

Incarcerated obturator hernia: pitfalls in the application of ultrasound

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Abstract

Objective To describe ultrasonographic appearance and diagnoses of incarcerated obturator hernia.

Methods Three consecutive cases of incarcerated obturator hernia examined preoperatively with ultrasound were presented to show the pitfalls in the application of ultrasound for the recognition of the entity. Retrospectively reviewed, ultrasound directly demonstrated an incarcerated obturator hernia in all the cases.

Results The herniated segment was delineated posterior to the pectineus muscle in the femoral triangle. However, the sonographer mistakenly interpreted it showed a femoral hernia in the first case. In the third case, the sonographer did not scan the femoral regions in the initial examination although he confirmed the evidence of small bowel obstruction. The evidence of an incarcerated obturator hernia was detected in the re-examination with ultrasound after it had been revealed by CT scan. Consequently, ultrasound was evaluated as applicable and useful for the recognition of incarcerated obturator hernia.

Conclusion Ultrasound is an useful tool for detecting obturator hernia. However, adequate education and training for examiners are required to prevent false interpretation or overlooking of the entity.

Keywords Obturator hernia · Ultrasound · Incarceration · Small bowel obstruction

Introduction

Incarcerated obturator hernia is a relatively rare cause of small bowel obstruction and rather difficult to diagnose preoperatively with physical examinations and plain X-rays. Delayed recognition has been related to increased morbidity and mortality [1–3]. However, the application of CT scan for acute abdomen has made it easier to visualize an incarcerated obturator hernia in the pelvis [4–8]. On the other hand, the application of ultrasound for acute abdomen has been widely discussed in recent years. However, very few reports were published for demonstrating the usefulness of ultrasound for the diagnosis of incarcerated obturator hernia [9–13]. In this report, we retrospectively evaluated the significance of ultrasound for the recognition of incarcerated obturator hernia and demonstrate some of the potential pitfalls of ultrasound in this application.

Materials and methods

Three consecutive cases of incarcerated obturator hernia admitted in the Kobe City Medical Center West Hospital were reviewed retrospectively. All of them were examined preoperatively with ultrasound. CT scan was utilized in two of them. In this report we reviewed the age, sex, body height/weight, past history of delivery and laparotomy, associated medical conditions, clinical symptoms, physical findings, laboratory data, plain X-ray images, ultrasonograms, CT images, operative findings, and outcome.

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Results

Case 1 had an incarcerated right obturator hernia. Cases 2 and 3 had an incarcerated left obturator hernia. The clinical pictures of the three cases are listed in the Table 1. All of them were thin, elderly women and had no previous history of laparotomy. Case 2 had no history of delivery. They did not have groin pain or thigh pain but had abdominal pain or vomiting. Case 3 was hypotensive when she presented to the emergency department with 3 days' history of nausea and vomiting. Tumor-like bulge with tenderness in the femoral triangle was palpated in Case 1, but no groin mass was recognized in Cases 2 and 3. A Howship–Romberg sign was checked and then confirmed in Case 2 after the diagnosis of incarcerated obturator hernia had been made with ultrasound. Laboratory data showed extreme abnormalities in Case 3 admitted with shock. Plain X-rays showed only small bowel obstruction in all the cases.

Retrospectively reviewed, ultrasound delineated the direct images of incarcerated obturator hernia as well as the images of small bowel obstruction in all the cases. The evidence of small bowel obstruction was demonstrated by dilated proximal small bowel accompanied with collapsed distal bowel (Fig. 1a). Each incarcerated intestinal segment was delineated as an akinetic, cystic mass with thickened wall posterior to the pectineus muscle in the femoral

triangle (Fig. 1b, c). However, the sonographer mistakenly interpreted the ultrasonograms as images of an incarcerated femoral hernia in Case 1. In Case 3, the sonographer did not scan the femoral region and consequently overlooked an obturator hernia in the initial examination. The evidence of the entity was confirmed in the re-examination with ultrasound after it had been demonstrated by CT scan (Fig. 2a).

CT scan demonstrated an incarcerated obturator hernia in Cases 2 and 3 (Figs. 1d, 2b). In Case 1, it was not performed for the preoperative evaluation. In each case urgent laparotomy showed an incarcerated obturator hernia and relieved the obstruction. Partial enterectomy was required for hemorrhagic necrosis of the incarcerated intestinal segment only in Case 3. No postoperative complications occurred in their clinical courses.

