Case Report

A case of hydrocele of the canal of Nuck in a female adult: Diagnostic challenges and surgical approach

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ABSTRACT

Hydrocele of the canal of Nuck is an uncommon condition in females, resulting from a persistent processus vaginalis that allows fluid accumulation along the course of the round ligament. Although well recognized in males as a hydrocele of the spermatic cord, this entity is rarely encountered in adult females and is often overlooked in the differential diagnosis of inguinal swellings. We report the case of a 33-year-old woman presenting with a gradually enlarging, painful swelling in the right groin. Clinical examination revealed an irreducible, non-tender mass without cough impulse. Ultrasonography demonstrated a well-defined, cystic lesion superficial to the femoral vessels, consistent with a hydrocele. The patient underwent surgical excision under spinal anesthesia. Intraoperatively, a bluish cystic mass extending toward the labia majora was identified, aspirated, and completely excised along with separation from the round ligament. Histopathology confirmed a cystic lesion lined by cuboidal to flattened epithelium with mild chronic inflammation. Post-operative recovery was uneventful. This case highlights the clinical and radiological challenges in diagnosing canal of Nuck hydrocele and emphasizes the importance of considering it as a rare but relevant differential in adult females presenting with inguinal masses. Surgical excision remains the definitive treatment of choice.

Key words: Canal of Nuck, Case report, Female hydrocele, Inguinal swelling, Round ligament

Hydrocele of the canal of Nuck is a rare developmental anomaly in females, first described by Anton Nuck in 1691 [1]. It results from the incomplete obliteration of the processus vaginalis, a peritoneal evagination that follows the course of the round ligament through the inguinal canal and into the labia majora [1]. Failure of this processus to regress can lead to the formation of a fluid-filled sac, analogous to hydrocele formation in the male scrotum. Although typically identified in pediatric populations, an increasing number of adult cases have been reported, largely owing to advancements in imaging modalities [1,2]. The condition often presents as a painless or mildly painful inguinal swelling, which may mimic more common pathologies such as hernia, lymphadenopathy, or abscess [2]. Although the condition is well recognized in pediatric populations, it remains rare in adults. Reported incidence is extremely low, with most evidence limited to isolated case reports and small case series in the literature.

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CASE PRESENTATION

A 33-year-old married woman presented with a 3-month history of gradually increasing swelling in the right groin, which was initially small (3 × 2 cm) but progressively enlarged to approximately 5 × 2 cm and was associated with dull aching pain.

The swelling was irreducible, and the cough impulse was negative. Contra-lateral and abdominal examinations were within normal limits.

Ultrasonography showed an encysted, anechoic, cystic collection of size measuring 6.9 × 2.4 × 1.1 cm, noted superficial to the femoral vessels and in the right inguinal canal.

Under spinal anesthesia, an incision from one finger breadth above the middle of the inguinal ligament toward to the pubic tubercle was made, dissected in layers, and the external oblique aponeurosis was visualized. Aponeurosis was cut open; underneath the aponeurosis, a bluish hue colored bulge was visualized (Fig. 1). After meticulous dissection, we noted that the bulge was entering the labia majora. Intraoperatively, the

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cyst was aspirated, confirming the presence of serous fluid (Fig. 2a). The cyst was separated from the round ligament and removed intact (Fig. 2b). The external oblique aponeurosis was closed.

Postoperatively, the specimen was sent for biopsy, microsections show cystic structure, lined by a single layer of cuboidal to flattened epithelium, and the wall is comprised of smooth muscle bundles and mild chronic inflammation (Fig. 3). The post-operative course was uneventful. The patient was mobilized on the first post-operative day and discharged on post-operative day 2. At follow-up visits at 2 weeks and 3 months, the surgical wound had healed well with no recurrence.

DISCUSSION

Hydrocele of the canal of Nuck is an uncommon condition in females that derives from the persistence of the processus vaginalis, a peritoneal extension that normally regresses shortly after birth [1,2]. Its clinical relevance lies in its rarity and the difficulty it presents in differentiating from more common inguinolabial pathologies [2]. The embryological basis is central to understanding this anomaly. In females, the gubernaculum attaches to the uterus and guides the round ligament through the inguinal canal toward the labia majora [3]. The processus vaginalis accompanies this descent and usually obliterates within the 1st year of life. Failure of closure creates a potential space in which fluid may accumulate, giving rise to a hydrocele, or in other cases, a hernia [4,5].

