CASE REPORT

Hydrocele in the Canal of Nuck

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We present a case of a hydrocele within the canal of Nuck that initially presented as a palpable mass in the right inguinal region. Ultrasonography demonstrated an anechoic cyst. Surgery was performed and the pathological diagnosis was a cyst in the canal of Nuck. This is a rare diagnosis, and the differential diagnosis often includes more common causes of inguinal masses. Ultrasound is the imaging modality of choice to narrow the differential diagnosis and to confirm a hydrocele. We also discuss the reported clinical and imaging characteristics of the cyst which differentiate it from other inguinal masses.

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Introduction

Coley, in 1892, reported 14 cases of a hydrocele in women. He described this "affection" as being "too rare an anomaly to deserve consideration" [1]. The rarity of this finding continues to be described in more current literature of 400 cases [2–7]. A female hydrocele or cyst of the canal of Nuck was named after a 17th century anatomist, Anton Nuck, in 1691 and is a lesion in the section of the processus vaginalis peritonei (male), or canal of Nuck (female), within the inguinal canal [5–9]. The canal of Nuck is a small evagination or finger-like protrusion of parietal peritoneum that accompanies the round ligament through the inguinal ring [5]. During the first year of life this protrusion typically obliterates completely, however, if there is limited proximal obliteration, it fills with fluid and forms a hydrocele [6,9,10] or indirect inguinal hernia [9]. The female hydrocele is equivalent to an encysted hydrocele of the spermatic cord in the male [5,10]. The cysts seldom exceed 3 cm in length [6,11] with a diameter of 0.3–0.5 cm [11].

We describe a patient with a fluctuating, palpable inguinal mass, thought initially to be a hernia. The surgical diagnosis was a cyst of the canal of Nuck. Clinical and radiological description of this mass and other groin masses are included to address the differential diagnosis. This report may assist clinicians in providing the patient with an accurate and timely differential diagnosis, allowing appropriate treatment.

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Case report

A 50-year-old woman presented to our chiropractic teaching clinic with a palpable mass in her right inguinal region which was noticed 1 week prior. Initially, the mass was described as non-tender, however it had become progressively tender. Ultrasonographic examination of the right inguinal region with a GE LOGIQ e (GE Healthcare, Milwaukee, WI) using an 8–13 MHz linear array transducer demonstrated an anechoic fluid-filled cystic structure in the right inguinal region. The cyst measured approximately 4.26 × 1.94 × 4.77 cm (Fig. 1). There was no evidence of neovascularity. During the Valsalva maneuver, the mass did not change in size and shape. A sonographic diagnosis of an indirect inguinal hernia was proposed. Six weeks after the initial complaint, the patient presented to a medical center for further evaluation. The mass was described as uncomfortable, and primarily a dull pain that presented as intermittent sharp pain. She reported that the pain was more significant after being on her feet for any considerable length of time. Her family history was remarkable for heart disease, hypertension, stroke, diabetes and uterine cancer. She reported a history of fibromyalgia, hypertension and hypothyroidism. She was married with three children. Previous surgeries included appendectomy, tonsillectomy, dilation and curettage and a Cesarean section. Physical examination revealed a well-developed, well-nourished woman in no acute distress. Her blood pressure was 140/90 mmHg with sinus rhythm. A right inguinal hernia was diagnosed clinically. The remaining physical examination was unremarkable. The recommendation was made to repair the right inguinal hernia, which was performed the following day. During surgical repair, a finger-like cystic structure was noted deep to the external oblique fascia which dissected to the labial area where it terminated. The structure, measuring 5.0 cm, was described as being fluid-filled and quite thin, similar to looking through peritoneum. The pathology report described the structure, composed of fibroadipose tissue, as a cyst of the canal of Nuck. The cyst was lined by mesothelium showing focal reactive hyperplasia and focal inflammation, without significant histopathologic abnormalities in the surrounding soft tissue. The patient provided written consent to utilize her medical record with no patient identifiers.

