

# A Rare Variant of Inguinal Hernia, Interparietal Hernia and Ipsilateral Abdominal Ectopic Testis, Mimicking a Spigelian Hernia. Case Report

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We report a case in which the combination of an interparietal inguinal hernia and ipsilateral ectopic testicle mimicked a spigelian hernia. The patient was a 22-day-old boy who presented with a reducible mass that extended from the right lumbar region to the iliac fossa region. The right testis was palpable in the right lumbar region. Ultrasonography and magnetic resonance imaging revealed that a small bowel had herniated through the inguinal region below the external oblique aponeurosis. Surgery was performed when the patient was 23 months old. Laparoscopic examination to identify the hernia orifice revealed that it was the deep inguinal ring, and the testicular vessels and the vas deferens passed beneath the hernia sac. An inguinal incision was made, and a hernia sac was observed passing through the deep inguinal ring and extending superiorly below the aponeurosis. The testis was found in the hernia sac. Traditional inguinal herniorrhaphy and traditional orchidopexy were performed, and the postoperative course was uneventful. It is difficult to understand the surgical anatomy of interparietal hernias, but once the surgical anatomy is understood, surgical repair is simple. We report the case with a review of the literature and also emphasize that laparoscopic exploration is helpful during surgery.

**Key words:** interparietal inguinal hernia, spigelian hernia, ectopic testicle.

## INTRODUCTION

The cause of indirect hernia is the presence of a protruding peritoneal sac (patent processus vaginalis) at the deep inguinal ring. The deep inguinal ring is formed basically by aponeurotic fibers of the transversalis fascia sling, with the inferior border of the ring is formed by the iliopubic tract, its superior border of the ring is formed by the transversus abdominis arch, and its median border of the ring is formed by the inferior epigastric vein [1].

Interparietal inguinal hernias are a rare variant of inguinal hernia in which the hernia sac lies between the layers of the abdominal muscles, and associations with ectopic or incompletely descended testis have been reported in the literature [2].

Spigelian hernias develop in an anterolateral area of the abdomen between the anterior superior iliac spine and the umbilicus in proximity to the lateral margin of the rectus abdominis muscle. The herniations occur through slit-like defects in the aponeurotic layer between the rectus abdominis muscle medially and the semilunar line laterally (so-called spigelian fascia) [3, 4].

Interparietal inguinal hernias mimic spigelian hernias clinically. We treated a patient with a rare variant of inguinal hernia, an interparietal inguinal hernia, who also had an ipsilateral ectopic testis.

## CASE REPORT

A 22-day-old male infant presented with a bulge in the right lower quadrant of the abdomen. Physical examination revealed a reducible mass extended from

