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Lumbar hernia: A commonly misevaluated condition of the bilateral costoiliac spaces

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ABSTRACT

Lumbar hernias develop through the weakening of the posterolateral abdominal wall associated with the Petit's triangle or the Grynfeltt-Lesshaft triangle. Clinicians are generally unfamiliar with the presentation of lumbar hernias, which frequently leads to misdiagnosis and delay of treatment. Prompt failure to diagnose and surgically correct lumbar hernias have resulted in increased morbidity. This review addresses the anatomical and clinical concepts associated with the bilateral costoiliac spaces, which may be implicated in the increased prevalence of left-sided hernias. Knowledge of the contents and boundaries of this enclosure can aid the physician in diagnosis. We explore the intraperitoneal and retroperitoneal diseases that present at the lumbocostal space, including lumbar hernias, which can be classified as congenital, acquired, traumatic, or iatrogenic in origin. In an evaluation, imaging is crucial for assessing musculofascial layer disruptions and hernia contents. Open and laparoscopic surgery, as well retromuscular lumbar hernia repair, are options to explore in surgical intervention, particularly if there are challenges in preliminary pain management.

1. Introduction

A lumbar hernia is a posterolateral body wall hernia where the bowel, omentum, or pre-peritoneal fat herniates through the lumbar triangles. Many surgeons are not familiar to lumbar hernias, which frequently leads to misdiagnosis and delay of treatment. Lumbar hernias have been misdiagnosed as lipomas [1–3], muscle strains, fibromas, abscesses, and kidney tumors, causing increased morbidity due to the incorrect diagnosis. As lumbar hernias are rarely discussed in literature, many orthopedists or radiologists do not suspect a hernia as the cause of low back pain. They occur more prevalently in males between 50 and 70 years old and are more frequent on the left side of the abdomen [4], which may be explained by the discrepancy between contents of the bilateral costoiliac spaces (Table 1). Familiarizing with the contents of these spaces can give insight into the nature of the hernia.

2. Clinical anatomy of the lumbar triangles

Herniation can occur through the Grynfeltt-Lesshaft triangle (*i.e.*, inferior lumbar triangle) or Petit's triangle (*i.e.*, superior lumbar triangle). Petit's triangle is bound by the anterior border of the external oblique muscle, the posterior border of the latissimus dorsi muscle, and the inferior border of the iliac crest. The Grynfeltt-Lesshaft triangle is bound laterally by the inferior oblique muscle, the floor of the transversalis fascia, the medial border of the quadratus lumborum, and superiorly by the 12th rib [1]. Individuals generally have variations in the size and anatomy of this triangle. In a study by Loukas et al., the Grynfeltt-Lesshaft triangle was found in 82% of the 50 cadavers that were observed. 50% of the people had Type I triangle, which is defined as a surface area of less than 5 cm^2, 22% had Type II with surface areas of 5–15 cm^2, 10% had Type III with surface areas of greater than 15 cm^2, and 18% had Type 0, with no existing triangle. Those with Type 0 had the external abdominal oblique muscle and sacrospinalis muscle enclosing the aponeurosis of the transversus abdominis muscle [5]. It is possible that bigger surface areas of the Grynfeltt-Lesshaft triangle may be more susceptible to herniation. There is a higher occurrence of lumbar hernias in Grynfeltt-Lesshaft triangle compared to in the Petit's triangle [6]. In an anatomo-radiologic study by Macchi et al., a musculoaponeurotic tunnel was imaged between the

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Table 1
Contents of the left and right costoiliac spaces.

Contents of the left costoiliac space	Contents of the right costoiliac space
Body and tail of pancreas	Accessory pancreatic duct
Descending colon	Appendix
Half of transverse colon	Ascending colon
Left adrenal gland	Bile duct
Left edge of the liver	Cecum
Left fallopian tube	Duodenum
Left half of the large intestine	Gallbladder with biliary tree
Left kidney	Half of transverse colon
Left ovary	Head of pancreas
Left ureter	Hepatic flexure of colon
Sigmoid colon	Liver
Spleen	Right adrenal gland
Splenic flexure of colon	Right fallopian tube
Stomach	Right half of the small intestine
	Right kidney
	Right ovary
	Right ureter

superior and inferior lumbar triangles in the oblique coronal plane. This tunnel may induce or encourage incarceration or strangulation of lumbar hernias [7].

An abdominal wall hernia may contain anatomical structures including the peritoneum, retroperitoneal fat, colon, small bowel, stomach, ovary, spleen, appendix, the greater omentum, urinary bladder, renal pelvis, gallbladder, liver, or kidney. Lumbar hernias can manifest through the posterior abdominal wall. The posterior abdominal wall is formed by the quadratus lumborum. From inside to outside, the following structures compose the posterior abdominal wall: peritoneum, fat and extraperitoneal membranous connective tissue, and the transversalis fascia. The deep muscular layer composing of the quadratus lumborum and psoas muscle exists followed by the middle muscular layer composing of the sacrospinalis, serratus posterior inferior, and internal oblique muscles. Then, the anterior, posterior, and middle thoracolumbar fascia envelops the aforementioned structures. Above, the superficial layer composed of the posterolateral latissimus dorsi muscle and the anterolateral external oblique muscle is present, followed by the superficial fascia, and finally the skin.

