The Use of In-Office and Emergency Room Ultrasonography in the Diagnosis of Cholelithiasis

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Ultrasonography has gained popularity as the diagnostic test of choice for cholelithiasis because it is simple, safe, non-invasive and of high accuracy even if compared with oral cholecystography.1-6 A variety of portable ultrasound machines are available. This prospective study demonstrated the reliability of the surgeon doing in-office and emergency room ultrasonography using a portable machine in the diagnosis of gallbladder stones. The results showed that the surgeon was able to perform this diagnostic test in the out-patient clinic and emergency room with a high degree of accuracy and reliability thus avoiding a possible delay in the investigation and treatment of patients. This finding is particularly important when considering patients presenting with acute biliary pain outside working hours.

Methods

A total of 122 consecutive patients were studied who presented to the out-patient (90 patients) clinic and emergency room (32 patients) with symptoms strongly suggestive of gallstone disease. Biliary pain was defined as mostly right upper quadrant or epigastric pain that sometimes radiated to the back or right shoulder, more often persistent than intermittent. Each suspected patient was scanned by the surgeon who wrote his independent report stating one of the following:

1. the gallbladder contained stones.
2. the gallbladder was normal and there was no stone in it.
3. the gallbladder could not be visualized, or
4. he was doubtful about the presence or absence of gallbladder stones.

The patient was then examined by two independent consultant radiologists who wrote their own usual full report of an upper abdominal ultrasound examination without knowing the surgeon’s opinion. The agreed opinion of the two radiologists was considered to be the final verdict. The surgeon used a portable machine OTE Biomedica Sim 4000i ‘3.5 MHZ’ transducer. The radiologists used a Siemens Sonoline F62 machine.

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Results

All patients diagnosed by radiologists as having stones were found to have gallbladder stones at cholecystectomy. The total number of normal gallbladders reported by the radiologists was 75 (61.5%); among them there were 69 cases reported normal by the surgeon, a specificity of 92%. The remaining six patients were as follows: one the surgeon could not examine in the out-patient clinic; one was reported positive for stones and the radiologists did not confirm this finding; there were four doubtful cases reported by the surgeon and the radiologists found them to have normal gallbladders with no stones.

The total number of positive cases for gallstones reported by radiologists was 47 (38.5%); among them there were 45 cases diagnosed by the surgeon, (i.e. sensitivity 96%). The remaining two cases were as follows: one the surgeon could not examine and in the second, the surgeon was in doubt. None of the positive cases reported by the radiologists were considered normal by the surgeon.

The surgeon and radiologists agreed on the presence of stones in 45 out of 47 cases (95.7%). They also agreed on the absence of stones in 69 out of 75 cases (92%). This means that the radiologists agreed with the surgeon in 114 out of 122 cases about the presence or absence of gall stones (93.4%); however, they did not agree with him in the remaining eight cases (6.6%). These consisted of five doubtful cases (4%), two cases (1.6%) of non-visualization of the gallbladder and one false positive (0.8%) (see Table 1).

Discussion

Symptoms due to gallstone disease are variable and often non-specific. Among them, biliary pain is relatively the most reliable, in spite of the fact that it has been reported that biliary pain shows low sensitivity and high specificity in the detection of gallstones. It has also been reported that nearly half of the patients who had cholecystectomy for gallstones still have some symptoms one year later even if all of them had typical biliary pain before surgery. Depending on biliary pain alone as a guarantee for presence of gallstones cannot be recommended and confirmation is mandatory before embarking upon surgical treatment. Eventually hospitals' ultrasound departments may be over-loaded with patients suspected of having gallstones.