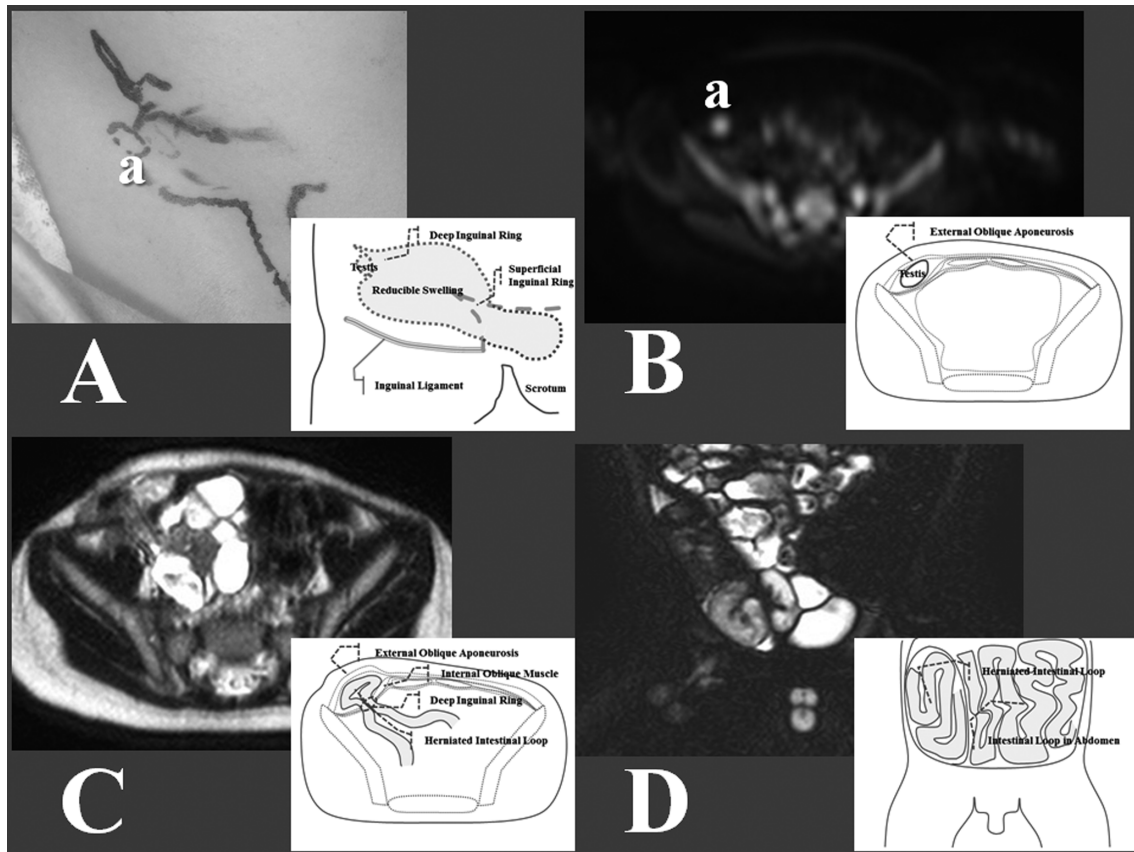
the right lumbar region to the right iliac fossa region. No abdominal wall defect was detected on palpation. The right testis could not be identified by palpation of the right scrotum or right inguinal canal, but palpation ultimately revealed its presence in the right lumbar region. (Fig. 1)

Ultrasonography and magnetic resonance imaging showed that a loop of small bowel had herniated through the inguinal region and was located between the external oblique aponeurosis and the internal oblique muscle and that the right testis was located in the abdominal wall on the right side above the inguinal region. (Fig. 1)

Under general anesthesia, a laparoscope was inserted into the abdominal cavity through the umbilicus to identify the anatomical position of the hernia orifice. A loop of small bowel had herniated through the hernia orifice, and it was possible to reduce it into the abdominal cavity. The hernia orifice was situated within the triangle formed by the transversalis fascia sling, the iliopubic tract, and the inferior epigastric vein, and thus the hernia orifice was the deep inguinal ring. The testicular vessels and the vas deferens passed beneath the hernia sac. (Fig. 2)

An inguinal incision was made in the right lower inguinal crease, and opening the inguinal canal revealed a large hernia sac that passed through the deep inguinal ring and extended superiorly to the anterior abdominal wall below the external oblique aponeurosis. (Fig. 3)

The hernia sac was ligated at the deep inguinal ring as in traditional inguinal herniorrhaphy, and traditional orchidopexy was performed. The postoperative



**Fig. 1** A mass is seen extending from the right lumbar region to the right iliac fossa region, and the right testis was palpable in the right lumbar region. (A) Magnetic resonance imaging revealed the presence of the right testis in the right abdominal wall (B) and that a loop of small bowel had herniated through the inguinal region and extended into the right lumbar region (C,D). The small letter “a” indicates the location of the testis.

diagnosis was interparietal inguinal hernia associated with ipsilateral ectopic testis, and the patient’s postoperative course was uneventful.

