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Case Report Open Access

Computerized Tomography Scan with a Valsalva Maneuver for the Diagnosis of Denervative Abdominal Wall Hernia

Xin Fan and Wen-hao Tang*

Department of General Surgery, Southeast University, Zhongda Hospital, Nanjing, 210009, People's Republic of China

Abstract

Background: Flank or abdominal hernia after open renal surgery is rare. The mechanisms of this pathology involve wound dehiscence and/or the sub-costal nerve severing, and the latter still has room for emphases, especially for diagnosis establishment.

Case Report: A 64-year-old woman presented with a ten years history of left abdominal pain and bulge after a left nephrectomy in 1998 because of her left renal stone disease. Following the procedure, she experienced a further left abdominal pain and developed a progressively enlarging left flank bulge. CT scan excluded the presence of an organic cause, such as intra-abdominal pathology, but showed a thinner layer of musculature on the left side without a definitive hernia orifice, which was distended during a Valsalva maneuver. A left flank denervative hernia was subsequently diagnosed. Surgical repair was employed with nonabsorbable synthetic mesh using a standard preperitoneal sublay fashion.

Conclusion: This case raises our awareness of a hard sign of a denervative abdominal wall hernia in CT scan: abdominal wall bulge with attenuation of the abdominal wall musculature and without definitive hernia orifice at the affected side. If there is any doubt in the diagnosis (often there is in early stage), a CT scan with a Valsalva maneuver is suggested, which will make the sign more significant.

Keywords: Hernia; Denervation; Valsalva maneuver; Computerized tomography; Abdominal wall

Introduction

The most familiar type of hernia occurs in the abdomen and the causes are either abdominal wall weakness or intraabdominal hypertension, or both. Most abdominal wall hernias result from a weakness in the abdominal wall that may be either congenital or acquired (most are incisional). Although denervative hernia or bulge produced by nerve damage and muscle paralysis is not a new entity of hernia [1-3] but still lots of work needs to be done in future, especially in the diagnosis establishment.

Case Studies

A 64 year-old woman underwent a left pyelolithotomy in 1988 and a left nephrectomy in 1998, respectively, both because of her left renal stone disease. Approximately 18 months after the nephrectomy, left flank bulge appeared and became progressively enlarging with a persistent disabling pain, which impacts on her quality of life and aesthetic appearance, and a truss had to be worn to hold bulge in and prevent pain, even in hot weather. In recent 10 years, although several ivory tower institutions have been visited, the diagnosis was still uncertainty.

A left upper abdomen and flank swelling was noted on inspection of the abdomen in the standing position (Figure 1A and 1B), but disappeared when she was in the dorsal decubitus position and reappeared during a Valsalva maneuver in the supine position. Two transversal incisional scars intersecting each other were seen at the left subcostal region. Her abdomen was soft without tender and the left side of the abdomen wall was slightly weaker with a target-oriented palpation, but no clear hernia orifice was found. The weakness area is approximately 15 cm × 10 cm.

A plain CT scan of the abdomen was performed showing an attenuation of musculature on the left abdomen and a distinct dilatation during a Valsalva maneuver (Figure 2). A left flank denervative hernia was subsequently diagnosed and an open surgical repair was the choice of the treatment.

At exploration, there was no clear defect neck or hernia sac found and a standard retromuscular sublay technique (deep to the transversus or rectus abdominis muscle) with an 18 cm × 15 cm nonabsorbable polypropylene mesh was used for the abdominal wall enhancement. An abdominal brace have been used for two month following the procedure. Physical examination 18 months after the repair surgery showed resolution of the hernia, although a minor asymmetry of abdominal wall still remained (Figure 1C).

Comment

It has been reported that a bulging or hernia after a flank incision for renal surgery is not rare and higher frequency is in left side [1]. The pathogenesis of this pathology includes wound healing failure or dehiscence, and/or the subcostal nerve injury. The former is more common and called as incisional hernia, but the latter is rare and still has room for investigation.

Neurologic injury following intercostal nerve impairment results in weakness and attenuation of the abdominal wall musculature in the nerve innervation zone, which can be explained why the higher incidence of permanent flank bulge is on left side as the anatomical position of left kidney is higher than the right one.

Although the diagnosis of a denervative hernia may be made clinically in the majority of cases if the surgeon is aware of the problem, Goodman described the important role of computerized tomography imaging in the differentiation diagnosis of a denervative bulge from an

***Corresponding author:** Tang WH, MD, Department of General Surgery, Southeast University, Zhongda Hospital, Nanjing, 210009, People's Republic of China, Tel: +0086 25 83262311; E-mail: tang_wh26@126.com

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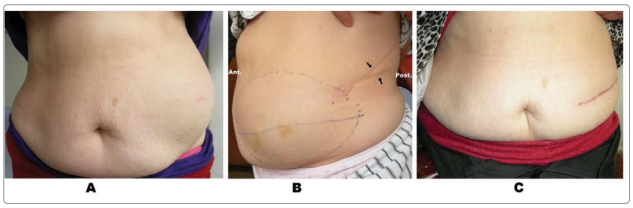

Figure 1: (A) Front view shows a left upper abdomen swelling in the standing position. (B) Left lateral view shows two transversal incisional scars (the arrows) posterior to the swelling. (C) Anterior view 18 months after abdominal wall enhancement surgery.

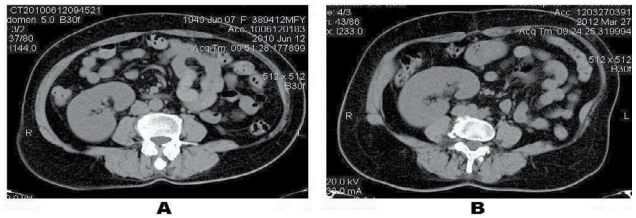

Figure 2: (A) Preoperative CT scan without contrast shows the layers of the musculature on the left side are much thinner than those on the right side. (B) the abdominal wall bulging appears during a Valsalva manoeuvre.

	Incisional	Denervative
History	Muscle cutting surgery	Denervation manipulation
'Location of bulging	incision site	distal to the nerve damage level
Definitive orifice	Yes	diffuse muscle weakness without orifice
Plain CT scan	defect of the abdominal wall musculature at the affected side	attenuation of the abdominal wall musculature at the affected side
CT scan during Valsalva manoeuvre	Clear hernia with definitive hernia neck	Abdominal wall bulge without orifice

Table 1. The difference between an incisional hernia and a denervative hernia.

incisional hernia [2], but in initial stage of the entity or in fat patients the abdominal wall bulge and the thinner musculature of the affected side will be insignificant and tend to be neglected (Figure 2), and a computerized tomography scan with a Valsalva maneuver will show the more significant signs (Table 1). Distinguishing the denervative hernia from the incisional hernia is crucial step in this situation as the area of the muscle attenuation in a denervative hernia are usually extensive and repairing a denervative hernia is a little bit of a challenge in hernia surgery, although there are several alterative techniques of repairing available, including open or laparoscopic, and different approaches [3,4]. The basic principle is to have a large mesh to avoid recurrence.

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