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A Rare Case of Laparoscopic Excision of Hydrocele in the Canal of Nuck in an Adult Female

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Abstract

Canal of Nuck hydrocele is a rare condition in females and it results from the incomplete closure of the secretory membranes of the processus vaginalis. We present a 33-year-old female presenting with a palpable mass in the right inguinal region with no other associated signs and symptoms. Ultrasound was done revealing a canal of Nuck hydrocele. The patient underwent laparoscopic excision of hydrocele with transabdominal preperitoneal hernioplasty. The patient was discharged on the second postoperative day. Canal of Nuck hydrocele in females is rare, occurring in about 9-11% in infants but the condition is rarer in adult females and only 27 cases are reported globally. Although infrequent, Nuck's hydrocele should be included in the differential diagnosis of inguinal swelling in females. Imaging such as ultrasound and MRI can help in clinching the diagnosis. The treatment of choice is always surgical, and laparoscopy offers a better technique in terms of visualizing and correlating nearby structures of the hydrocele. This is the first reported case on surgical repair of the canal of Nuck hydrocele in an adult female in the Philippines. As such, its contribution to global literature is important in order to gain a more holistic understanding of such a rare disease entity in females. **Keywords:** Laparoscopic Excision of Hydrocele; Canal of Nuck; Hydrocele in Adult Female

Introduction

The canal of Nuck was described by Anton Nuck in 1961, stating that this is an anatomic abnormality resulting from the failure of the closure of the processus vaginalis in females during the first year of life. Incomplete closure of the canal of Nuck leads to the formation of hydrocele¹ and this has been attributed to a defect of the secretory membranes resulting in an imbalance in secretion and absorption of fluids of the processus vaginalis [2]. Reported symptoms include pain and swelling on the inguinal region, sometimes reaching up to the vulva. A thorough literature review showed that only 27 cases of canal of Nuck hydrocele are reported globally. All of these cases were operated on by complete excision of the hydrocele followed by repair of hernia defect if identified. Of the 27 cases, 10 patients underwent laparoscopy while 17 patients underwent the open approach. This paper is another case report on the hydrocele of the canal of Nuck in an adult female who underwent laparoscopic excision of the hydrocele with transabdominal preperitoneal (TAPP) hernioplasty. We aim to share our experience on this rare condition and demonstrate our technique for excision and repair of hernia caused by a canal of Nuck hydrocele.

Case Report

A 33-year-old female presented with a four-month history of right inguinal swelling not associated with pain, fever, bowel or urinary symptoms. There was no history of local trauma, symptoms of nausea, vomiting, or abdominal discomfort. At presentation, physical examination revealed a palpable soft, nontender right inguinal mass, prominent upon standing up and straining and reduced spontaneously on supine position. Her abdomen was soft, non-distended and non-tender with no signs of bowel obstruction. Ultrasound was done (Figure 1) revealing a tubular anechoic structure with round cystic component in the right inguinal region extending to the mons pubis on standing position, measuring approximately 5.6x2.2x4.4 cm (27 ml). There was no significant intralesional vascularity noted. The impression was a hydrocele of the canal of Nuck in the right inguinal region. She was advised surgical intervention through laparoscopy.



Figure 1: (a) Ultrasound of the inguinal area showing a cystic component in the right inguinal region. (b) Valsalva maneuver done showing a tubular anechoic structure extending to the mons pubis.

The patient was placed in a supine position under general anesthesia. A 12-mm trocar was placed at the umbilicus for camera entry. Gradual insufflation was done and under direct visualization, a 5 mm port was placed along the lateral border of the rectus muscle on the right at a level slightly below the umbilicus. Limited diagnostic laparoscopy showed infraumbilical area adhesions. Subsequent adhesiolysis was done and another 5 mm port was inserted at the left hemiabdomen upon adequate visualization of the abdominal wall. Diagnostic laparoscopy showed a 5x4 cm fluid filled cystic mass attached to the round ligament (Figure 2). The peritoneum was incised along a line approximately 3 cm above the superior edge of the hernial defect, extending from the anterior superior iliac spine to the medial umbilical ligament. The flap was then mobilized using blunt, sharp, and electrocautery dissection. The inferior epigastric vessels, pubic symphysis, the lower portion of rectus abdominis, and Cooper's ligament were identified and exposed. Dissection was done at the preperitoneal plane until the cyst was completely released from its attachments towards the inguinal

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canal. Hydrocele was mobilized and ligated at its distal tip using Vicryl 2-0 sutures. The round ligament was identified, ligated and released from its attachment to the hydrocele. The hydrocele was completely excised and was sent to histopathology for biopsy. After excision, hernioplasty was done. The preperitoneal dissection was continued until the anatomic landmarks were identified: the epigastric vessels, round ligament and gonadal vessels. Exposure of the site and type of hernia was identified, and the two dangerous triangles, the doom and pain, were identified as well. A Titanium mesh (15x10 cm) was laid over the preperitoneal space completely covering the myopectineal orifice. The peritoneal flap was then reapposed using V-loc sutures. Histopathology confirmed the presence of a hernial sac. The patient's postoperative course was uneventful, and she was discharged after two days.

