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Spiegelian hernia — anatomy, diagnosing and imaging difficulties: a report of 2 cases

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Spiegelian hernias account for less than 1% of all hernias diagnosed in the adult population. The most important factors in the proper diagnostic process are detailed physical examination combined with imaging procedures.
Two cases of Spiegelian hernias are presented. The anatomical background of the pathology, as well as diagnostic procedures and surgical treatment, is discussed. (Folia Morphol 2009; 68, 3: 179–183)

Key words: hernia, surgery, diagnostic imaging, differential diagnosis, rectus abdominis muscle

INTRODUCTION

The semilunar line, also called the Spiegel line, was first described by and named after a Belgian surgeon Adriaan van der Spiegel. It extends between the 9th costal cartilage and the pubic tubercle and forms a border between the belly and aponeurosis of the internal oblique abdominal muscle [6, 20].

The most common presence of Spiegelian hernia (SH) is related to the anatomical features of the semilunar line and the Spiegel fascia. This type of hernia is considered rare; although in many cases it is under recognized due to difficulties in the diagnosing process. Frequently, the hernia contains not only intestines or fat but also the cutaneous branches of T10–T12, and this can be clinically represented as discomfort in this region.

The anatomy of the Spiegelian fascia is composed of two different areas. The first part, located beneath the umbilicus, is a combined aponeurosis of transverse abdominis muscle and internal oblique muscle aponeurosis. Above the umbilicus, the fibres cross and form a structure that prevents the presence of hernia formation. Below the umbilicus, the fibres have a different direction and the barrier is not as strong. The Spiegel fascia is widest and weakest in the area near the umbilicus and the connecting line between both anterior superior iliac spines, and the area between the semilunar line and the inferior epigastric vessels [16]. Spiegel's hernia was first recognized by Josef Klinkosh in 1764 [20]. The average diameter of the hernial ring usually ranges between 0.5 and 2 cm. Two types of SH have been described based on their relation to the inferior epigastric vessels [10]. Approximately 90% of all SH cases occur in the area above these vessels where the fascia is widest — so-called higher SHs. This specific region was named the Spiegelian hernia belt by Spangen and includes a transverse band extending up to 6 cm above the line connecting the anterior superior iliac spines. Lower SHs occur beneath

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inferior epigastric vessels, are rare, and are often misdiagnosed as ascending direct inguinal hernias [5, 6, 11].

Spiegelian hernias are not a common type of hernia as they account for less than 1% of all the hernias diagnosed in the adult population [13]. They are also very rare among the child population, and two times more common in boys than in girls [9].

The etiology of the SH remains unclear due to its numerous possible causes and their parallel coexistence. One of the possible factors the role of which has been stressed in the literature is congenital, decreased resistance of tissues in the SH belt [9]. Campanelli et al. classify the causes of SH appearance into three categories. One of them is related to the different directions of fibres of the transverse and internal oblique muscles above and under the umbilicus. Another cause might be connected with the anatomical position of the external oblique muscle fibres that are the only ones to reinforce the aponeurosis at the level of the arcuate line. Finally, the last reason might be the route of the epigastric artery that runs via the transversalis fascia and the sheath of the rectus abdominis [3, 13].

Factors that increase the intra-abdominal pressure increase the frequency of appearance of SH. Such factors include obesity, chronic constipations, ascites, muscular strain, multiple pregnancies, previous surgeries, and peritoneal dialysis.

Decreased quality of connective tissue can also increase the frequency of SH appearance (especially among women, with a peak occurrence at 50–60 years of age) [3, 10].

A SH formation includes protrusion of preperitoneal fat and a peritoneal sac; however, many structures have been found in the hernial sac, e.g. greater omentum, intestines, ovaries, sigmoid colon, urinary bladder, and even Meckel's diverticulum. In only 6% of the total number of cases were such hernias incarcerated [11].

As the SH is not a common type of hernia, it might cause multiple diagnostic difficulties. The most important factors in the proper diagnostic process are detailed physical examination combined with imaging procedures that include radiography, barium radiology, ultrasonography, and computed tomography, among which the last two seem to be the most useful [3, 10, 12, 15]. Visualization of the anatomy of the Spiegelian fascia is difficult, and the presence of a hernia may easily be missed on reporting; therefore, an underestimation of the presence of SH in diagnostic imaging occurs.

Figure 1. Case 1, intraoperative view of Spiegelian hernia sac.

The objective of this report is to present the management of two cases of Spiegelian hernias diagnosed and treated in the General Surgery Department of the District Specialistic Hospital in Lublin.

CASE REPORTS

Case 1

A 44-year-old female patient (body mass index 30.86) was admitted to our General Surgery Department with a history of abdominal pain located in the left-lower abdominal quadrant. The pain increased at palpation of this region, exercise, and during a Valsalva manoeuvre. The patient was diagnosed with an oesophageal hernia and underwent surgery 1 year before the current admission. On admission, the patient was in good clinical condition.

