

Volume Ultrasound: usefulness of the render view in the characterization of gallbladder polyps

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Introduction

Ultrasound has been recognized as the modality of choice for evaluating the gallbladder.¹ In the presence of polypoid lesions, the size, stalk (pedunculated or sessile), contour (smooth or lobulated) and number of polyps need to be evaluated in order to make a differential diagnosis.

The incidence of gallbladder polyps of any type is quite varied in the medical literature. Eighty percent of polyps occur in females and generally occur after the third decade of life. Polyps can be cholesterol in nature or inflammatory, the latter being a reaction of the gallbladder wall rather than a true benign lesion. True benign mucosal lesions are either adenomyomas or papillomas. Both adenomyomas and papillomas have malignant potential. There are many reports documenting carcinoma in situ and cancers arising from these lesions.³ The risk factors for malignancy are: age exceeding 50 years, coexistence of gallstones, and size greater than 10 mm in diameter.⁴

Standard two-dimensional (2D) ultrasound poses several challenges for accurately characterizing such lesions. Volume Ultrasound is useful in overcoming these challenges by displaying the findings in a more comprehensive manner so that the referring physician and patient can clearly understand.

Prior reports have suggested that three-dimensional (3D) sonography adds no advantage for diagnosis of gallstones when compared with 2D. However, new techniques suggest that Volume Ultrasound may be better than 2D for differential diagnosis of gallbladder polyps and may improve the localization and staging of gallbladder carcinoma.² The objective of this case report is to corroborate this hypothesis.

Patient history

A 33-year-old, Asian male presented with post-prandial right upper quadrant discomfort and dyspeptic symptoms for more than three years. The patient had not experienced any weight loss or other gastrointestinal (GI) symptoms. The physical examination provided no relevant information. A complete workup was ordered which included both a 2D and 3D abdominal ultrasound focused on the gallbladder.

2D abdominal ultrasound

The 2D ultrasound exam with Coded Harmonic Imaging (CHI) demonstrated the gallbladder with multiple well-defined, low-level focal masses along the luminal wall. A dominant mass at the fundus measured 1.1 cm. Another prominent mass, located in the proximal half of the anterior gallbladder wall measured 0.34 mm (Fig. 1). The transverse magnified image (Fig. 2) added no additional information to truly characterize the nature of the masses.

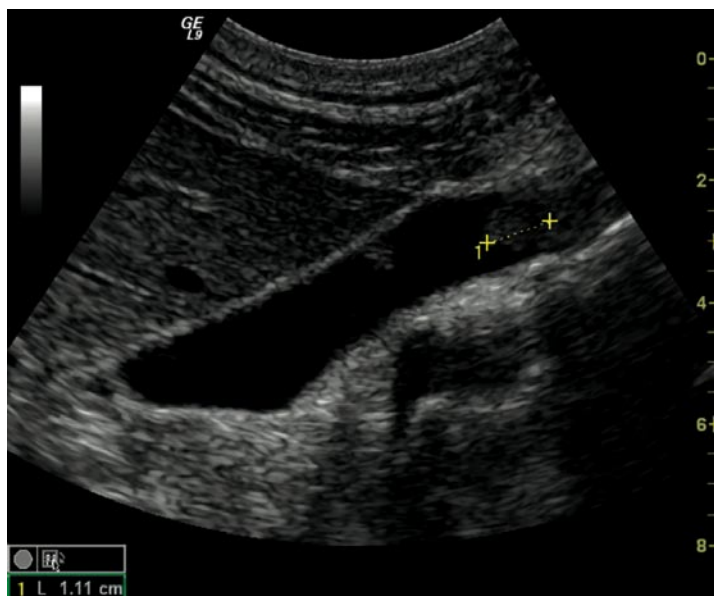


Figure 1
2D image showing polypoid masses at the fundus and the anterior wall of the gallbladder.

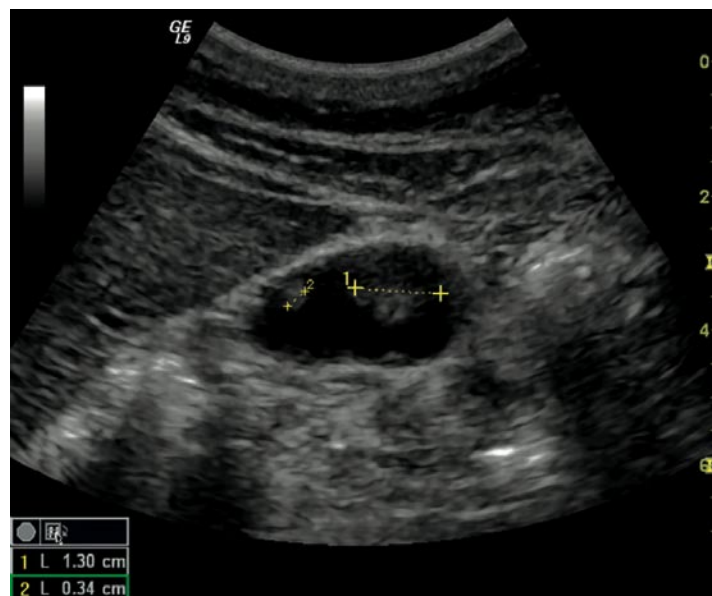


Figure 2
Magnified 2D transverse image of the polypoid masses.

