

A Rare Case of Strangulated Hernia of the Canal of Nuck with Ovarian Necrosis in a Female Infant from a Resource-Limited Setting: A Case Report and Literature Review

Gabriel Kakuru Shamavu¹, Jeannot Munihi Baanitse², Allen Kawayi Awazi¹, Jean-Paul Mitengezo Twishime³, Banga Mseza¹, Ahmed Kiswezi²

¹Department of Pediatrics and Child Health, Faculty of Clinical Medicine and Dentistry, Kampala International University Western Campus, Ishaka, Uganda; ²Department of Surgery, Faculty of Clinical Medicine and Dentistry, Kampala International University Western Campus, Ishaka, Uganda; ³Department of Obstetrics and Gynecology, Faculty of Clinical Medicine and Dentistry, Kampala International University Western Campus, Ishaka, Uganda

Correspondence: Gabriel Kakuru Shamavu, Department of Pediatrics and Child Health, Faculty of Clinical Medicine and Dentistry, Kampala International University Western Campus, Ishaka, Uganda, Email gabrielshamavu@gmail.com

Background: The canal of Nuck, the female equivalent of the male processus vaginalis, is a rare site of hernia in infants. In severe cases, incarceration or strangulation may occur, posing the risk of tissue necrosis and requiring urgent surgical intervention.

Case Presentation: We report a case of a 13-week-old female infant presenting with a painful, irreducible swelling in the left inguinal region. Surgical exploration revealed a strangulated necrotic left ovary. An oophorectomy and herniotomy were performed.

Discussion: An incarcerated hernia of the canal of Nuck is a surgical emergency, and limited imaging access should not delay the decision. High clinical suspicion of an incarcerated hernia and cost-effective ultrasonography are crucial for early diagnosis and timely surgical intervention to prevent irreversible complications.

Conclusion: This report highlights diagnostic and management challenges in a low-resource setting and underscores the importance of early recognition in preventing irreversible complications.

Keywords: canal of Nuck, strangulated hernia, ovarian necrosis

Introduction

Inguinal hernia is among the most common congenital anomalies in the pediatric population, with an estimated incidence ranging from 0.8% to 4.4% in term infants and up to 30% in preterm infants.^{1–3} Although more frequently diagnosed in males due to the role of the processus vaginalis in testicular descent, a homologous structure in females, the canal of Nuck can persist if it fails to obliterate, creating a potential pathway for indirect inguinal hernia.⁴

The canal of Nuck, first described by Anton Nuck in 1691, is a patent peritoneal pouch in females that extends into the labia majora, analogous to the processus vaginalis in males, and normally regresses within the first months of life.^{5,6}

While inguinal hernias are significantly less common in females, with a male-to-female ratio of approximately 6:1 to 10:1, hernial sacs in girls may contain adnexal structures such as the ovary, fallopian tube, or, very rarely, the uterus.^{1,7} These adnexal hernias are rare but carry a high risk of incarceration, torsion, and strangulation, potentially resulting in ovarian necrosis, especially in infants under one year of age.⁸

Prompt clinical recognition and surgical intervention are crucial to prevent irreversible damage, yet diagnosis may be delayed in female infants owing to the rarity of the condition and nonspecific presentations. We present a rare case of a strangulated canal of Nuck hernia containing a necrotic ovary in a female infant managed in a resource-limited setting.

This case highlights the need for heightened awareness, rapid assessment, and early referral in similar contexts. This report adheres to the 2020 Surgical Case Report (SCARE) guidelines.⁹

Case Presentation

Patient Description and Case History

A previously healthy thirteen-week-old female infant was brought to the emergency department with a 3-day history of irritability and persistent crying. The mother reported progressive discomfort, particularly at night, associated with a sudden appearance of swelling in the left groin when crying. The swelling subsequently extended into the left labia majora and became firm, tender, and irreducible ([Figure 1](#)). The infant had no history of fever, vomiting, or bowel disturbances. This was the infant's first hospital admission, and her medical history was unremarkable. She was born at term via spontaneous vaginal delivery with a birth weight of 3.2 kg, following an uneventful antenatal period. Since birth, she was exclusively breastfed and had demonstrated normal growth and age-appropriate developmental milestones. Her immunizations were up-to-date according to the national schedule. Notably, an umbilical hernia was detected at one month of age during a routine outpatient consultation. The hernia was monitored and showed gradual regression. There was no family history of congenital anomalies, connective tissue disorders, or inguinal hernias.