Discussion

Obturator hernia is defined as an abdominal wall hernia protruded through the obturator canal, and usually consists of a hernia sac containing small bowel. The entity is relatively rare, but a significant cause of small bowel obstruction, especially in thin, elderly females [1–3]. It is also reported to occur more often in the multipara. The

Table 1 The clinical pictures of the three cases of incarcerated obturator hernia

	Case 1	Case 2	Case 3
Age/sex	84/female	77/female	72/female
Body height/weight (cm/kg)	145/41	162/40	158/36
Previous history of delivery/laparotomy	3 times/none	None/none	Once/none
Associate medical conditions	AV block	Diabetes mellitus	COPD, Angina, AR
Chief complaints	Diffuse abdominal pain No vomiting	RLQ pain No vomiting	No pain Vomiting
Duration from the onset to admission	38 h	24 h	48 h
Vital signs	Stable	Stable	Shock
Physical findings in the femoral triangle	Bulge with tenderness	No bulge	No bulge
Laboratory data	WBC 7,300/ μ L CPK 110 IU	WBC 8,300/ μ L CPK 21 IU	WBC 24,100/ μ L CPK 3,498 IU Amylase 1,466 IU
Plain X-ray diagnosis	SBO	SBO	SBO
Ultrasound diagnosis (initial exam. → re-exam.)	SBO due to incarcerated femoral hernia	SBO due to incarcerated obturator hernia	SBO due to unknown cause → incarcerated obturator hernia
CT diagnosis	Not performed	SBO due to incarcerated obturator hernia	SBO due to incarcerated obturator hernia
Laparotomy	Herniorrhaphy without enterectomy	Herniorrhaphy without enterectomy	Herniorrhaphy with enterectomy

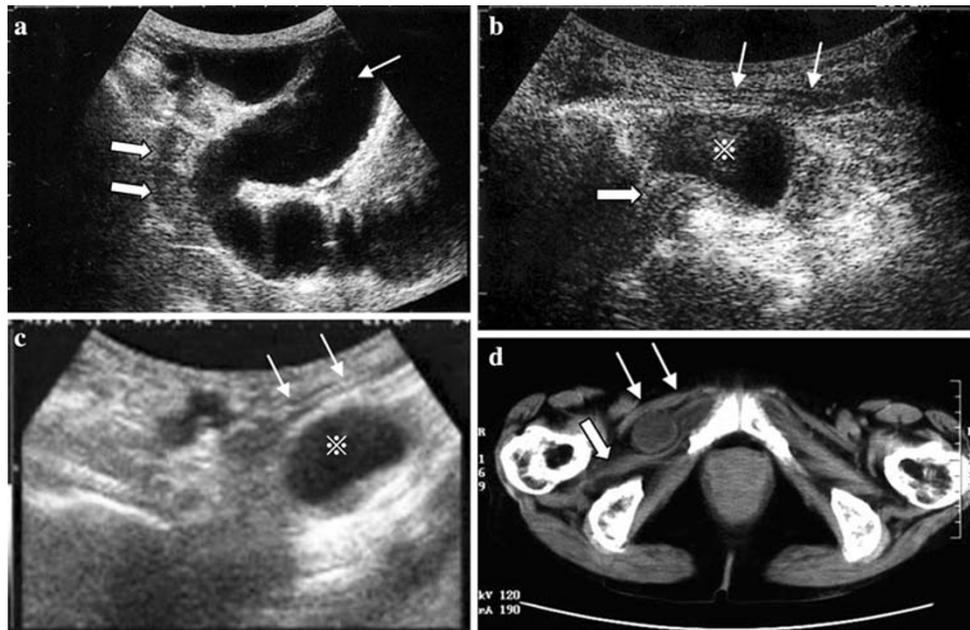


Fig. 1 Ultrasonograms of the Case 2. **a** Ultrasound showed the evidence of small bowel obstruction by showing fluid-filled dilated small bowel (*arrow*) proximal to collapsed distal bowel (*broad arrows*). **b** The herniated intestinal segment (X) was delineated posterior to the pectineus muscle (*arrows*), strangulated at the hernia

orifice (*broad arrow*). **c** The herniated intestinal segment (X) was delineated posterior to the pectineus muscle (*arrows*), medial to the femoral artery and vein. **d** CT scan demonstrated the herniated intestinal segment between the pectineus muscle (*arrows*) and the obturator externus muscle (*broad arrow*)

