CASE REPORT

Dynamic ultrasound with postural change facilitated the detection of an incisional hernia in a case with negative MRI findings

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Abstract Incisional hernias commonly develop after abdominal surgeries with a lower incidence in patients receiving laparoscopy. Diagnosis through a non-surgical approach is usually made by computed tomography or magnetic resonance images (MRI) but both image modalities require patients to be examined in a supine position. We reported a case noticing a mass over her right lower abdomen after a laparoscopic liver segmentectomy with negative findings of hernia on MRI. A hernia sac was found by ultrasound with the patient being standing, highlighting the utility of dynamic ultrasound with postural change in investigation of incisional hernias.

Keywords CT · MRI · Ultrasound · Incisional hernia · Laparoscopy

Sommario Il laparocele dopo interventi di chirurgia addominale si realizza con minore incidenza nei pazienti

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trattati con laparoscopia. La diagnosi non chirurgica di solito è fatta contomografia computerizzata o risonanza magnetica (MRI), ma entrambe le modalità richiedono che i pazienti siano esaminati in posizione supina. Presentiamo un caso di massa del basso addome, a destra, dopo segmentectomia epatica laparoscopica, con risultati negativi per ernia all'esame 24 MRI. L'ecografia, con paziente in piedi, ha evidenziato un sacco erniario, dimostrando l'utilità dell'ecografia dinamica, con cambio posturale, nelle indagini per laparocele.

Introduction

Incisional hernias commonly develop in patients following abdominal surgeries, even approached by the laparoscopic method [1, 2]. Detection of incisional hernia may be difficult in cases with obesity or small fascial defects [2]. Computed tomography (CT) [3] or magnetic resonance images (MRI) [4] provide adequate cross-sectional images for the abdominal wall, although both image modalities require patients to be examined in a supine position. We reported a case noticing a mass over her right lower abdomen after a laparoscopic liver segmentectomy with negative findings of hernias on MRI. A hernia sac was found by ultrasound with the patient being standing, highlighting the utility of dynamic ultrasound with postural change in investigation of incisional hernias.

Case report

An 83-year-old obese female, a chronic hepatitis B carrier, was diagnosed with hepatocellular carcinoma during the

Fig. 1 The MRI showed normal bowel segments and negative findings of masses in her abdominal wall

Fig. 2 The ultrasound images showed intact muscle layers at her right lower abdomen with thinner extra-peritoneal fat when the patients was examined in the supine position

annual survey and then received a laparoscopic segmentectomy for a $3 \times 3 \times 2$ cm sized tumor located at the S6 segment. Five months after the surgery, she intermittently palpated a soft non-tender mass over her right lower abdomen. However, her surgeon failed to identify any mass at that area and decided to arrange MRI to clarify her statement. The MRI with oral intake of contrast revealed fatty infiltration of the liver and a small amount of fluid near the resection margin. There was no evidence of tumor recurrence in the remnant liver or any mass inside her abdominal wall (Fig. 1). Since the mass kept bothering her, she was referred to our musculoskeletal ultrasound laboratory for a thorough examination of her superficial abdomen. We used a 14-MHz linear array transducer (Acuson S2000 system; Siemens Ultrasound, Mountain View, CA, USA) to scan through the area where she noticed a mass. Under the supine position, the muscle layers at her right

Fig. 3 The ultrasound images demonstrated a defect at the posterior fascia layer with a bowel loop protruding against the abdominal wall when the patient was examined in the standing position

lower abdomen appeared symmetrical to her left side, although the extra-peritoneal fat seemed thinner at the right side. No mass was identified even under the Valsava maneuver (Fig. 2). When she stood up and was about to leave, she told the examiner: “I feel the mass and please check it again”. This time, she received the examination in an upright position. The ultrasound images found a defect at the posterior fascia layer with a bowel loop protruding against the abdominal wall (Fig. 3). The lesion disappeared once the patient returned to a supine position. An incisional hernia was impressed and she was referred to the surgical department for further management.