Physical Examination Results

At presentation, the infant was alert, but irritable. Vital signs were within normal limits, with an axillary temperature of 36.8°C, heart rate of 138 beats per minute, respiratory rate of 40 breaths per minute, and oxygen saturation of 98% on room air. Examination revealed a tense, tender, non-reducible mass in the left inguinal region, extending into the labia



Figure 1 Irreducible Swelling in the left groin extended into the left labia majora.

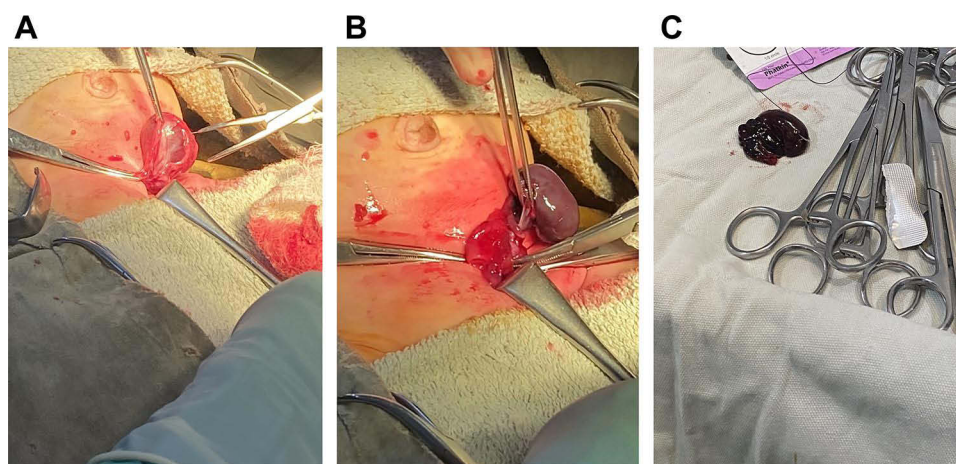


Figure 2 (A) Opened Hernia sac containing the left fallopian tube and the left ovary. (B) Necrotic Untwisted left ovary with bleeding on the twisted level of the fallopian tube. (C) Necrotic ovary specimen sent for histopathology studies.

majora (Figure 1). The abdomen was soft, non-distended, and non-tender with active bowel sounds. The umbilical hernia appeared small in size, with no signs of incarceration or inflammation.

Investigation Findings

Point-of-care ultrasound of the left groin swelling revealed an adnexal structure within the inguinal mass, raising the suspicion of a left-sided incarcerated ovarian hernia. There was no evidence of a contralateral hernia. Laboratory tests including a complete blood count (CBC), C-reactive protein (CRP), and serum electrolyte levels, were within normal ranges.

Treatment

Based on the clinical and radiological findings, a diagnosis of strangulated inguinal hernia containing a torsed ovarian structure was made. The infant was promptly scheduled for an emergency surgery. Under general anesthesia, inguinal exploration was performed, which revealed a twisted and necrotic left ovary and fallopian tube within the hernial sac (Figure 2A and B). The vascular pedicle was torsed, confirming adnexal infarction. An oophorectomy was performed, and the hernia sac associated with the patent canal of Nuck was ligated and excised (Figure 2A–C). Histopathological examination of the resected specimen revealed a necrotized ovarian tissue (Figure 2C). The procedure was performed by a general surgeon, assisted by a Medical Officer. Due to ongoing spontaneous regression, the umbilical hernia was not addressed during the surgical intervention. Postoperatively, the infant was monitored in the pediatric ward. Analgesia with paracetamol (20mg/kg), 100mg two times a day for 3 days) was administered, and breastfeeding was encouraged. Her recovery was uneventful, with full resolution of the pain and swelling. The patient was discharged on the third postoperative day with appropriate follow-up instructions.

Outcome

At a follow-up visit four months later, the infant was clinically stable with no signs of recurrence. She continued to demonstrate normal physical growth and developmental milestones, with a healthy nutritional status. No abnormalities were detected on the contralateral side during the follow-up examination.

Discussion and Literature Review

The canal of Nuck represents the female counterpart to the processus vaginalis in males, and a peritoneal extension accompanying the round ligament through the inguinal canal. Normally, this structure undergoes obliteration between the seventh month of gestation and first year of life. Failure of this closure results in a patent canal of Nuck, which can

manifest clinically as a hydrocele or more critically, as an inguinal hernia containing pelvic organs.^{8,10} Although rare, this anomaly has the potential for significant morbidity if not promptly recognized and treated.