### DISCUSSION

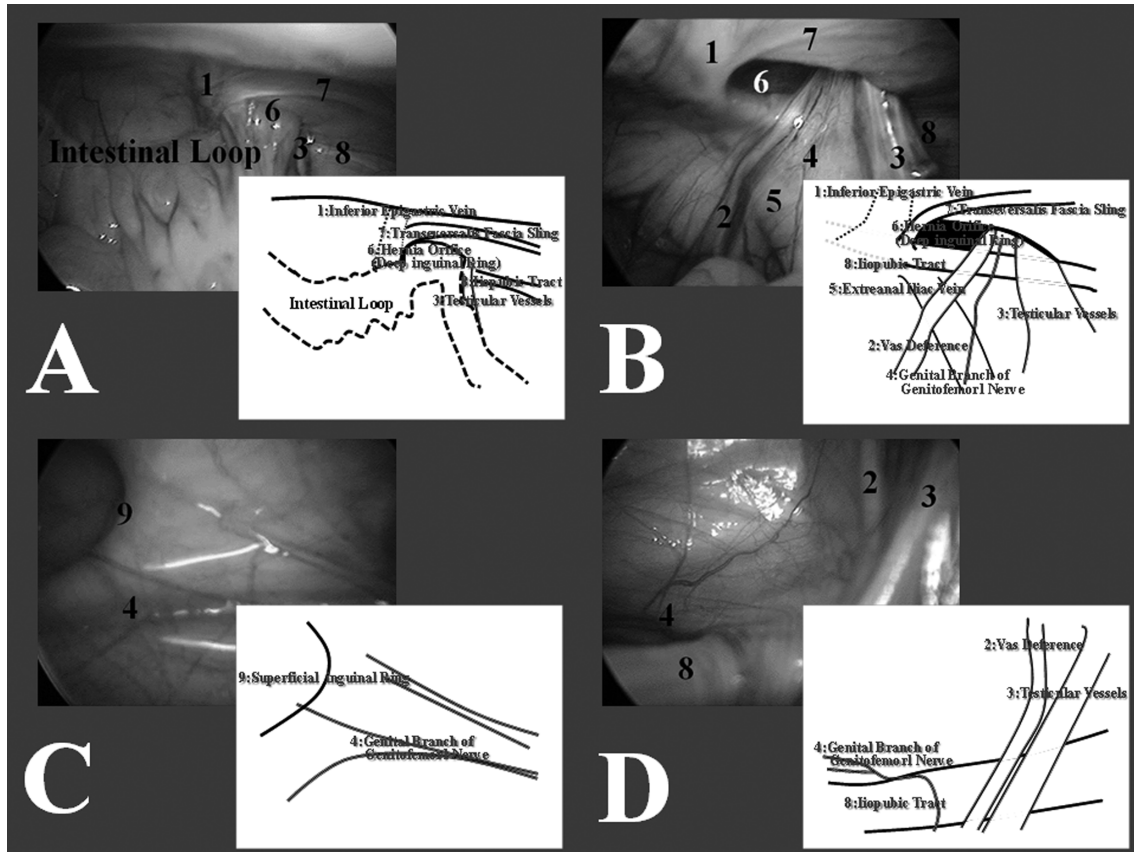
Interparietal inguinal hernias form a group of rather unusual hernias located between the layers of the abdominal wall in the inguinal region. The etiology of interparietal hernia may be related to the etiology of undescended testis. The ipsilateral testis of patients who have an interparietal hernia usually lies at or just outside the external inguinal ring, where it blocks further descent of the hernia sac, thereby causing it to advance between the muscle layers of the abdominal wall [5].

The clinical presentation with a reducible mass and the site of the mass in our patient suggested a diagnosis of spigelian hernia, and we used a laparoscope to search for the hernia orifice. Laparoscopic exploration revealed that the hernia orifice was the deep inguinal ring, the same as in indirect inguinal hernias, and that the vas deferens and the testicular vessels were extending toward the abdominal wall instead of toward the scrotum. We made a diagnosis of interparietal inguinal hernia associated with ipsilateral ectopic testis, and we concluded that traditional inguinal herniorrhaphy and traditional orchidopexy would be sufficient to repair the hernia and position the testis in the scrotum.

Spigelian hernias are rare at any age and are exceedingly rare in infants and children. Several cases of congenital spigelian hernia associated with ipsilateral undescended testis have been reported in the literature [6].

