

Ultrasonographical evaluation of Asymptomatic Gall Bladder Diseases – An epidemiological study in North India

ASHISH VERMA, SUYASH MOHAN, SANJAY SARAN BAIJAL

ABSTRACT

To detect the prevalence of asymptomatic gall bladder (GB) diseases by using ultrasonography (USG) as the primary screening modality. Ultrasonography is the most appropriate tool which can be used for the diagnosis of gall bladder disease. Despite the availability of sophisticated imaging modalities, especially computerized tomography (CT) and magnetic resonance imaging (MRI), USG still remains the initial and powerful screening modality of choice for evaluating the GB pathology.

Over a period of two and a half years (July 2004 to Jan 2007), 640 subjects (105 healthy volunteers and 535 randomly selected patients with unrelated medical problems) were examined by using real time, grey scale, B mode USG with a 3.5 MHz convex transducer (Sonoline G60S system, Siemens Medical Solutions, WA, USA). To ensure adequate GB distension, the examination was performed after an overnight fast of 8 – 12 hours.

Among the 105 healthy volunteers, the prevalence of the silent

GB disease was 15.24%, while among the 535 patients presenting with unrelated symptoms, the prevalence was 10.84 %. However, the overall prevalence was 11.56%. Asymptomatic GB disease is more common in females, in the fourth and fifth decades of life, the mean age being $42.0 \pm 12.64\%$. Cholelithiasis (4.22%), followed by chronic cholecystitis with cholelithiasis (3.12%), were the commonest abnormalities which were detected. The accuracy of USG in delineating asymptomatic GB disease at our center was found to be 94.12%, as revealed by consistent USG and histopathological findings.

Cholecystosonography is a potentially valuable tool which is used for the diagnosis of GB disease. A strong case is made to recommend the USG screening of females between the ages of 41 – 50 years who were otherwise normal.

Key Words: Ultrasonography, Cholelithiasis, Chronic cholecystitis

INTRODUCTION

The use of ultrasonography (USG) as a diagnostic aid for the visualization of the gall bladder was first suggested by Hubilitz in 1972 [1]; since then, it has been used with increased frequency and confidence by radiologists. With the rapid strides in technological advancement, the accuracy and reliability of USG has also increased.

Sonographical patterns for the commonly encountered causes for gall bladder diseases viz. gall stones, carcinoma gall bladder (CAGB), adenomyosis and cholecystitis have been well described in the literature. These conditions may however, not always be symptomatic, especially in the early phases of their natural history. In the United Kingdom, about 8% of the population aged over 40 years have gall stones, which has increased to over 20% in those aged over 60. Fortunately, 90% of these stones remain asymptomatic; however, cholecystectomy remains the most commonly performed abdominal surgical procedure [2].

Reports from western literature present a variable picture for asymptomatic GB diseases [3], [4], Only few studies evaluating this issue in the Indian population, are however present in the literature [5].

Our study was aimed at estimating the prevalence of asymptomatic gall bladder diseases by following standardized diagnostic criteria in healthy volunteers and in patients presenting with symptoms which were unrelated to gall bladder diseases.

MATERIAL AND METHOD

USG was carried out in 105 healthy volunteers and 535 patients (males and females) who presented to the medical and surgical gastroenterology units of our institution with signs and symptoms

which were unrelated to the diseases of the biliary system. After an overnight fast, real time, grey scale, B-mode USG examination was done by using a 3.5 MHz convex transducer (Sonoline G60S system, Siemens Medical Solutions, WA, USA).

The patients were initially positioned in the supine position and the right upper abdominal quadrant was examined, starting with the liver, in the routine manner. The gall bladder was examined initially with the patient in the supine position, followed by examination in both the decubitus and the sitting positions. Deep respiratory excursions were advised, with the jaggling movement of the gall bladder caused by the transducer, to make the small calculi and those impacted to the wall, more obvious. Sonographical Murphy's sign was elicited in all the patients, with the transducer placed directly above the gall bladder [6], [7], [8].

Moderate compression was applied and the patient was observed for facial wincing. A focused question regarding pain on pressure was also asked if no wincing was noted; in case of a positive response, control examinations with probe pressure over the left lumbar region and the hypogastrium was also done. The patient was then turned to the left decubitus position and compression was given over the gall bladder to confirm the Sonographical Murphy's sign in all the above situations [7], [8], [17].

RESULTS

The incidence of GB disease in the study groups was 11.6%. Cholelithiasis was present in 66 cases (10.3%); acalculous cholecystitis was present in 3 (0.47%); and gall bladder polyps in 3 (0.47%).

Among the 640 subjects who were screened, the ages ranged from 3 – 78 years and the male-female ratio was 1:1.5 [Table/Fig 1].