Hernias involving the canal of Nuck occur predominantly in infants and young girls under five years of age, but cases have been reported in older children and adolescents.^{10,11} Prematurity appears to be a key risk factor, likely due to the incomplete obliteration of the processus vaginalis at birth.³ Additional factors such as increased intra-abdominal pressure due to mechanical ventilation or pulmonary disease may also contribute.¹²

From an embryological perspective, the craniocaudal closure pattern of the processus vaginalis explains the variable presentation; if only the inferior portion remains patent, an encysted hydrocele may form, whereas full patency predisposes to a communicating hydrocele or true herniation involving abdominal or pelvic organs.^{6,10} The hernias of the canal of Nuck are typically classified as indirect because of their location lateral to the inferior epigastric vessels.¹³

Among the most alarming presentations is the herniation of adnexal structures, especially the ovary, fallopian tube, and occasionally, the uterus. Although ovarian herniation is more common and often unilateral, complete herniation of both the adnexa and uterus has been reported, primarily in infants under one year of age.^{14–16} These cases raise embryological questions regarding the uterine mobility. One hypothesis proposed by Okada et al suggests that herniation of the ipsilateral adnexa may traction the uterus and contralateral adnexa through the canal, facilitated by the broad ligament.¹⁷

Laterality patterns also appear to favor right-sided hernias, possibly due to the protective effect of the sigmoid colon on the left.⁶ However, left-sided or bilateral herniation can occur, as in the case described by Derinkuyu et al, who reported a 12-week-old female with left-sided herniation of the uterus, both adnexa, and small bowel loops, highlighting the complexity and variability of this condition.¹⁵

The clinical presentation typically involves a palpable, often irreducible, groin or labial mass. The risk of incarceration and strangulation, especially of the ovarian tissue, is high, necessitating prompt diagnosis. Several studies have demonstrated how delays can result in ovarian necrosis and subsequent oophorectomy.^{18,19} In contrast, early recognition as in the reports by Derinkuyu et al and Amreen et al facilitated organ preservation and uncomplicated recovery.^{15,20}

Ultrasonography remains the first-line imaging modality due to its safety and diagnostic yield. Typical findings include a solid mass with peripheral cysts, suggestive of ovarian tissue. Color Doppler assessment is critical to evaluate vascularity and rule out torsion.^{8,21} While CT scan may incidentally detect the canal of Nuck hernias, its use is generally discouraged in pediatric populations due to radiation exposure.¹⁰

Management involves surgical repair ideally before complications such as torsion, strangulation, or infertility arise. High ligation of the hernial sac and reduction of viable structures in the abdominal cavity are standard. In certain cases, oophoropexy or fixation of the ovary to prevent future torsion has been advocated.¹¹

Conclusion

In summary, hernias of the canal of Nuck, while rare, demand high clinical suspicion in female infants presenting with inguinal or labial swelling. Timely imaging and intervention are pivotal to preserving gonadal function and preventing emergent complications. The condition underscores the importance of understanding embryological anomalies and their clinical ramifications. In resource-limited settings, maintaining a high index of suspicion, acting promptly when intervention is required, and ensuring early referral when necessary are particularly crucial to avoid delays that may lead to irreversible outcomes.

Abbreviations

CT, Computed Tomodensitometry; CRP, C Reactive Protein; CBC, Complete Blood Count.

Data Sharing Statement

All data generated or analyzed during this study are included in this case report.

Informed Consent and Right of Anonymity

The informed consent for publication, including permission for the use of images, was obtained from the parents.

Disclosure

The authors declare no conflicts of interest.