The use of in-office or emergency room ultrasonography by a surgeon to diagnose gallbladder stones will give immediate supplementary data to the information elicited from the routine history and physical examination. So the surgeon as sonographer occupies a unique position which permits him to relate the sonographic findings directly and immediately to the medical problem, thus avoiding for patients the inconvenience and delay of referral. Findings can be documented and saved in the form of photographs and faster treatment can be planned. To control the possible abuse of this approach and avoid unacceptable levels of negative gallbladder explorations or inappropriate reassurance of patients there are two points which should be stressed. Firstly the surgeon should not embark on doing ultrasound for his patients without appropriate training; such a training can be obtained in his own hospital provided it is qualified and equipped to do so as in teaching hospitals. Secondly the surgeon should always refer the doubtful cases to a more experienced radiologist. The incorporation of office ultrasonography in the assessment of various medical conditions has been used by some specialties. Obstetricians have used it in prenatal diagnosis of spinal anomalies; prediction of gestational age and estimating the weight of the term fetus. Urologists have used sonography in the initial evaluation of patients with voiding symptoms, and haematuria as well as screening patients with known congenital anomalies such as hypospadias. Primary care physicians have used it in the estimation of gestational age. Surgeons have utilized ultrasonography during biliary surgery; but the in-office use of sonography as a preoperative diagnostic test, although it is practised in some surgical units has not gained popularity in surgical practice. In this study we have demonstrated the reliability and accuracy of its use by a surgeon in the preoperative diagnosis of gallbladder stones.

The surgeon was able to perform in-office ultrasound and emergency room examination successfully in 120 (98.36%) out of 122 patients while he failed to visualize two patients' gallbladders by the portable machine but he was able to visualize the gallbladder and arrive at the

Table 1

<table>
<thead>
<tr>
<th></th>
<th>Gallbladder without stones</th>
<th>Gallbladder with stones</th>
<th>False + ve</th>
<th>False - ve</th>
<th>Gallbladder not seen</th>
<th>Doubtful</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Radiologists</td>
<td>75</td>
<td>47</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>122</td>
</tr>
<tr>
<td>Surgeon</td>
<td>69</td>
<td>45</td>
<td>1</td>
<td>0</td>
<td>2</td>
<td>5</td>
<td>122</td>
</tr>
</tbody>
</table>
correct diagnosis when he examined the same patients using the radiologists' machine which may indicate a limitation of the power of the portable machine.

In routine practice the patient suspected of having gallstones is sent for ultrasound examination by a radiologist which can result in a delay in management. The radiology department can also be overloaded with suspected patients who eventually prove to have normal gallbladders (61.5%) in this study. In-office sonography can save the time of patients as the planning of their treatment can start immediately. The radiologist's time will be available for investigating more difficult problems, if the surgeon undertakes routine gallbladder ultrasonography. In this study the surgeon actually needed the opinion of the radiologist in five cases of doubtful stones (4.09%) and in two cases (1.63%) because he was unable to visualize the gallbladder using a portable machine, so a total of seven (5.73%) patients actually needed to be referred to a radiologist, a substantial saving of time and effort. These figures are comparable with other reports. A report from the London Hospital showed an overall equivocal case incidence of 8% ranging from 0 to 14%; a false positive rate of 1.4%, and a false negative rate of 3.7% with an incidence of overall incorrect scans of 5%. The Rome group for the study of cholelithiasis reported 2.8% of inconclusive or doubtful ultrasound examinations. In both reports the ultrasonography was performed by Consultants in the radiology department. The surgeon had only one (0.82%) false positive result in this series. The surgeon considered an intraluminal artifact shadow as a stone, this shadow could not be seen by the radiologist and the oral cholecystogram was normal. A valid point against in-office ultrasound is that other unexpected findings such as metastatic lesions, cysts, etc could be overlooked by a surgeon; such things can be avoided by training, for an adequate period with an experienced ultrasonist. So then abnormalities which are not definitely indicative of pathology may be detected by the surgeon and referred to an experienced radiologist. Because ultrasonography is very operator-dependent, it would be expected that with more practice the surgeon would become progressively more accurate.

In conclusion, we recommend the use of in-office and emergency room ultrasonography by a surgeon for the diagnosis of cholelithiasis. We think that this approach should reduce the load on radiologists and enhance the clinical judgement of surgeons in the in-patient clinic or emergency situation when dealing with a patient with suspected gallstone disease. Such a procedure should also ensure faster treatment of patients.

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