Volume Ultrasound

A surface rendering of the gallbladder was acquired using the 4D3C volume transducer on a LOGIQ® 9 ultrasound system (GE Healthcare, Milwaukee, WI). All images were obtained with a volume angle of 60° and a rendering combination of surface smooth and gradient light. Through manipulation of the volume data and exclusive LOGIQ 9 raw data capabilities, the gallbladder mucosa and mucosal folds, were clearly demonstrated and exact nature of these masses delineated. The mass at the fundus showed a sessile stalk with a loss of continuity of the gallbladder wall (Fig. 3 a, b, c). The contour of the mass was lobulated, demonstrating the so-called “cauliflower” appearance (Fig. 4).

The mass on the anterior wall demonstrated a clearly defined sessile stalk with a smooth contour (Fig. 5). After the patient was discharged, the study was recalled from the onboard database. Adjustments to image parameters such as, overall gain, transparency and translation movements were made using the raw data, which increased confidence in the initial diagnosis.

Discussion

It is often difficult to determine the nature of polypoid lesions of the gallbladder with ultrasound examination alone. In some cases, surgery is required to confirm pathologic diagnosis. Literature suggests that surgery is indicated when a sessile polyp with a diameter exceeding 1.0 cm is detected by ultrasonography.⁵

This case report demonstrates the advantages of Volume Ultrasound over 2D imaging when facing a differential diagnosis of gallbladder polyps. The rendered images demonstrate clinical benefit by clearly illustrating the lesion characteristics of the gallbladder mucosa. Volume Ultrasound has the potential to improve staging for gallbladder carcinoma as previous studies have reported.² The additional advantage of raw data also increased the confidence of the initial diagnosis.

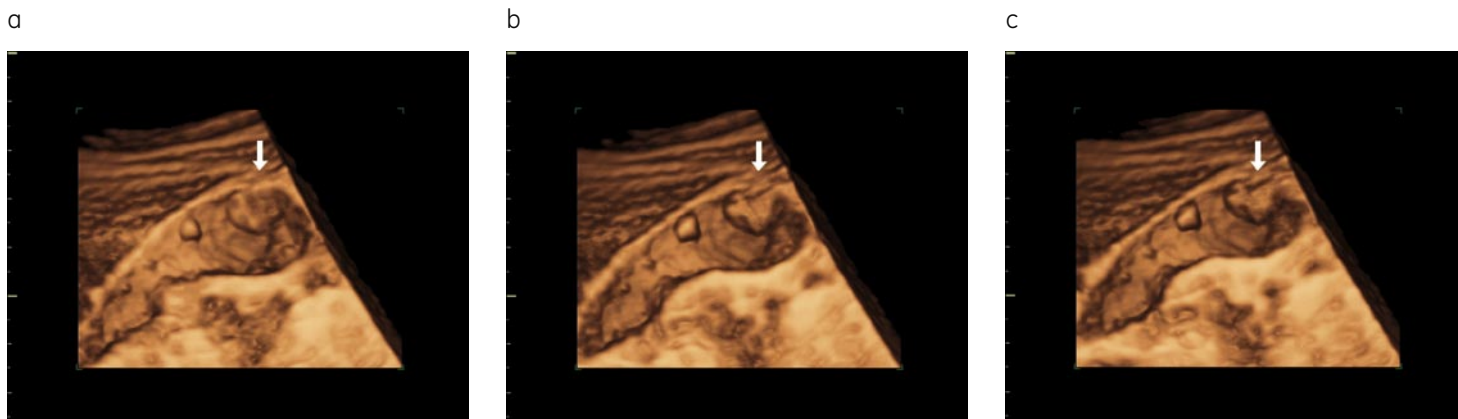


Figure 3 (a, b, c)

Sequence of rendered sagittal views clearly showing the disruption of the wall at the fundus of the gallbladder (Arrows).

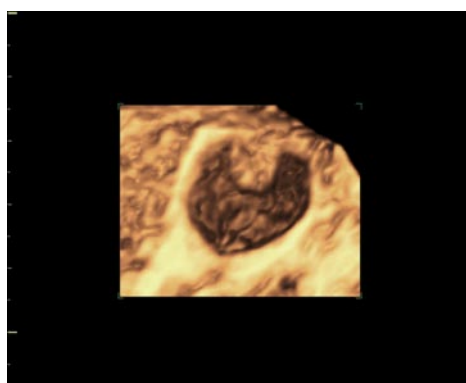


Figure 4

Rendered transverse view of the polyp at the fundus with a nodular, “cauliflower” appearance.



Figure 5

Rendered view demonstrating a sessile polyp with a smooth contour in the anterior wall of the gallbladder.

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