3. Classification of lumbar hernia

3.1. Congenital

Congenital hernias occur from birth mainly due to defects in the musculoskeletal system or defects during the development of the posterior abdominal wall. A significant embryological cause of lumbar hernias is the weakening of the aponeuroses associated with the layered abdominal muscles that invade the somatopleure upon deriving from the paraxial mesoderm [8]. There may be a correlation between maternal diabetes and congenital lumbar hernias [9], but more research must be done to confirm this speculation.

Congenital hernias are usually associated with other congenital abnormalities including of the spine, viscera, undescended testis, and bilateral renal agenesis. It is more common in the Grynfeltt-Lesshaft triangle as it is penetrated by nerves or vessels that weaken the floor in contrast to the Petit's triangle which contains less nerves and vessels [10]. However, it can also occur in the Petit's triangle, where there have been cases of neonatal incarceration occurring as an unreducible lumbar mass. Bilious vomiting and abdominal distention usually follows, and may require emergency reduction and primary closure [11].

Lumbocostovertebral syndrome (LCVS), a rare disorder present primarily in children that causes a congenital absence of ribs, meningocele, scoliosis, hemivertebrae, or hypoplasia of the truncal and abdominal wall, can present as a lumbar hernia [12]. It is hypothesized that vascular disruption of a somite can result in the defects [13]. Presence of hemivertebrae is usually alongside scoliosis or musculoaponeurotic defects that contain herniated bowel loops. Lumbar hernias caused by scoliosis may cause colon obstruction, decreasing the patient's quality of life [14]. The defect can be present within the Grynfeltt-Lesshaft's triangle as well as the Petit's triangle [15].

Although rare, LCVS may be associated with vertebral defects, anal atresia, cardiac defects, trachea-esophageal fistula, renal anomalies, and limb abnormalities (VACTERL). In one case, a male infant was born at 38 weeks of gestation with LCVS and thoracic hemivertebrae with kyphoscoliosis, high anorectal malformation, dextrocardia with atrial septal defect, hypospadias, renal pelvic pyelectasis, and congenital talipes equinovarus [16]. LCVS with VACTERL anomalies are extremely rare, with only two cases reported in literature.

Malrotation of the left kidney and hydronephrosis is usually associated with congenital lumbar hernia. Malrotation, renal anomalies of renal pyelectasis, pelviureteric junction obstruction, bilateral renal agenesis, malascended kidneys, and hypospadias may be present in junction with lumbar hernia due to the kidney anomalies [17].

Anthrogryposis is a condition where multiple join contractures are found throughout the body at birth. Decreased muscle bulk and symptoms of malignant hyperthermia may be present within the patient along with bilateral congenital lumbar hernias. It has been revealed that a mutation in the R4861C of the ryanodine receptor 1 gene is associated with central core disease. It is hypothesized that ryanodine 1 mutations are responsible for the development and differentiation of muscles [18].

Though highly uncommon, a retrocecally-tracked appendicular abscess may rupture to cause formation of an inferior lumbar hernia [19].

3.2. Acquired

Acquired lumbar hernias are spontaneous, and heighten in likelihood with age, quick weight loss, muscular atrophy, chronic bronchitis, extremes of body mass, wound infection, and strenuous physical activity. In several cases, the patient may not feel the need or may feel too embarrassed to visit a doctor to examine the swelling, as it may disappear upon lying prone and appear only when straining. In addition, no pain, inflammation, or blood investigation abnormalities may be present. Because ultrasonography may not detect any abdominal wall defects, the hernia may go unnoticed and untreated for several years. Table 2 outlines instances of acquired lumbar hernia.

Lafer observed a causal relationship between neuroblastomas and lumbar hernias, with lumbar hernias resulting from neuropraxia secondary to intrathoracic paravertebral tumor. In this study, the examined patient had a lumbar hernia that resolved itself after excision of a thoracic ganglioneuroblastoma while another patient had a large intrathoracic neuroblastoma and lumbar hernia, which also resolved itself after the paravertebral tumor was removed [20]. Further research is needed to corroborate these findings.

An acquired Grynfeltt lumbar hernia can be complicated by incarceration and acute bowel obstruction [21]. It is essential to treat acquired lumbar hernias per an individual case-by-case basis.

3.3. Traumatic

Though there are various causes of traumatic lumbar herniation, most are caused by motor vehicle collisions or road injuries [6,22] as

Table 2
Acquired lumbar hernias.

Primary lumbar hydatid cyst [44]
Grynfeltt lumbar hernia [45–47]
Thoracolumbar hernia [48]
Secondary to neuroblastoma [20]
Spontaneous [49,50]