The evaluation of sonographic image resolution after barium upper G.I.T. Examination

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تقييم وضوح فحص السونار عقب فحوصات الباريوم

كان سابقا الاعتقاد سائدا بان وجود الباريوم في المعدة والامعاء يؤثر سلبيا على وضوح الصورة في السونار اذا كان الفحص مباشرة بعد فحوصات الباريوم مما يؤدي ذلك الى تأخر تشخيص المرض وبالتالى تأخر علاجه في حال تطلب اجراء الفحصين في نفس الوقت . لهذا الغرض اجريت هذه الدراسة بحيث قمنا بفحص السونار قبل وبعد فحوصات الباريوم للمعدة والامعاء وشملت الدراسة ٦٨ مريض لمدة ١١ شهرا. لذا اصبحت ١٣٦ فحص سونار من قبل الباحث واخر اختصاصي سونار من قبل الباحث واخر اختصاصي سونار . استخدمنا مقياس يقيم وضوح صورة السونار يتراوح بين الصفر والاربعة لستة مناطق تشريحية (المرارة، البنكرياس، الشريان الاورتي، بوابة الكبد، فصي الكبد الأيمن والأيسر). نتيجة البحث كانت عدم تشوه صورة السونار اذا اجري الفحص مباشرة بعد الباريوم.

Summary :

The presence of barium in the GIT after barium studies of the stomach & colon is thought to interfere with the performance of abdominal sonography. This concept result in delay in diagnosis & scheduling in conveniences when both studies are indicated at the same time. To determine if this belief is true, we prospectively obtained sonograms before & after biphasic upper GIT examination in 68 patients for 11 months period. The 136 sonograms were randomized & interpreted by the author & blindly by other radiologist & we used a scale from 0-4 to rate the appearance of six anatomical areas (gall bladder, pancreas, aorta, porta hepatis & RT & LT lobes of the liver). The results showed no degradation of the images of these structures on the sonograms obtained after the barium meal compared with the prebarium sonograms.

We concluded that barium doesn't interfere with sonography performed immediately after an upper GIT examination. Consequently when both studies are needed, a sonogram can be scheduled after an upper GIT examination.

Introduction

It is generally believed that a barium examination should not be done before an abdominal sonograms because the barium will obscure the sonographic anatomy by scattering or absorbing the sound waves [1,2]. The interfering effect of barium on sonograms was commonly observed when static B-mode examination were the standard sonographic technique.

Abdominal sonography is a valuable technique in diagnosing many abdominal diseases. It is safe, portable, repeatable & relatively inexpensive. Sensitivity of abdominal US is regarded so high in most abdominal pathologies [3].

In contrast to large bowel disease , small bowel disease is relatively rare. Nevertheless, examination remains predominantly a radiological responsibility because of the relative inaccessibility of the small bowel. Although enteroscopy continues to develop, it is still principally confined to specialist centers & modern push enteroscopes cannot examine the entire small bowel in most patients except during laparotomy. The small bowel is difficult to examine : there are multiple overlapping loops, which are highly mobile & to make matters worse, are often furiously peristalsing [4].

Aim of the study:

This prospective study is done to evaluate the clinical utility of US following upper GIT barium studies when both examinations are indicated.

Patients & methods :

During the period of 11 months, 68 patients scheduled for an upper GIT series at our medical centre were participated in the study & they were studied by routine conventional US examination. The cases were examined in AL-Najaf teaching hospital. Informed medical questioner was obtained in all cases ,including : the name , age , sex, symptoms, clinical signs , examination requested ,and referring physician . Patients fasted 12 hours before the examination in the usual fashion. Before & usually no more than 15 minutes after the upper GIT study, we obtained real-time sonograms of the abdomen on each patient by using a 3.75 MHz convex transducer (siemens high resolution real time machine (VERSA Pro)). For each patient six regions were examined & photographed systematically, left lobe, right lobe of the liver, porta hepatis, pancreas, GB & aorta. Immediately after the sonograms each patient had a routine ***biphasic*** upper GIT series with a dense barium & sparkles powder. This was followed by a thinner barium. The volume of barium injected ranged from 200-250 ml, & examination time averaged 20 minutes. No attempts was made to correlate the findings from upper GIT series with the results on sonography. However, none of the patients had gastric outlet or small bowel obstruction. No small bowel studies were performed as part of the upper GIT series. Few patients had barium in the colon when the last film was taken. All patients had barium remaining in the stomach & proximal small bowel.

The sonograms were interpreted by the author & blindly by other radiologist. Six regions (gall bladder , pancreas , aorta , porta hepatic , RT & Lt lobes of the liver) were subjectively rated on scale of 0 (very poor) , 1(poor), 2 (relatively clear) , 3(fairly clear) to 4 (excellent).