Spigelian hernia (1-2% of all hernias) result from a protrusion of preperitoneal fat and a congenital or acquired defect in the spigelian aponeurosis. The term spigelian aponeurosis refers to the part of the aponeurosis of the transversus abdominis muscle between the linea semilunaris laterally and the lateral edge of the rectus abdominis muscle medially. Most spigelian hernias lie in the “spigelian hernia belt”, a 6-cm-wide transverse zone above the interspinal plane. Lower spigelian hernias are rare and should be differentiated from direct inguinal hernias and supravesical hernias [7].

Testicular descent occurs in two phases: a transabdominal phase and an inguinoscrotal phase. The first phase, the transabdominal phase (8-15 weeks of gestation) is controlled by enlargement of the gubernaculum and regression of the cranial ligament. Insulin-like hormone 3 is the primary regulator of the first phase, possibly assisted by müllerian inhibiting substance/antimüllerian hormone (MIS/AMH) and by regression of the cranial suspensory ligament induced by testosterone. The second phase (25-35 weeks of gestation), the inguinoscrotal phase, requires migration of



**Fig. 2** Laparoscopic exploration around the hernia orifice revealed that the hernia orifice was basically formed by the transversalis fascia sling, the iliopubic tract, the transversalis fascia sling, and the inferior epigastric vein, so that the hernia orifice is the deep inguinal ring (A, B). The laparoscopic view within the hernia sac showed that the testicular vessels and the vas deferens passed through the deep inguinal ring toward the right side of the abdominal wall instead of toward the scrotum. (C, D) The numerals 1, 2, 3, 4, 5, 6, 7, 8, and 9 indicate the position of the inferior epigastric vein, vas deferens, testicular vessels, genital branch of the genitofemoral nerve, external iliac vein, hernia orifice (deep inguinal ring), transversalis fascia sling, iliopubic tract, and superficial inguinal ring, respectively.

the gubernaculum from the groin into the scrotum, and its migration is guided by calcitonin gene-related peptide released by the genitofemoral nerve. The inguinoscrotal phase of testicular descent is regulated by androgens and by calcitonin gene-related peptide release by the sensory nucleus of the genitofemoral nerve [8–10].

We have reported a case in which the interparietal inguinal hernia combined with the ipsilateral ectopic testis mimicked a spigelian hernia. We were unable to determine the pathogenic mechanism that was responsible for the interparietal inguinal hernia and abdominal position of the testis in our patient.

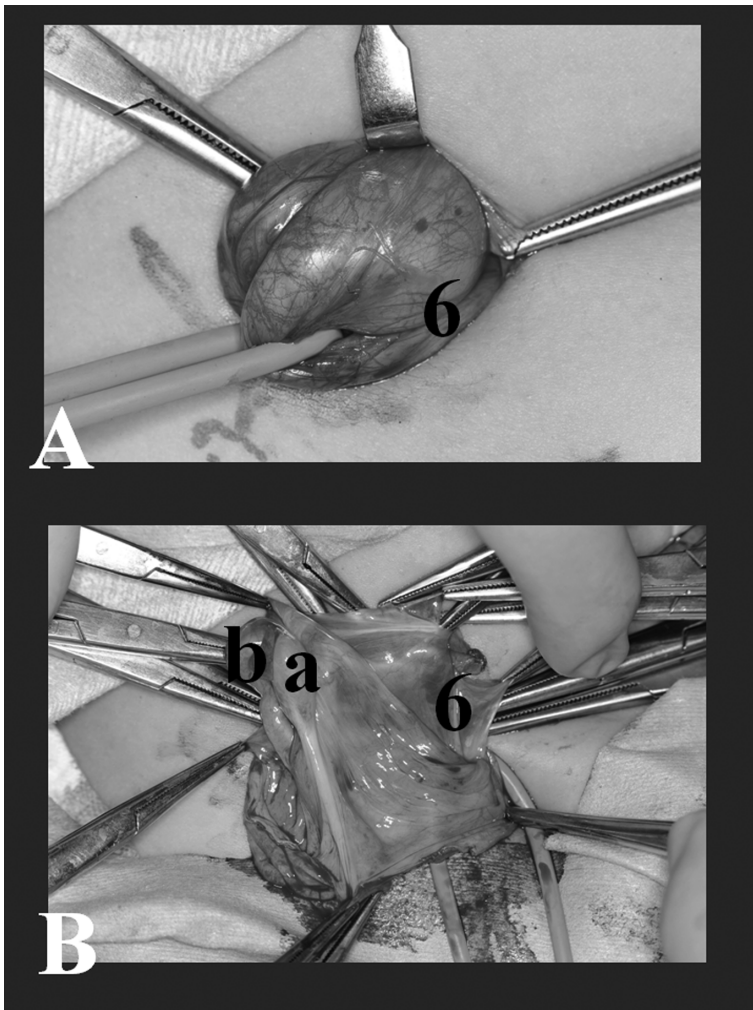
The pathogenetic mechanism of typical indirect inguinal hernias is penetration of the abdominal wall by the gubernaculum through the deep inguinal ring in the transabdominal phase, migration of the gubernaculum into the scrotum through the inguinal canal, pulling the testis, epididymis, and peritoneum (processus vaginalis) with it in the inguinoscrotal phase, and, finally, expansion of the hernia sac (patent processus vaginalis) in the inguinoscrotal direction through the inguinal canal by abdominal pressure.

