

## Bladder Hernia in Nuck's Canal: A Case Report

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### Case Report

We report a rare case of a 6-year-old girl with a herniated bladder in Nuck's canal. The literature describes serious complications following bladder perforation during isolation of the hernia sac. Clinical evaluation of the hernia contents, classically intestinal, leads to underestimation of the likelihood of bladder herniation, leading surgeons to operate only on the basis of clinical signs. In the case of bladder involvement, the presence of urinary symptoms such as dysuria, polyuria, hematuria, nocturia, and reduction in hernia size after urination may be a characteristic sign. Ultrasonography could be crucial for early diagnosis leading to appropriate management and better outcome. Surgeons should be aware of the high incidence of "bladder ears" in infants and children to prevent urinary tract injuries.

### Introduction

Inguinal hernias in children have a reported incidence of 0.8% to 4.4%. Herniotomy is the most frequent procedure in the practice of the pediatric surgeon. They are rarer in girls than in boys and are the result of patency of Nuck's canal, which is an ejection of the parietal peritoneum through the inguinal canal to the labia majora. Nuck's canal hernias are indirect hernias and usually have intestinal and peritoneal contents and are often treated surgically non-emergently. However, herniation of other organs, such as

the ovaries, can lead to incarceration, strangulation, and torsion requiring urgent surgery.

In male children, communication between the abdominal cavity and the scrotal sac results in persistence of the peritoneal-vaginal duct. In girls, inguinal hernia is usually due to failure to close Nuck's canal, which causes communication between the abdominal cavity and the labia majora. (fig.1)

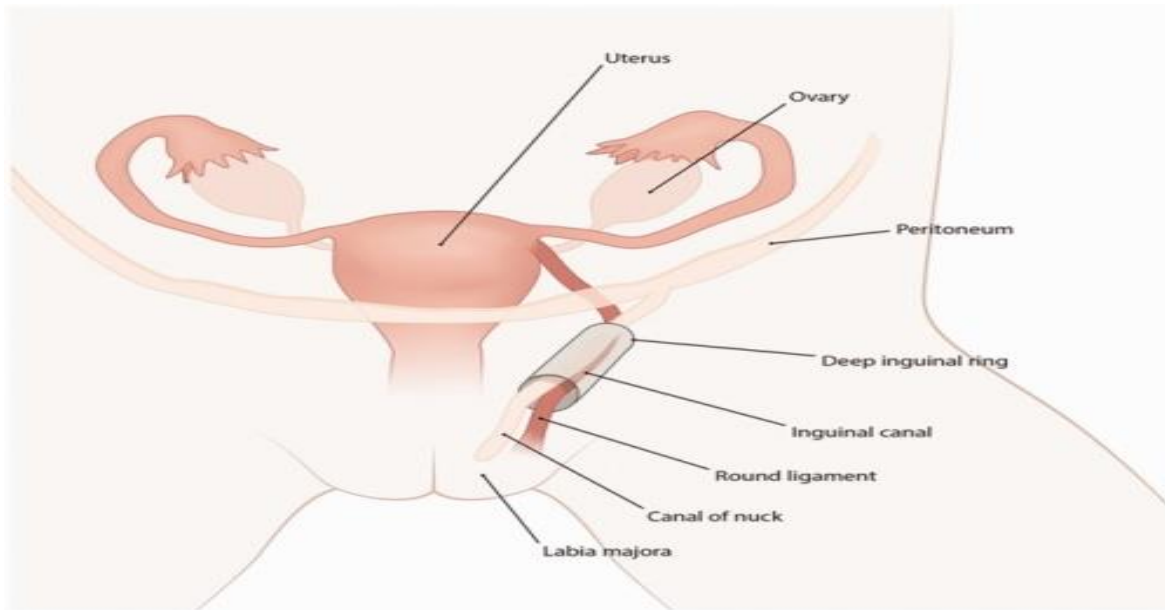
Herniated visceral contents include the peritoneal fat, small and large intestines, ovaries, bladder, uterus, and appendages.

### Case Report

6-year-old girl came to emergency observation due to suspect non-reducible left inguinal hernia. A careful medical history showed that the patient presented episodes of recurrent cystitis with foul-smelling urine. In the course of cystitis she complained dysuria and urgent urination. Previously, the little girl had presented a not painful swelling in the left inguinal area, spontaneously reducible after urination. No previous documented episodes of bacteruria. For some days the swelling appears to the parents no longer reducible. Laboratory tests showed modest neutrophilic leukocytosis (WB: 11,200/mm<sup>3</sup> - N: 79%) modest increase of VES (1st hour: 35); PCR ++; BUN and creatinine in the normal range. The patient underwent an inguinal and pelvic Eco-Color-Doppler examination: suprapubic scans of the bladder and inguinal region were performed, using an AU 590 Asynchronous ultrasound device

(Esaote Biomedica) with a 3.5 MHz convex probe. The examination was conducted with the young patient in supine position and in standing position with a full bladder. Scans carried out on the bladder in supine position showed regular distension, position and morphology, with imaging to be referred to a herniated pseudo-diverticulum in the left inguinal canal. The study of the inguinal canal clearly showed this pseudo-diverticular image in continuity with the lumen of the bladder homolaterally. The scans

performed in standing position showed the appearance of an anechoic formation with posterior reinforcement at the level of the left inguinal canal which, after positioning of the color, did not show vascular character, while it "imprinted" the left common iliac vein (Fig. 1); another scan evidenced a channel communicating with the bladder (Fig. 2). In scans performed after urination, the formation described was not evident.