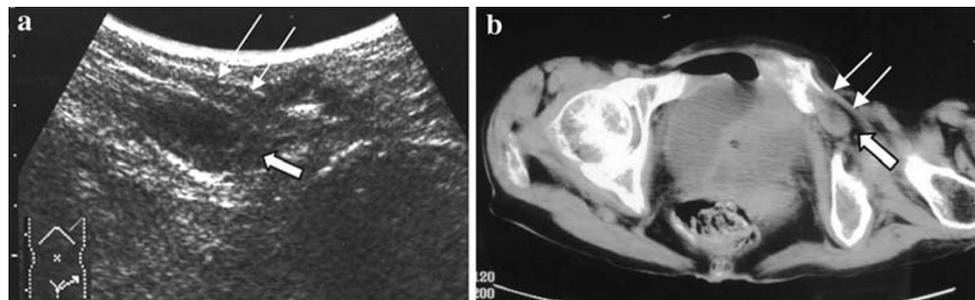


Fig. 2 Ultrasonogram and CT image of the Case 3. **a** Re-examination with ultrasound showed the herniated segment of the small bowel (*broad arrow*) beneath the pectineus muscle (*arrows*). **b** CT

demonstrated a small herniated segment of the small bowel (*broad arrow*) between the pectineus muscle (*arrows*) and the obturator externus muscle

female predominance of the entity has been supposed to be the results of pregnancy which leads to relaxation of the pelvic peritoneum and a wider and more horizontal obturator canal. The herniated intestinal segment is often incarcerated and strangulated because the hernia orifice is small, about 1 cm in diameter [2]. Consequently, early recognition of the entity is crucially important because delay in diagnosis and treatment is often associated with its high mortality and morbidity.

Clinical symptoms and signs are usually consistent with acute or recurrent bowel obstruction, but in the majority of the cases no symptoms characteristic to the obturator hernia can be obtained. Howship–Romberg sign, which stands for pain radiating along the medial aspect of the thigh when

the leg is extended or abducted because of obturator nerve compression by the hernia contents, has been reported to be recognized in less than half the patients [1–3]. It may not be checked preoperatively unless obturator hernia is considered as one of the disorders to be differentiated. A groin mass is rather difficult to recognize with palpation because the herniated mass locates deep in the femoral triangle, concealed beneath the pectineus muscle. Plain abdominal X-rays usually show the evidence of small bowel obstruction, but are not diagnostic for obturator hernia. Consequently, obturator hernia has been a diagnostic challenge before CT of the pelvis becomes a standard diagnostic tool for the entity. With CT of the pelvis, the herniated segment covered with the hernia sac is

demonstrated as a soft tissue mass or opacified loop between the pectineus muscle and the obturator externus muscle [4–8].

On the other hand, the application of ultrasound for obturator hernia has been limited, but a few investigators reported that ultrasound was useful for the early recognition of the entity [9–13]. In our case series, ultrasound directly showed an incarcerated obturator hernia, and was evaluated as applicable and useful for the recognition of the entity. The opportunities for sonographers to encounter with some cases of obturator hernia may increase, as ultrasound has become widely used for the evaluation of acute abdomen including bowel obstruction. Therefore, it is required to clarify the ultrasonographic features of incarcerated obturator hernia, and the pitfalls in the application of ultrasound for the entity.

The ultrasonographic features of incarcerated obturator hernia are indicated as followed. (1) The herniated intestinal segment is visualized as a cystic mass with thickened wall posterior to the pectineus muscle in the femoral triangle. The pectineus muscle can be clearly delineated with a high-frequency probe, and is an important landmark to differentiate an obturator hernia from a femoral hernia in the ultrasound examination (Fig. 3). In cases of femoral hernia, a herniated segment is visualized anterior to the pectineus muscle in the subcutaneous space (Fig. 4). (2) The evidence of small bowel obstruction is demonstrated by showing dilated proximal small bowel and collapsed distal bowel. (3) Peritoneal fluid may increase depending on the severity of bowel obstruction. (4) Peristaltic activity of the incarcerated intestinal segment is supposed to depend on the degree of incarceration. In our case series, each incarcerated intestinal segment was observed as an akinetic, cystic one. However, obturator hernias with mild incarceration may show peristalsis when they are observed with ultrasound. Rettenbacher et al. [14] reported that peristalsis within hernia was absent during the sonographic investigation in 13 (76%) out of 17 cases of incarcerated abdominal wall hernia and 24 (38%) of 63 cases of non-incarcerated one [14]. They also reported that 18 (78%) out of 23 incarcerated abdominal wall hernias had detectable blood flow on color Doppler sonography. Practically, the significance of color Doppler ultrasound is not determined for the assessment of the viability of hernia contents.