The male-female ratio in asymptomatic patients with GB disease (n=74) was 1:1.8, with a peak incidence in the fifth decade. [Table/ Fig 1]

Age Range (Years)	Male		Female		Total	
	No	%	No	%	No	%
1 – 10	14	5.53	13	3.36	27	4.22
11 – 20	16	6.32	14	3.62	30	4.69
21 – 30	21	8.30	131	33.85	152	23.75
31 – 40	10	3.95	58	14.98	68	10.62
41 – 50	60	23.72	88	22.74	148	23.12
51 – 60	60	23.72	57	14.73	117	18.28
61 – 70	55	21.74	18	4.65	73	11.41
71 – 80	17	6.72	8	2.07	25	3.91
Total	253	100	387	100	640	100

[Table/Fig 1]: Age and Sex distribution of all subjects screened

It was observed that among the 105 healthy volunteers, the prevalence of the silent GB disease was 15.2%. Subjects with diseases other than that of the hepatobiliary system showed a lower incidence of 10.84 %. Thick wall GB, echo and acoustic shadowing were the commonest USG morphologies which were observed in 85.1%, 70.3%, and 73% of the patients [Table/Fig 2].

USG findings	Number	Percentage
Echo	52	70.27
Acoustic shadowing	54	72.97
Contour irregularity	13	17.57
Thick wall	63	85.14
Shadow changes with posture	42	56.76
Calcification	3	4.05
Sludge	22	29.73
Polyp	4	5.4
Liver infiltration	1	1.35
GB wall edema	4	5.41
WES triad	20	27.03
Dilated cystic duct/CBD	2	2.7
Sonographic Murphy's sign	2	2.7

[Table/Fig 2]: Sonographic morphology in patients with asymptomatic gall bladder disease

USG abnormalities were detected in 20.27% of the pregnant women, in 15.24% of the healthy volunteers, in 8.11% of the cases with Koch's abdomen and in 8.75% of the cases with benign prostatic hyperplasia, among others.

DISCUSSION

USG has established itself as a first line of investigation in GB diseases. The reported accuracy of USG in various series is 90 – 98% (9). USG diagnoses gall stones and gall bladder malignancies (CAGB) with high accuracy [7], [8].

Pant and Gupta (10) examined 2500 patients with USG and found calculi in 62 (2.48%), while Brinholz (11) studied an asymptomatic population of 581 subjects and found silent gall stones in 64 sub-

jects at an incidence of 11%. In the present study, 74 (11.6%) patients had asymptomatic gall stones. This variation of the incidence in various series may be due to the diverse dietary habits.

GB polyps have been found in 1% patients undergoing cholecystectomy [1]. The evidence for the adenoma – carcinoma sequence is abundant [12]. The risk of developing carcinoma in a polyp is reported to be about 0.0020 – 0.0160% per year. This risk increases with the size of the polyp or with GB wall thickening. Of the patients who were screened in this study, 0.47% were found to have GB polyps, an incidence which was similar to that from earlier reports. CAGB is associated with stones in 40 – 100% of the patients.

The importance of the development of carcinoma in patients with asymptomatic gall stones has been well emphasized. In the present study, carcinoma was present in 2 (0.37%) patients and in both, it was associated with gall stones. One patient underwent surgery and the diagnosis was confirmed on histopathological examination. The survival of the patients with CAGB varies with the stage of the disease at the time of presentation. Patients with stage 1 disease have 90 – 95 % survival rates, while the rates are 65 – 90 % for stage 2 disease and 8 – 20 % for stage 3 disease. Most of the patients with stage 4 disease die within 6 months [13], [14], [15]. These findings suggest that USG examination should not be localized to the disease in question and that a complete abdominal examination should be performed in order to pick up silent diseases which may subsequently become symptomatic. USG may also be used as a screening modality for the early detection of CAGB.

The peak incidence of asymptomatic GB diseases in the present study occurred in women in the fourth decade; this is also the peak age for carcinoma in this region [16], [17].

We suggest that every woman over the age of 40 years, living in an endemic zone, should be screened sonographically at least annually. The false negativity of ultrasonography for such screening is acceptably low, and was found to be 2.3 % in a series of 133 patients [19].

We further suggest that every female who is referred to a radiologist for USG should be screened for the GB disease as well; thus, we might be able to pick up the cases of carcinoma earlier and this might make a worthwhile cure possible.

Though we have not compared ultrasonography with any other modality which is capable of diagnosing gall bladder diseases, a review of relevant literature emphasizes ultrasound as the modality with maximum specificity and sensitivity for diagnosing symptomatic as well as asymptomatic gall bladder diseases. CT scan however, has been mentioned as the first line in the diagnostic work up if a patient presents with acute abdomen, which may further turn out to be due to a symptomatic gall bladder disease [18].