After performing abdominal ultrasound, the patient was qualified for surgery and underwent a laparotomy. After the incision of the aponeurosis of the left external oblique muscle, a 10 cm long hernial sac was found and the presence of a Spiegelian hernia was confirmed (Fig. 1). The hernial ring was located near the deep inguinal ring and measured 3 cm in diameter. The ring was single stitched. A mesh was introduced under the aponeurosis and attached by a single suture. The fascia was closed above the mesh.

No complications occurred during the postoperative period and the patient was discharged on the 4th day after surgery.

Case 2

A 78-year-old female patient was admitted to the same General Surgery Department due to pain located in the right hypogastric region with disten-

sion and constipation lasting for 6 months. The patient's medical history included sigmoid diverticulitis, arterial hypertension and hypothyroidism, and a cholecystectomy had been performed at the age of 65. She had been diagnosed and treated in the gastroenterological, urological, and internal medicine departments.

On admission, the patient was in a good clinical state and her body mass index was 31.25. During physical examination, a palpable painful mass was detectable in the right iliac fossa, especially when the Valsalva manoeuvre was performed. The patient underwent a colonoscopy during which hyperplastic polyps and sigmoid diverticuli were detected. No other pathologies were revealed. During ultrasound examination of the abdomen, a Spiegelian hernia was also found. The ultrasound revealed homogenous, normal-sized liver status post cholecystectomy. No signs of widening of the extrahepatic bile ducts were detected. The head and body of the pancreas were normal, and there was a 24 mm hypoechogenic mass at the pancreatic tail. Except for bilateral central renal cysts and hypotonic renal pelves, no pathological signs were observed at the ultrasound exam. Abdominopelvic computer tomography (CT); helical CT exam of the abdomen was performed with standard biphasic protocol; was performed, which revealed: status post cholecystectomy, no signs of bile duct dilation, and normal liver, pancreas, spleen and adrenal glands. Additionally, a duodenal diverticulum measuring 20 × 12 mm distal to the inferior genu of the duodenum, and bilateral central renal cysts up to 30 mm in diameter, were also found. The remaining renal parenchyma was normal. Celiac and mesenteric lymph nodes were as large as 8–10 mm. The presence of a sliding oesophageal hernia was confirmed. An incarcerated hernia at the lateral edge of the right rectus abdominis muscle was confirmed. The hernial sac contained a loop of small intestine (Figs. 2, 3). The diameter of the hernia ring was 17 mm. Additionally, a thickening of the rectal wall up to 10 mm, measuring 20 mm in section, was detected. The remaining pelvic organs were normal.

The patient underwent surgery. Laparotomy revealed the presence of an inguinal sac near the sheath of the rectus abdominis muscle. The hernial sac was opened and the presence of pre-omental fat was stated. The fat was pushed back to the peritoneal cavity and the hernial ring was closed. The hernia was repaired using the extraperitoneal mesh technique. The peritoneum and the sheath of the rectus abdominis muscle were stitched.

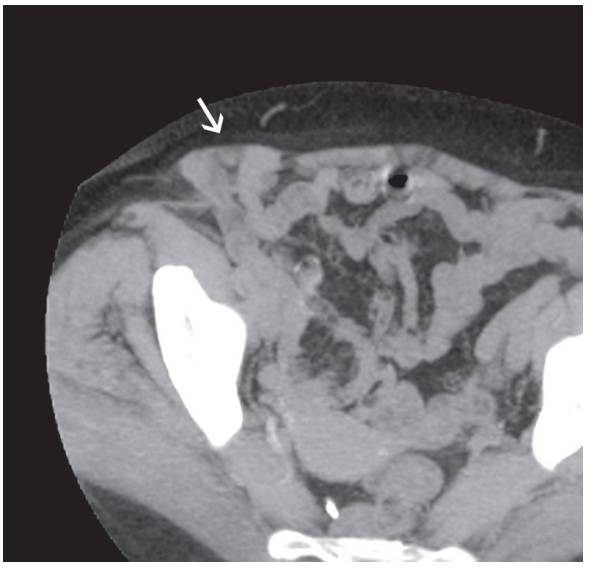

Figure 2. Case 2, preoperative computer tomography scan, axial maximum intensity projection (MIP). Arrow indicates hernia sac with loop of small intestine.