**Figure 1:** anatomy of Nuck's canal.



**Figure 2:** Suprapubic ultrasound scan of the bladder: diverticulum in the inguinal canal- bladder ear.



**Figure 3:** Supra-pubic ultrasound scan of the bladder: left bladder and bladder ear are evident.

Therefore, urgent surgery was performed for suspected bladder herniation. In the preoperative phase, a 10Ch Foley catheter was placed in order to favor the depletion of the bladder and the consequent, easy, reduction of the bladder pseudodiverticulum herniated in the inguinal canal. A minimal inguinoscopy was then performed on the left. Nuck's duct was identified, isolated and tied with a transfixing point at the base, then the section of the duct previously "twisted" on its axis was made. At the end of the surgery, the bladder catheter was removed. The dissected Nuck's duct was sent for pathological examination. Discharged in the 1st postoperative day, she returned to our attention in the 3rd day with suprapubic pain, fever up to 39.5° C and macrohematuria. Urine examination showed numerous leukocytes in the urine sediment, with negative urine culture. Normal values in blood count, hemoglobin, serum electrolytes and hepatic indexes were reported. PCR and PCT in the normal range. Ceftriaxone (75mg/Kg/day i.v.) was started with lowering of temperature in the first day. On the 11th postoperative day, an ultrasound examination was performed with a finding of normality.

## Discussion

Inguinal hernia correction is a common surgical procedure that, however, can sometimes confuse the surgeon who is faced with unusual content that can unexpectedly complicate its management. Diagnosis is based primarily on history and clinical examination; imaging techniques such as ultrasound, CT, MRI, and color Doppler are almost never necessary preoperatively, but when performed have been helpful in managing hernias with unusual contents.

Our case report is noteworthy for its extreme rarity. Unusual contents in the pediatric age group are found in Amyand's hernia (appendix), Littre's hernia (Meckel's diverticulum); hernia of the uterine adnexa is reported as a rare but typical occurrence in girl's hernia. In our case, the history showed a correlation between the urination disorder presented by the girl and the appearance of swelling in the inguinal region, and its disappearance after urination. Color Doppler ultrasound was performed showing the presence of a bladder diverticulum in the inguinal canal. This preoperative diagnosis was essential to avoid bladder perforation during the fascia incision performed to open the inguinal canal, thus avoiding serious postoperative consequences.

The incidence of "bladder hernia" in patients with inguinal hernia has been estimated at 1 to 3% by some authors and up to 10% by others. Almost always asymptomatic, it is rarely diagnosed before surgery. In adults, they are almost always right-sided, direct hernias. Urinary symptoms such as dysuria, polyuria, hematuria, nocturia may be present and reduction in hernia size after urination may be a pathognomonic sign. It is common in elderly males, obese subjects. When the bladder hernia is incarcerated in the inguinal hernia, the incidence of bladder injury during surgery is very high (28.6%). In 1961, Allen and Condon observed lateral protrusions of the urinary bladder during intravenous urography and cystography performed in infants up to 12 months of age. These lateral protrusions were found to be bladder herniations through the inner inguinal canal ring; Allen and Condon called these herniations "bladder ears."

In girls, bladder herniation is a very rare occurrence, with few cases described in the literature; even rarer is the finding of a bladder diverticulum, a situation described as an "ear of the bladder," incarcerated in an inguinal hernia. The presence of postoperative hematuria is an alarming symptom of a possible bladder injury. For this reason, catheterization remains controversial. Although it may promote catheter infection, it protects the surgeon from possible bladder injury. Catheterization allows assessment of immediacy of hematuria and allows detection of bladder hernia. When the bladder hernia is incarcerated in the inguinal hernia, the incidence of bladder injury during surgery is very high (28.6%). In 1961, Allen and Condon observed lateral protrusions of the urinary bladder during intravenous urography and cystography performed in infants up to 12 months of age. These lateral protrusions were found to be bladder herniations through the inner inguinal canal ring; Allen and Condon called these herniations "bladder ears."

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In conclusion, "unusual" contents of the inguinal hernial sac are rare, but when the surgeon is faced with this eventuality, he may encounter great difficulty, even if he is an experienced surgeon. A proper history can lead to further imaging investigations in the preoperative phase that can better elucidate the visceral contents involved and thus improve management and avoid possible disasters already reported in the literature such as bladder perforation.

## Authorship

All persons who meet authorship criteria are listed as authors, and all authors certify that they have participated sufficiently in the work to take public responsibility for the content, including participation in the concept, design, analysis, writing, or revision of the manuscript. Furthermore, each author certifies that this material or similar material has not been and will not be submitted to or published in any other publication.

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## Conflicts of Interest

The authors whose names are listed immediately below certify that they have NO affiliations with or involvement in any organization or entity with any financial interest (such as honoraria; educational grants; participation in speakers' bureaus; membership, employment, consultancies, stock ownership, or other equity interest; and expert testimony or patent-licensing arrangements), or non-financial interest (such as personal or professional relationships, affiliations, knowledge or beliefs) in the subjectmatter or materials discussed in this manuscript.

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