REFERENCES:

- [1] Aldridge MC, Bismuth H. gall bladder cancer: the polyp cancer sequence. Br J Surg. 1990; 70: 363-364.
- [2] Johnson AG, FriedM, Tytgat GN, .Asymptomatic Gallstone Disease Core Team; WJO Practice Guidelines.
- [3] Hopper KD, Landis JR, Meilstrip JW, McCauslin MA, Sechtin AG. The prevalence of asymptomatic gall stones in general population. Invest Radiol. 1991; 26: 939-945.
- [4] Chapman BA, Wilson IR, Frampton CM, Chisholm RJ, Stewart NR, Eagar GM, Allan RB. Prevalence of Gall Bladder disease in diabetes mellitus. Dig Dis Science. 1996; 41: 2222-2228.
- [5] Pandey M, Khatri AK, Sood BP, Shukla RC, Shukla VK. Cholecystosonographic evaluation of the prevalence of gall bladder disease. A university hospital experience. Clin Imaging. 1996; 20: 269-272.
- [6] Sanders RC, Winter T. Right Upper Quadrant Pain In: Clinical Sonography.-A practical Guide. 4th Edn. Lippincott Williams Wilkins; 82-89.
- [7] Bortoff GA, Chen MYM, Ott DJ, Wolfman NT, Routh WD. Gallbladder Stones: Imaging and Interventions. RadioGraphics. 2000; 20: 751-7.
- [8] Marton K, Doubilet P. How to Image the Gallbladder in Suspected Cholecystitis. Ann Intern Med 1998; 109 (1): 722-729.

- [9] Hershman MJ, Campion KM, Reilly DT. Can surgeons rely on ultrasonography for gall stones? *J Royal Coll Surgs, Edinburgh*. 1986; 31: 35-36
- [10] Pant CS, Gupta RK. Silent gall stones – Diagnosis on real time ultrasonography. *Ind J Radiol Imaging*. 1986; 40: 103-105.
- [11] Brinholz JC. Population survey ultrasonic cholecystosonography. *Gastrointest Radiol*. 1982; 7: 165-167.
- [12] Kozuka S, Tsubone M, Yashi A, Haehisuka K. Relation of adenoma carcinoma in the gall bladder. *Cancer*. 1982; 50: 2226.
- [13] Benelli B, Borghetti M, Parizale M, Bertolotti PA, Mentanari G, Maldotti M, Bonrodi R, Reduzzi L, Abbiati C. The efficacy of sonography in the diagnosis of gall bladder carcinoma. *Minerva Medicine*. 1989; 80: 237-239.
- [14] Elvin A, Erwald R, Muren C, Mare K. Gall bladder carcinoma. Diagnostic procedures with emphasis on ultrasound diagnosis. *Ann Radiol Paris*. 1989; 32: 282-287.
- [15] Wanebo JH, Vezeridis MP. Cancer of the gall bladder. *J Surg Oncol*. 1993 (Suppl. 3); 134-139.
- [16] Shukla VK, Khandelwal C, Roy SK, Vaidya MP. Primary carcinoma of the gall bladder: A review of a 16 years period at the university hospital. *J Surg Oncol*. 1985; 28: 32-35.
- [17] Hublitz UF, Kahn PC, Sell LA. Cholecystosonography: An approach to non visualized gall bladder. *Radiology*. 1972; 103: 645-649.
- [18] Grand D, Horton KM, Fishman E. CT of the Gallbladder: Spectrum of Disease. *Am J Roentgenol*. 2004; 183: 163-170.
- [19] Walker J, Chalmers RTA, Allan PL. An audit of ultrasound diagnosis of gall bladder calculi *Br J Radiol*. 1992. 65; 581-584.

AUTHORS:

1. Dr. ASHISH VERMA
2. Dr. SUYASH MOHAN
3. Dr. SANJAY SARAN BAIJAL

NAME OF DEPARTMENT(S) / INSTITUTION(S) TO WHICH THE WORK IS ATTRIBUTED:

Dept of Radiodiagnosis, Sanjay Gandhi Postgraduate Institute of Medical Sciences, Raebareilly Road, Lucknow – 226014, India.

NAME, ADDRESS, TELEPHONE, E-MAIL ID OF THE CORRESPONDING AUTHOR:

Dr. Sanjay Saran Bajjal, Professor, Dept of Radiodiagnosis, Sanjay Gandhi Postgraduate Institute of Medical Sciences, Rae Bareilly Road, Lucknow – 226 014 U.P, India.

E Mail: drsuyash@gmail.com, ssbajjal@srgpgi.ac.in

Phone: +91 522 2668700 Extn: 2574 (O); 2568(R)

Fax No: +91 522 2668717

DECLARATION ON COMPETING INTERESTS: No competing Interests

Date of Submission: **July 22, 2010**

Peer Review Completion: **Nov 22, 2010**

Date of Acceptance: **Jan 18, 2011**

Date of Final Publication: **Apr 11, 2011**