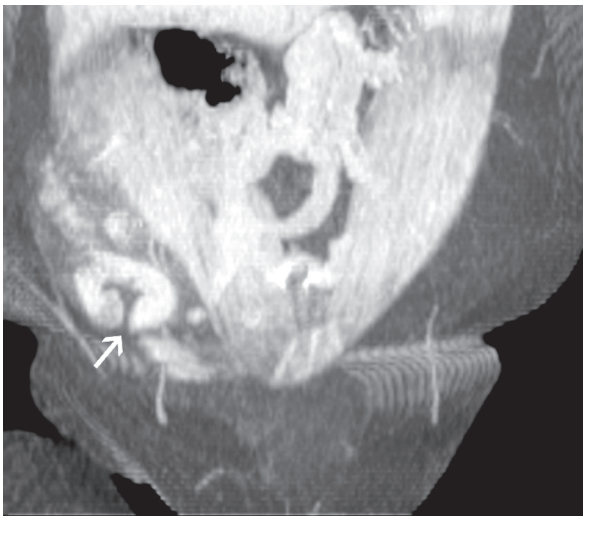

Figure 3. Case 2, preoperative computer tomography scan, coronal maximum intensity projection (MIP). Arrow indicates hernia ring with protruding loop of small intestine above.

The postoperative period was uneventful. The patient was discharged on the 5th day after the surgery.

DISCUSSION

The diagnosis of a Spiegelian hernia can cause diagnostic difficulties due to symptoms that are not specific, anatomical conditions (usually it is occulted in the abdominal wall), and it is difficult to

detect during regular radiographs. Therefore, in many cases physical examination fails to state the correct diagnosis. The differential diagnosis of this type of hernia includes many other disorders that can occur in the abdominal wall, e.g. lipomas or haematomas [1].

In the presented cases both patients fitted the typical age group for Spiegelian hernia occurrence. However, one of these patients presented with abdominal pain in the right iliac fossa, while in most cases, the SH is located in the left iliac fossa or it is symptomless. The other patient had been diagnosed in several departments before the proper diagnosis. Despite the presence of typical symptoms like pain that increased with effort, constipation, nausea, and palpable painful mass, the final diagnosis caused difficulties. Both patients were obese, and that fact made the physical examination even more difficult. Introducing additional imaging procedures did not reveal the presence of a hernia immediately, and finally CT turned out to be most useful examination in obtaining the right diagnosis.

Our experience supports the theses that imaging procedures should be introduced to supplement the physical examination in SH management. Abdominal ultrasound, herniography, and CT scans have been described to have the most important value [1]. Ultrasonographic examination of the abdomen is a relatively cheap and noninvasive examination that can be repeated during the diagnostic process. As such, it should be the first-choice procedure during diagnosis of the process of occult abdominal hernias [17]. However, in overweight individuals it might not be as useful and should be supplemented by CT examination. According to Toms et al. [18] making a clinical diagnosis can be very difficult in obese patients with Spiegelian hernias and therefore should be supported by both CT and ultrasound examination. Moreover, the symptomatic presence of infracted omentum within the hernial sac can be documented during these examinations [18].

Ianora et al. [8] stressed the usefulness of spiral CT, especially in occult abdominal hernia diagnosis, as this type of examination allows them to be distinguished from other diseases, e.g. haematomas, abscesses, or neoplasms of the abdominal wall. Spiral CT examination can clearly show the anatomical relations of the hernial sac and its contents. Authors state that this type of examination is essential in obese patients or in patients with postoperative scars.

According to Sen et al. [17] herniography can also be performed in the detection of occult hernias and is considered a sensitive procedure. However, the use of contrast makes the examination invasive and should be used selectively.

The treatment of SH should be surgical. Different authors describe several surgical techniques to treat this type of hernia. We introduced a synthetic mesh in both cases. Palanivelu et al. describe the laparoscopic technique of Spiegelian hernia repair with mesh to be safe, easy, and feasible for experienced surgeons [7, 14]. Bittner et al. [2] described a laparoscopic mesh-free technique of Spiegelian hernia repair. This method has all the advances of laparoscopic surgery but is cheaper and does not introduce foreign material.

Campanelli et al. [3] performed 2500 hernia surgeries including 32 Spiegelian hernia repair surgeries. The authors used the mesh repair technique with a modification consisting of prolene hernia system (PHS) material utilization when the orifice was similar to the connector. They concluded that the surgical repair of the SH should consist of the introduction of the preperitoneal prosthesis under the local anaesthesia (if the patient's health state allows for it).

The open mesh technique of SH repair is common and has some advantages. Celdran et al. [4] describe 9 cases in which this technique was used. The authors concluded that the open mesh technique was a safe and simple technique (the mesh is located between the external and internal oblique muscles), which allowed the semilunar area to be covered more completely compared to laparoscopic techniques. Additionally, the open mesh technique can be used in SH with incarceration. Zacharakis et al. [19] described a SH mesh repair in a patient with incarcerated omentum. The plug and mesh technique was effectively introduced in this type of hernia and had a durability of three years on follow-up.

CONCLUSIONS

As a rare condition, Spiegelian hernias may cause diagnostic difficulties due to symptoms which are not specific, anatomical conditions, and difficulties in imaging. Therefore, in many cases, correct diagnosis is found after a long diagnostic process, and the differential diagnosis of this type of hernia includes many other disorders that can occur in the abdominal wall. Proper knowledge of this condition, diagnostic modalities, and surgical treatment are essential for surgical management of patients with Spiegelian hernias.

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