Our hypothesis to explain the pathogenesis of the interparietal hernia and ipsilateral abdominal ectopic testis in the case we are reporting is that the gubernaculum migrated only as far as the lateral abdominal

wall in the inguinoscrotal phase instead of proceeding into the scrotum, probably due to an impaired release of calcitonin gene-related peptide by the genitofemoral nerve during the inguinoscrotal phase [11], and that the processus vaginalis penetrated through the deep inguinal ring and stopped at the lateral abdominal wall, just beneath the external oblique aponeurosis, instead of moving down into the scrotum. As a result of failure of the gubernaculum to migrate into the scrotum, the inguinal canal space was not well developed [12], and the hernia sac expanded between the external oblique aponeurosis and the internal oblique muscle as well as through the inguinal canal. (Fig. 4)

## CONCLUSION

We treated a patient with a rare variant of inguinal hernia, an interparietal inguinal hernia, who also had an ipsilateral ectopic testis. The clinical manifestations of interparietal inguinal hernia are similar to those of lower spigelian hernia. It is very difficult to diagnose interparietal hernias preoperatively. Laparoscopic exploration is very helpful in making the diagnosis. Based on the laparoscopic findings in our patient, we concluded that the anatomical relation between



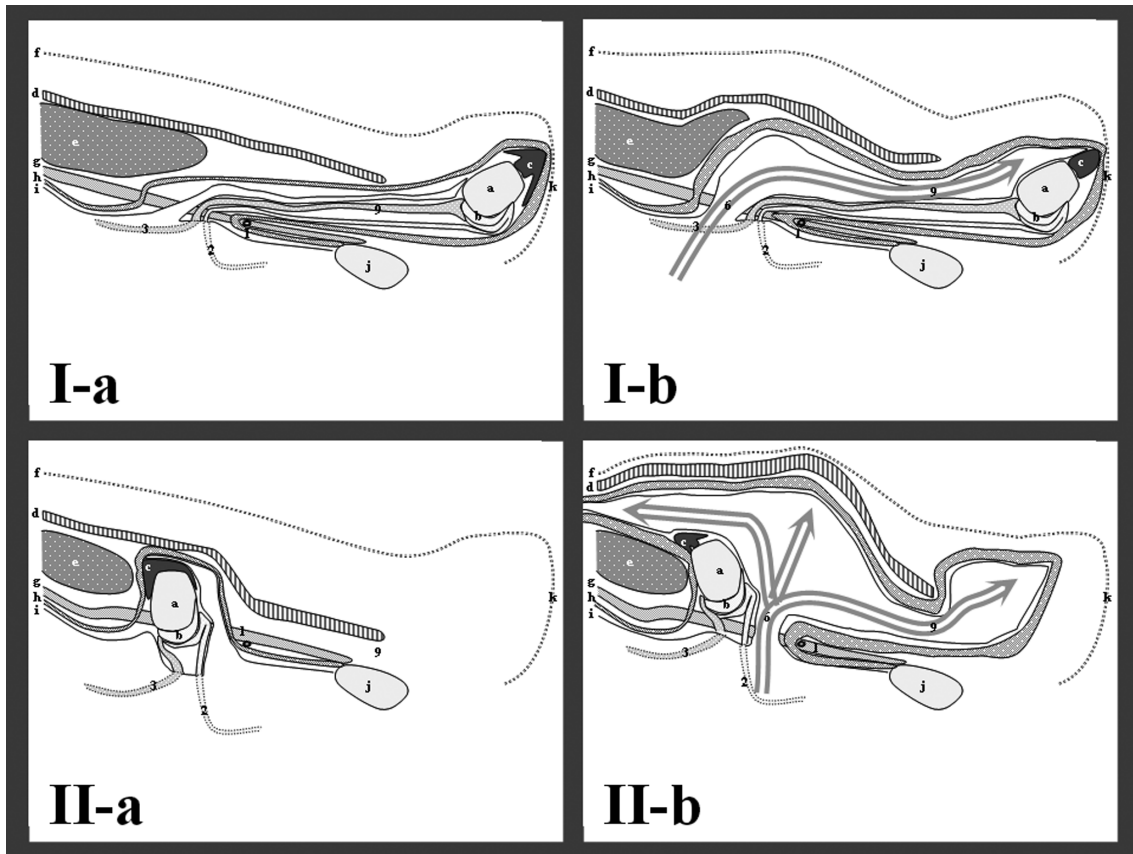
**Fig. 3** The hernia sac passed through the deep inguinal ring and extended superiorly to the anterior abdominal wall below the aponeurosis of the external oblique muscle (A). The testis was lying on the hernia sac and the gubernaculum was absent (B). The numerals 6 and 9 indicate the position of the hernia orifice (deep inguinal ring) and superficial inguinal ring, respectively. The small letters a and b indicate the position of the testis and the epididymis, respectively.

