analysis in both positions was calculated. Statistics patient demographics in both positions (supine and semi-prone) was calculated. Results: The visualization quality of bile duct stones was significantly higher in the semi-prone position compared to the supine position in ultrasound.

Conclusion: In conclusion, our study demonstrates that the semi-prone position provides better visualization of bile duct stones compared to the supine position.

Keywords: Common Bile Duct (CBD); Ultrasound; Supine; Semi-Prone Position

Introduction

Bile duct stones, or choledocholithiasis, are common gastrointestinal disorders that can lead to serious complications if left untreated. Accurate visualization and diagnosis of bile duct stones are essential for appropriate management and patient outcomes [1,2]. Traditionally, imaging studies for detecting bile duct stones are performed with the patient in the supine position [3,4]. However, recent evidence suggests that alternative positions, such as the semi-prone position, may offer improved visualization of bile duct stones. This study aimed to compare the visualization quality of bile duct stones between the supine and semi-prone positions using ultrasonography [5,6].

Methods

- Study design: This was a prospective, observational study conducted at CMH Peshawar between January and May 2024.
- **Patient Population:** 100 consecutive patients with suspected choledocholithiasis were enrolled in the study.
- **Inclusion criterion:** Both genders, age above 18 years, patients having symptoms of choledocholithiasis like jaundice, pain in right upper quadrant of abdomen and deranged LFT's.
- *Exclusion Criterion*: Patients with allergy and any metastatic spread.
- **Imaging modalities:** Each patient underwent ultrasonography in both the supine and semi- prone positions.

- **Assessment of visualization quality:** Experienced radiologists independently assessed the visualization quality of bile duct stones in each position using standardized criteria.
- **Statistical analysis:** Statistical analysis was performed to compare the visualization quality between the supine and semi-prone positions.

A total of 100 patients with suspected choledocholithiasis were included using a non- probability purposive sampling method for this study. Each patient underwent a comprehensive assessment including medical history and physical examination. Subsequently each patient underwent ultrasound in both the supine and semi-prone positions. The visualization quality of bile duct stones was assessed by experienced radiologist (5 years post specialization experience) in both positions. Comparative analysis in both positions was calculated. Statistics for patient demographics in both positions (supine and semi-prone) was calculated.

Results

The data includes 44 male patients and 66 female patients as shown in the figure below.

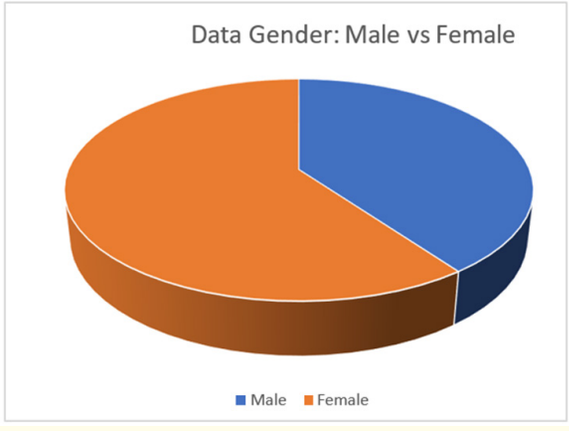

Figure 1

The CBD stones were mostly found in the distal end of CBD as compared to the proximal end as shown in the figure below.

The visualization quality of bile duct stones was significantly higher in the right semi-prone position compared to the supine position in ultrasound. In our study it has been observed that out of 100 patients 87 patients show better visualization of stone in semi-prone position however 13 shows good visualization of CBD stone in supine position as shown in Bar diagram below

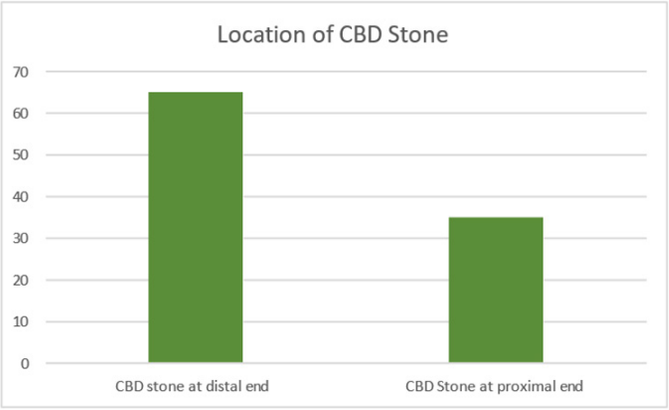

Figure 2

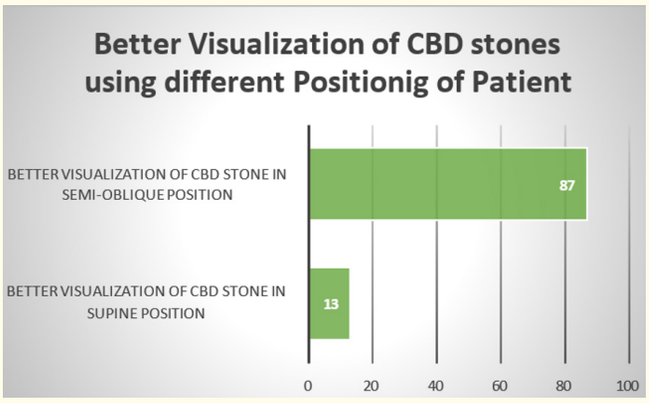

Figure 3

Discussion

The findings of this study support the notion that the semi-prone position offers superior visualization of bile duct stones compared to the traditional supine position [7-9]. The improved visualization quality in the right semi-prone position has important clinical implications [10-12], as it may lead to more accurate diagnosis and appropriate management of choledocholithiasis [13-15]. A clinical comparison study demonstrated that the semi-prone position could offer improved visualization in certain cases, particularly when initial imaging in the supine position is inconclusive. The semi-prone position allows for a different angle and potentially reduces interference from overlying bowel gas, thereby enhancing the detection of bile duct stones [15,16]. This position also aids in the assessment of the biliary tree's anatomy and pathology, providing a more detailed and clearer image of the stones and any associated complications such as bile duct dilation or inflammation [17,18]. The semi-prone position, also known as the left lateral decubitus position, is often used in ultrasonography to improve the

visualization of certain anatomical structures by utilizing gravity to displace the intestines and reduce gas interference [19]. This can be particularly beneficial in imaging the bile ducts and gallbladder. Studies have shown that the semi-prone position may enhance the quality of images by providing better acoustic windows and allowing for more comprehensive examination of the biliary tract [20]. Conversely, the supine position, where the patient lies flat on their back, is the standard position used in many ultrasonographic procedures [21]. While it is generally comfortable for the patient and provides good overall views, it can sometimes be limited by bowel gas and the position of the gallbladder, which can obscure the bile ducts [22,23] Overall, the choice between the supine and semi-prone positions should be guided by the patient's specific condition and the initial findings of the ultrasonography [24]. In cases where visualization is poor in the supine position, switching to a semi-prone position can be a valuable alternative to improve diagnostic accuracy [25]. Further studies are warranted to validate these findings and explore their impact on patient outcomes.

Conclusion

In conclusion, our study demonstrates that the semi-prone position provides better visualization of bile duct stones compared to the supine position. These findings highlight the importance of considering alternative patient positions during imaging studies for suspected choledocholithiasis to improve diagnostic accuracy and optimize patient care.

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