Discussion

Cystic groin masses in women are rare. Clinically, masses in the groin are often diagnosed as hernias or lymphadenopathies. Differential diagnosis based on clinical findings alone is difficult because the abnormalities have similar characteristics [12]. The majority of the reported cases of hydroceles of the canal of Nuck were not conclusively diagnosed until surgery was performed on a suspected inguinal hernia [2]. Inguinal hernias are associated with a cyst of the canal of Nuck in 30–40% of cases [5]. Clinical differentiation of a canal of Nuck cyst from an inguinal hernia is difficult, but a few differences have been described. A cyst of the canal of Nuck has been described as more noticeable while standing and remaining visible while lying supine, unlike an inguinal hernia. With a Valsalva maneuver, the cyst may recede into the inguinal canal whereas an inguinal hernia will not [7]. During a Valsalva maneuver, and with the patient standing, the hydrocele may increase in transverse diameter [9]. There may be lack of impulse with a cough in a hydrocele [3]. Hydroceles of the canal of Nuck are usually painless, nonreducible, and demonstrate transillumination, in contrast to inguinal hernias [10]. Khanna reports that, while the cysts may present as painless inguinal masses, uncomfortable or frankly painful swelling in the inguinolabial region can occur [10]. Khanna describes a cystic groin mass in a woman as rare and highlighted seven masses they encountered in their patients (Table 1) [13]. Interestingly, a cyst of the canal of Nuck was not mentioned, likely due to its comparative rarity. Table 2 presents differential diagnoses for inguinolabial masses [9]. In 1948, a cystic mass in the inguinal region of a woman was suspected to be a bladder diverticulum; however, during a surgical procedure to further explore the cyst, communication with the bladder was not confirmed [14]. The exact cause of the cyst formation is unknown [2]. One proposed mechanism is that the canal of Nuck cyst may occur due to an imbalance of fluid secretion and absorption by the secretory membrane lining the canal [2,10]. The hypersecretion or underabsorption may be due to inflammation, trauma or impairment of lymphatic drainage [2]. A second mechanism for cyst formation may be due to

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**Table 1** Cystic masses of the female groin.

| Mesothelial cyst of the round ligament |
| Varicosity of the round ligament |
| Cystic lymphangioma |
| Epidermal inclusion cyst |
| Abscess |
| Pseudoaneurysm |
| Herniation of the ovary |
a direct communication of the cyst to the peritoneal cavity, similar to the congenital inguinal hernia in the male [3,10].

Sonography is the primary imaging modality used when assessing palpable groin masses [6,7,12,13]. The sonographic findings of a hydrocele in the canal of Nuck are typically of an anechoic cystic mass with posterior acoustic enhancement. The shape, extent, and presence of septations are somewhat variable. A dumbbell-shaped cyst with internal septum [6] or a sausage-shaped mass [7] coursing along the round ligament and distending the labium majus [9] may be seen. The cystic mass may demonstrate a fine circumferential echogenic margin and possible septa or cystic internal structures with multiloculated cysts. The internal cystic structures may be cysts within cysts that represent the remains of the obliteration of the small evagination in the inguinal canal [2]. Power or color Doppler imaging demonstrates no internal or peripheral vascularity [2,15].

While sonography is the primary imaging modality for diagnosis, magnetic resonance imaging (MRI) has also been utilized in the differential diagnosis of groin masses [5]. MRI findings are not readily described in the literature but include a thin-walled tense cystic mass in the inguinal area [11] or a multiseptated cystic structure with rim and septae enhancement after intravenous contrast administration. In the latter description, the septations were attributed to underlying inflammation and/or hemorrhage [15].

Treatment for a hydrocele of the canal of Nuck consists of surgical repair with resection of the hydrocele, ligation of the neck of the canal of Nuck and closure of the fascial defect in the parietal peritoneum [7]. A less invasive option includes ultrasound-guided aspiration of the cyst [6]. Miklos et al. reported difficulty in locating and excising the mobile mass [10]. Pathological examination after surgical removal has described a multiloculated mass containing hemorrhagic fluid [15]. This finding of hemorrhagic fluid appears to be an exception as the hydrocele is usually described as an anechoic appearance on ultrasonography.

We report a cyst in the canal of Nuck that initially presented as a diagnostic conundrum. The patient’s clinical presentation led to a working diagnosis of an inguinal hernia. Ultrasonography confirmed an inguinal mass but dynamic maneuvers were not consistent with an inguinal hernia. A cyst in the canal of Nuck is a rare cause of an inguinal mass in women and therefore may not be a consideration in the differential diagnosis for an inguinal mass. Recognition and understanding the clinical and imaging presentation of a cyst in the canal of Nuck may prevent unnecessary diagnostic evaluations, as ultrasonography may be sufficient for preoperative diagnosis. Also, appropriate clinical differential diagnosis may obviate diagnostic delay and ensure its timely treatment.

Table 2  Differential diagnoses for inguinolabial masses.

<table>
<thead>
<tr>
<th>Indirect inguinal hernia</th>
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<tbody>
<tr>
<td>Endometriosis of the round ligament</td>
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<td>Adenopathy</td>
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<tr>
<td>Vulvovaginal cyst and tumors:</td>
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<tr>
<td>- Leiomyoma</td>
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<td>- Bartholin’s cyst or abscess</td>
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<td>- Sarcoma</td>
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References