Biphasic barium meal examination : double contrast views of the stomach are initially obtained and then the patient swallows diluted barium (100% W/V), this mixes with the 250% W/V barium in the stomach to produce a density that, in a thin layer, can be seen through[4].

Results

A total number of 68 patients (36 female , 32 male) : complain from upper GIT problems were primarily examined by conventional US then barium study & again by US. Their ages range from 23-70 years (mean = 51. 9 years).

The results for the six areas examined sonographically are shown in Table 1 .For reader 2 (other radiologist) there was no statistically significant difference in any of the areas examined when comparing pre barium & post barium sonograms. Foe reader 1 (author) the porta hepatis, pancreas, GB, & the aorta actually were visualized better after the barium study ($P<0.05$). the two remaining areas (RT & Lt lobes of the liver) showed no statistically significant difference.

Table 1 : sonographic appearance of the abdominal organs after upper GIT examination (%)

Antomic location	improved		No change		Worse	
	Reader 1	Reader 2	Reader 1	Reader 2	Reader 1	Reader 2
Gall bladder	48%	33%	45%	42%	7%	25%
Pancreas	35%	25%	50%	50%	15%	25%
Aorta	40%	18%	45%	45%	16%	37%
Porta hepatis	40%	20%	50%	58%	10%	23%
Rt liver lobe	20%	18%	53%	60%	27%	22%
LT liver lobe	33%	23%	45%	65%	22%	12%

Note: data show the percentage of change (if any) supposed by each reader for each anatomic location after upper GIT examination. None of the sonograms were thought to be of non diagnostic quality.

Discussion

The prohibited performance of abdominal sonography after barium studies arose from experience without dated sonographic equipment.

However we have observed that the presence of barium does not interfere with sonographic images made by using modern, high quality, real time units. In addition, early studies documenting interference with barium involved in vitro B-mode scanning of isolated loops of small intestine in a water bath. The end point of these experiments were visualization of the bowel wall, not visualization of the abdominal organs. In vivo studies were limited to one patient only [2,5]. In the present study, we examined the effect of barium on sonographic appearance of abdominal organs rather than on the bowel wall. Therefore, We performed a prospective study to determine if barium given during an upper GIT examination interferes with real time abdominal sonography.

We did not evaluate the kidneys because barium in the stomach & small bowel would be less likely to interfere with renal visualization than with visualization of other structures such as the aorta, pancreas, liver, porta hepatis & G.B. The pelvis was not evaluated because of the inconvenience of patients requiring to have a full urinary bladder for the pelvic examination.

The results show that sonography can be performed satisfactorily with barium in the stomach & proximal small bowel. This also may be true with barium in the colon after barium enemas, although the effect of air in the colon after air-contrast barium enemas remains to be studied.

A puzzling findings was a strong trends towards improvement of sonographic images in 4 anatomic areas noted by one observer, this may be a statistical anomaly, but it could be due to barium & water outlining the bowel to a greater degree & therefore adding to the overall definition of the abdominal anatomy. In fact filling the stomach & duodenal sweep with fluid has been advocated to visualize better the pancreas & other structures in the upper abdomen. The readers, even in retrospect, could not identify which sonograms were performed after a barium meal.

Barium might act as an acoustic window. Moreover, there is the possibility that the heavier barium- filled loops of small bowel are more easily displaced by transducer pressure. Considerably greater probe pressure is exerted with a real time probe than was the case with B-mode equipment, this allows one to push interfering bowel loops out of

the sound beam & facilitates compression of the bowel lumen sufficiently to eliminate barium from the portion of the bowel under the probe.

We conclude that sonography can be performed after an upper GIT series, accordingly we have change our scheduling practices & no longer require the abdominal sonograms to be performed before the barium examination.

References:

1. Sarti DA. Diagnostic ultrasound : text & cases, 2nd edition. Chicago: year Book Medical, 1997 .
2. Sarti DA, Lagere A. Reexamination of the deleterious effects of gastrointestinal contrast material on abdominal echography. Radiology 1988 ; 126 : 231 – 232.
3. Lin Z.Y., Chang W.Y., Wang L.Y., et al. Duplex pulsed Doppler sonography in the differential diagnosis of hepatocellular carcinoma & other common hepatic tumors. Br. J. Radiology 1992; 65:202-206.
4. Steve Halligan. The small bowel and peritoneal cavity. In : Sutton D. :- A Text book of radiology and imaging 7th ed. Vol.1 London Churchill living stone ; 2005 : p.615.
5. Leopold GR, Asher WM. Deleterious effect of gastrointestinal contrast material on abdominal echography. Radiology 1991; 98:637-640