Discussion

An incisional hernia is the protrusion of tissues or organs through an operation-related defect of abdominal walls with an incidence ranging from 2 to 20 % after an abdominal surgery [1]. The laparoscopic approach minimizes the surgical wound and reduces the risk of hernias through the use of small-caliber trocars [5]. The most common region for a trocar site hernia is near the umbilicus, usually with a larger-sized pore to facilitate the specimen removal [1, 6]. In contrast, the incidence of lateral hernia is only one-third of umbilical hernia following laparoscopic surgeries, rendering the diagnosis of hernia in her right lower abdomen less favorable [2, 7]. Technical factors (wider trocar size, leaving fascial defect open, midline trocars, stretching the port site for retrieval and effects of compressed air) and host problems (obesity, poor nutrition status and infection) were known to contribute to the development of an incisional hernia [2], although our case was only manifested with obese. The unusual location, inconsistent patient’ statements and negative MRI findings led the surgeon to prescribe a high frequency ultrasound examination, for the reassurance of the tumor or identification of a possible superficial lesion.

The golden standard to confirm an incisional hernia is through surgical exploration, which is rarely performed unless an incarceration lesion is suspected. CT is the mostly used image modality to diagnose the incisional hernia, with sensitivity of 0.83 and specificity of 0.67 reported by one observational study [3]. MRI has the advantage of zero radiation and multiplanar tissue resolution [4], although evidence is still lacking regarding its sensitivity for hernia detection compared with CT. Diagnosis may remain difficult if the fascial defect is small or the patient is obese. Oral intake of contrast and the use of Valsava maneuver are recommended to increase the diagnostic accuracy [2]. Furthermore, in such a case with intra-abdominal malignancy, tumor seeding along the trocar tract should be always kept in the differential diagnosis [8], which can be well delineated by both imaging tools. Another potential causes comprised a post-surgical seroma or hematoma, which corresponded the characteristics of the present tumor with the size varying according to different postures. However, MRI failed to identify any cleft in the abdominal wall and a possible mass lesion near her previous trocar site in this case.

Ultrasound has been employed for the survey of hernias since 1980 [9] and current research indicated a moderate sensitivity (70.8 %) and an excellent specificity (100 %) for incisional hernia detection by using CT findings as the golden standard [10, 11]. Ultrasound scanning combined with palpation for abdominal walls with forceful attempted exhalation was suggested to improve the detection rate [12]. Although a main advantage of ultrasound over CT and MRI is the allowance of dynamic examination, few studies emphasized the importance of a standing posture for investigating an incisional hernia. In the present case, the Valsava maneuver failed to provoke the protrusion of the hernia sac, partly due to weak cough ability of the old patient. However, in a supine position, the gravity tended to keep the hernia sac in the abdominal cavity and counteracted the increased abdominal pressure developed by the Valsava maneuver. In contrast, a standing posture generated a constant outward and downward force, resulting in the bulge of the bowel loop. Moreover, her history indicated a late-onset type hernia, usually deriving from dehiscence of the anterior fascial and posterior fascial plane with intact peritoneum [2]. Since the role of CT in diagnosing asymptomatic late-onset type hernias has not been established [2, 13], our case demonstrated a diagnostic protocol comprising dynamic ultrasound and posture change might be a more cost-effective and sensitive approach to survey this type of hernia. Most of all, the investigator can use ultrasound to check whether the hernia sac is reductable in real time, and arranges early surgical intervention once incarceration hernia is suspected.

In conclusion, MRI or ultrasound might under-diagnose incisional hernias in a supine position even following the Valsava maneuver. The present report demonstrated the potential utility of dynamic ultrasound with postural change in recognizing an incisional hernia.

Conflict of interest Patcharaporn Wongsithichai, Ke-Vin Chang, Chen-Yu Hung, and Tyng-Guey Wang declare that they have no conflict of interest.

Ethical standards All procedures followed were in accordance with the ethical standards of the responsible committee on human experimentation (institutional and national) and with the Helsinki Declaration of 1975, as revised in 2008. Informed consent was not necessary since there is no identifying information in this case report.

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