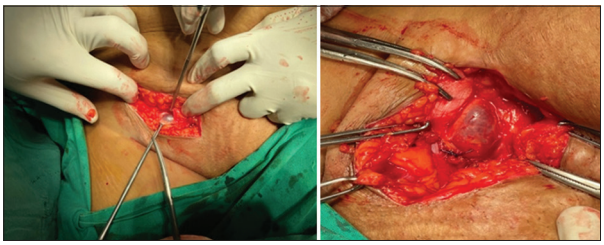

Figure 1: Intraoperative image showing bluish cystic swelling beneath the external oblique aponeurosis in the right inguinal region and dissection of the cystic lesion extending toward the labia majora

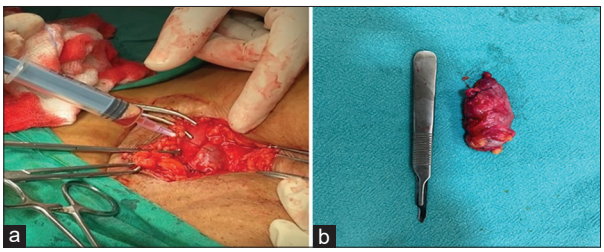

Figure 2: (a) Aspiration of clear serous fluid from the cyst confirming hydrocele and (b) complete excision of the hydrocele sac after separation from the round ligament

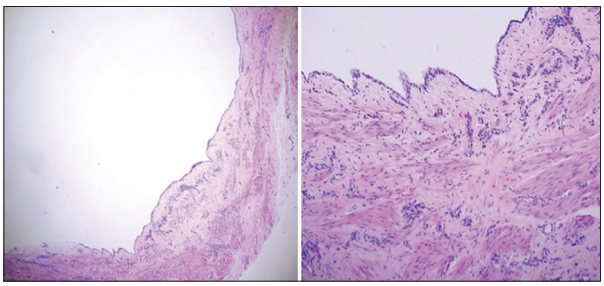

Figure 3: Histopathological examination of the excised cyst showing a cystic wall lined by cuboidal to flattened epithelium and highlighting smooth muscle bundles within the cyst wall and mild chronic inflammatory infiltrates

Clinically, patients often present with a painless or mildly painful swelling in the inguinal or labial region. The condition is frequently misdiagnosed as an inguinal hernia, lymphadenopathy, or cystic lesion, highlighting the importance of considering hydrocele of the canal of Nuck in the differential diagnosis of groin masses in women [5,6]. Prodomidou *et al*. conducted a systematic review of adult cases of hydrocele of the canal of Nuck, identifying 16 case reports with a mean patient age of 35 years and a notable right-sided predominance of 81% [7]. The most frequent clinical manifestation was a painless or mildly painful swelling in the inguinal or labial region. Given its non-specific presentation, the differential diagnosis of a female inguinal mass is broad and includes inguinal hernia, lymphadenopathy, cysts, endometriosis, abscesses, benign tumors, and, rarely, malignancy [8]. Hydroceles of the canal of Nuck have been classified into three distinct types [9]: (a) Encysted type, characterized by a closed cyst without communication with the peritoneal cavity, which may occur anywhere along the round ligament from the deep inguinal ring to the labia majora; (b) Communicating type, analogous to congenital hydrocele in males, in which persistent communication with the peritoneal cavity allows bidirectional fluid movement; (c) Hourglass (combined) type, resulting from constriction at the deep inguinal ring, with the distal portion occupying the inguinal canal and often mimicking an indirect inguinal hernia.

Imaging plays a pivotal role in evaluation. Ultrasound is the first-line modality, typically demonstrating a well-circumscribed, thin-walled, anechoic lesion without vascularity or change during the Valsalva Maneuver [10]. Magnetic resonance imaging may be employed in complex cases, offering superior delineation of the lesion and its relation to surrounding structures [11]. Histopathological examination remains definitive, confirming the cystic nature and excluding neoplastic transformation [12].

Surgical excision is the treatment of choice. The open inguinal approach allows safe and complete removal of the cyst with minimal recurrence risk [12,13]. In recent years, laparoscopic approaches have been reported, offering both diagnostic and therapeutic advantages, although technical challenges may necessitate conversion to open surgery [14]. Prognosis following complete excision is excellent.

Similar to previously reported adult cases, our patient presented with a slowly progressive inguinal swelling without systemic symptoms. A systematic review by Prodromidou *et al*. reported that adult cases of canal of

Nuck hydrocele commonly occur around a mean age of 35 years and show a marked right-sided predominance, findings that are consistent with our case [7]. Because the clinical presentation is often non-specific, the condition is frequently misdiagnosed as an inguinal hernia or lymphadenopathy until imaging or surgical exploration establishes the correct diagnosis. Our case highlights the importance of considering hydrocele of the canal of Nuck in the differential diagnosis of inguinal masses in adult females. It also adds to the limited but growing body of literature on this rare condition and emphasizes the need for greater clinical awareness to ensure accurate diagnosis and timely management.

CONCLUSION

Hydrocele of the canal of Nuck is an uncommon but important differential diagnosis in females presenting with inguinal swelling. While ultrasonography serves as a useful initial diagnostic tool, definitive confirmation is typically achieved through surgical exploration. Complete surgical excision remains the treatment of choice, providing both symptom relief and histopathological confirmation. Clinicians should also be mindful of the potential for associated contralateral hydrocele or inguinal hernia. Greater awareness of this unusual entity can help avoid misdiagnosis and ensure timely, effective management.

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