In our case series, we also indicated pitfalls for applying ultrasound for incarcerated obturator hernia. In the Case 1, the examiner made a misdiagnosis by careless interpretation of the ultrasonograms and a belief that the palpated bulge in the femoral triangle stood for an incarcerated femoral hernia. In the Case 3, the examiner overlooked the obturator hernia in the initial examination because he did not hit the entity at the time and consequently, skipped scanning around the femoral triangle. These misdiagnoses

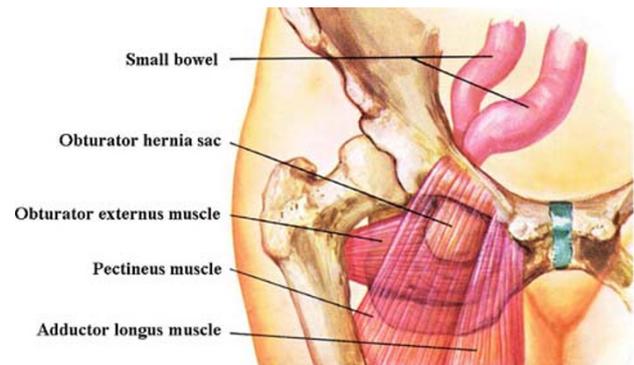


Fig. 3 Anatomy of obturator hernia. *Right* incarcerated obturator hernia is indicated between the pectineus muscle and obturator externus muscle in the illustration cited from Maruzen [15]

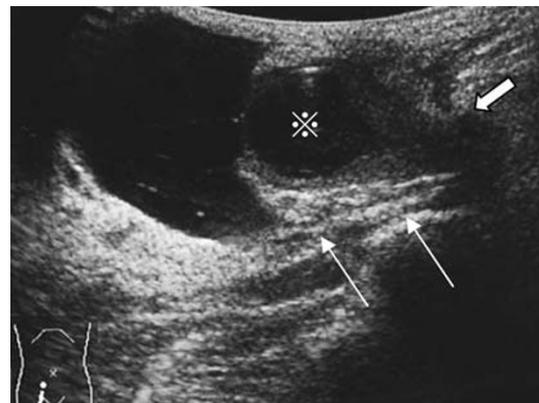


Fig. 4 Ultrasonogram of a femoral hernia. Incarcerated femoral hernia (✖) is delineated anterior to the pectineus muscle (arrows). The femoral canal (the hernia orifice) is indicated by a *broad* arrow. Accumulated fluid surrounding the hernia contents is seen in the hernia sac

were related with lack of knowledge or lapse of memory on the entity, and therefore, expected to be preventable by routine scanning around the groin and femoral triangle in addition to adequate education and training for examiners. Generally speaking, ultrasonography as well as the physical examinations are dependent on the examiners' skill and experience and consequently, may fail to demonstrate the incarcerated obturator hernia in the femoral region. Therefore, it is important to manage the operator-dependent nature of ultrasound properly by developing the competency of sonographers and the systematic ways of scanning.

Ultrasound has been increasingly used for acute abdominal disorders in recent years and consequently, has been evaluated as useful for the diagnosis of bowel obstruction. Furthermore, our case series suggest that it can be applied for the recognition of incarcerated obturator hernia. The early recognition of the entity will consequently reduce its morbidity and mortality and also reduces

the cost for CT scan and other imaging modalities. Therefore, important are the use of ultrasound to make a rapid evaluation for acute abdominal disorders including bowel obstruction, and routine scanning around the groin and femoral triangle so as not to overlook the entity when ultrasound is applied for the evaluation of small bowel obstruction.

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