References

- Kapur P, Caty MG, Glick PL. Pediatric hernias and hydroceles. *Pediatr Clin North Am.* 1998;45(4):773–789.
- Ein SH, Njere I, Ein A. Six thousand three hundred sixty-one pediatric inguinal hernias: a 35-year review. *J Pediatr Surg.* 2006;41(5):980–986. doi:10.1016/j.jpedsurg.2006.01.020
- Grosfeld JL. Current concepts in inguinal hernia in infants and children. *World J Surg.* 1989;13(5):506–515. doi:10.1007/BF01658863
- Park SJ, Lee HK, Hong HS, et al. Hydrocele of the canal of Nuck in a girl: ultrasound and MR appearance. *Br J Radiol.* 2004;77(915):243–244. doi:10.1259/bjr/51474597
- Jedrzejewski G, Osemlak P, Wieczorek AP, Nachulewicz P. Nuck canal hernias, typical and unusual ultrasound findings. *Ultrasound Q.* 2019;35(1):79–81. doi:10.1097/RUQ.0000000000000409
- Nasser H, King M, Rosenberg HK, Rosen A, Wilck E, Simpson WL. Anatomy and pathology of the canal of Nuck. *Clin Imaging.* 2018;51:83–92. doi:10.1016/j.clinimag.2018.02.003
- Lao OB, Fitzgibbons RJ, Cusick RA. Pediatric inguinal hernias, hydroceles, and undescended testicles. *Surgical Clinic North Am.* 2012;92(3):487–504. doi:10.1016/j.suc.2012.03.017
- Yang DM, Kim HC, Kim SW, Lim SJ, Park SJ, Lim JW. Ultrasonographic diagnosis of ovary-containing hernias of the canal of Nuck. *Ultrasonography.* 2014;33(3):178–183. doi:10.14366/usg.14010
- Agha RA, Franchi T, Sohrabi C, et al. The SCARE 2020 guideline: updating consensus surgical case report (SCARE) guidelines. *Int J Surg.* 2020;84:226–230. doi:10.1016/j.ijsu.2020.10.034
- Rees MA, Squires JE, Tadros S, Squires JH. Canal of Nuck hernia: a multimodality imaging review. *Pediatr Radiol.* 2017;47(8):893–898.
- Maqbool S, Huma A, Anwar MI, Khan MA, Lee KY. Ovary and fallopian tube as contents of indirect inguinal hernia: a case report. *Int J Surg Case Rep.* 2022;100:107733. doi:10.1016/j.ijscr.2022.107733
- Fu YW, Pan ML, Hsu YJ, Chin TW. A nationwide survey of incidence rates and risk factors of inguinal hernia in preterm children. *Pediatr Surg Int.* 2018;34(1):91–95. doi:10.1007/s00383-017-4222-0
- Sameshima YT, Yamanari MGI, Silva MA, Neto MJF, Funari MBG. The challenging sonographic inguinal canal evaluation in neonates and children: an update of differential diagnoses. *Pediatr Radiol.* 2017;47(4):461–472. doi:10.1007/s00247-016-3706-8
- Cascini V, Lisi G, Di Renzo D, Pappalepore N, Lelli Chiesa P. Irreducible indirect inguinal hernia containing uterus and bilateral adnexa in a premature female infant: report of an exceptional case and review of the literature. *J Pediatr Surg.* 2013;48(1):e17–9. doi:10.1016/j.jpedsurg.2012.09.065
- Derinkuyu BE, Affrancheh MR, Sonmez D, Bingol Kologlu M, Fitoz S. Canal of Nuck hernia in a female infant containing uterus, bilateral adnexa and bowel. *Balkan Med J.* 2016;33(5):566–568.
- Muthiyal S, Kini V, Kounsai A, Ibrahim AA. Rarity in conspicuity—Ultrasound diagnosis of sliding left inguinal hernia through canal of Nuck with uterus, fallopian tubes and ovaries. *Eur J Radiol Open.* 2016;3:35–37.
- Okada T, Sasaki S, Honda S, Miyagi H, Minato M, Todo S. Irreducible indirect inguinal hernia containing uterus, ovaries, and Fallopian tubes. *Hernia.* 2012;16(4):471–473. doi:10.1007/s10029-010-0764-y
- Sadiqi J, Ezmarai M, Niazi J. Canal of Nuck incarcerated ovarian hernia with strangulation, a case report. *Radiol Case Rep.* 2022;17(5):1475–1477. doi:10.1016/j.rader.2022.02.025
- Choi KH, Baek HJ. Incarcerated ovarian herniation of the canal of Nuck in a female infant: ultrasonographic findings and review of literature. *Ann Med Surg.* 2016;9:38–40. doi:10.1016/j.amsu.2016.06.003
- Amreen S, Yaseen Y. Ovarian inguinal hernia. *J Ultrason.* 2020;20(82):226–227. doi:10.15557/JoU.2020.0039
- Chan D, Kwon JK, Lagomarsino EM, Veltkamp JG, Yang MS, Pfeifer CM. Canal of Nuck hernias. *Acta Radiol Open.* 2019;8(12). doi:10.1177/2058460119889867

International Medical Case Reports Journal

Publish your work in this journal

The International Medical Case Reports Journal is an international, peer-reviewed open-access journal publishing original case reports from all medical specialties. Previously unpublished medical posters are also accepted relating to any area of clinical or preclinical science. Submissions should not normally exceed 2,000 words or 4 published pages including figures, diagrams and references. The manuscript management system is completely online and includes a very quick and fair peer-review system, which is all easy to use. Visit <http://www.dovepress.com/testimonials.php> to read real quotes from published authors.

Submit your manuscript here: <https://www.dovepress.com/international-medical-case-reports-journal-journal>

Dovepress
Taylor & Francis Group