the hernia orifice and inferior epigastric vessels is an important clue to the diagnosis. Focusing on this anatomical relationship when examining detailed ultrasound scans may make preoperative diagnosis possible. Once the surgical anatomy is understood, surgical repair is simple. Interparietal hernias associated with ipsilateral ectopic testis appear to be caused by failure of the gubernaculum to migrate into the scrotum in the inguinoscrotal phase (25–35 weeks of gestation) of testicular descent.

**Conflict of interest statement:** Neither of the authors, Takeshi Hirabayashi and Shigeru Ueno, has any conflicts of interest.

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**Fig. 4** Figures I-a and I-b are schematic views of the pathogenetic mechanism of typical indirect inguinal hernias. The patent processus vaginalis extends in the inguinoscrotal direction through the inguinal canal (I-a). The space of the hernia sac (the patent processus vaginalis) was expanded in the same direction by the abdominal pressure (I-b). Figures II-a and II-b show schematic views of our hypothesized pathogenetic mechanism of interparietal hernia. The gubernaculum has stopped at the abdominal wall and fixed the testis, epididymis, and peritoneum (patent processus vaginalis) at the abdominal wall, just beneath the external oblique aponeurosis (II-a). The space of the hernia sac (the patent processus vaginalis) has expanded superiorly between the external oblique aponeurosis and the internal oblique muscle and in an inguinoscrotal direction through the inguinal canal (II-b). The numerals 1, 2, 3, 6, and 9 indicate the positions of the inferior epigastric vein, vas deferens, testicular vessels, hernia orifice (deep inguinal ring), and superficial inguinal ring, respectively. The small letters a, b, c, d, e, e', f, g, h, i, j, and k indicate the positions of the testis, epididymis, gubernaculum, external oblique aponeurosis, internal oblique muscle, cremaster muscle, skin, transversus abdominis muscle, fascia transversalis, peritoneum, pubic bone, and scrotum, respectively.