Discussion

The processus vaginalis is clinically apparent within the 12th week of gestation embryologically. In females, the round ligament of the uterus descends to the ipsilateral labia majora, extending through the inguinal canal. This is the equivalent of the descending of testis in males. A peritoneal evagination also descends following the round ligament, which is known as the canal of Nuck. Normally, it obliterates from the seventh month of gestation to one year of age. Its persistence results in a patent canal of Nuck. This condition is present most often in girls aged <5 years and occur in 9-11% of infants born prematurely [1,3]. In adults, the condition is rare and only case reports and limited case series have since been published. Table 1 shows a list of all the cases reported in literature.

There were 27 cases reported from 2001-2020. Patients typically present with inguinal swelling or inguinal swelling with hernia. Work ups include inguinal ultrasound, whole abdomen CT scan, MRI and transvaginal ultrasound or a combination of imaging studies. Seventeen (17) patients underwent open surgery while ten (10) had laparoscopy as the procedure of choice.

In 1941, Counseller and Black⁵ published the classification of canal of Nuck hydrocele:

- **Type 1:** There is no communication between hydrocele and peritoneal cavity, mimicking a direct hernia.
- **Type 2:** The hydrocele communicates with the peritoneal cavity, thus mostly resulting in an indirect hernia.
- **Type 3:** Combined type with an encysted part that does not communicate with the peritoneal cavity and another one that does.



Figure 2: Intraoperative images of laparoscopic excision of canal of Nuck hydrocele with hernioplasty, right: (a) cystic mass (hydrocele) on the right side of the abdominal wall; (b) transabdominal pre-peritoneal approach done for excision of hydrocele and subsequent hernioplasty; (c) ligation of distal portion of hydrocele; (d) excision of hydrocele and separation from peritoneum using harmonic device; (e) placement of mesh; (f) closure of peritoneum using V-loc sutures.

Published Study	Participant	Clinical Presentation	Work-Ups	Surgical Intervention
Baral., <i>et al.</i> July 2020	1	Inguinal swelling with hernia	Ultrasound, MRI	Open Hydrocelectomy, Hernia Repair with Mesh
Chichara. <i>, et al</i> . June 2020	1	Inguinal swelling	CT Scan	Laparoscopic Hydrocelectomy, TAPP
Prodromidou., <i>et al.</i> March 2020	1	Inguinal swelling	MRI	Open Hydrocelectomy, Hernia Repair
Shahid., <i>et al.</i> January 2020	1	Inguinal swelling	Ultrasound	Laparoscopic Hydrocelectomy TAPP
Fikatas., <i>et al</i> . l January 2020	6	Inguinal Swelling (2) Inguinal swelling with hernia (4)	Ultrasound (4) Ultrasound, MRI (1)	Laparoscopic Hydrocelectomy, TAPP repair (4) Open Hydrocelectomy (1) Open Hydrocelec- tomy, Lichenstein repair (1)
Lucas., <i>et al</i> . Jan 2019	1	Inguinal swelling	Ultrasound, CT scan, TVS	Laparoscopic exploration followed by Open Hydrocelectomy, High ligation
Caviezel., <i>et al.</i> March 2019	1	Inguinal swelling	Ultrasound, MRI	Open Hydocelectomy, High ligation
Karapolat., <i>et al</i> . 2018	1	Inguinal swelling	Ultrasound, MRI	Open Hydocelectomy, High ligation

Topalet., <i>et al</i> . Oct 2018	1	Inguinal swelling with hernia	Ultrasound, MRI	Open Hydrocelectomy, hernia repair with Mesh
Lombardo., <i>et al.</i> Nov 2017	1	Inguinal swelling	Ultrasound, MRI	Open Hydrocelectomy, hernia repair with Mesh
Ferreira., et al. 2017	1	Inguinal swelling	Ultrasound	Open Hydrocelectomy
Kim Sept., <i>et al.</i> 2016	1	Inguinal swelling	CT scan, MRI	Open Hydocelectomy, High ligation
Sethi and Patel, 2016	1	Inguinal swelling	Ultrasound, CT scan	Open Hydrocelectomy
Patnam., <i>et al</i> . 2016	1	Inguinal swelling	Ultrasound, CT Scan	Open Hydrocelectomy
Kono., <i>et al</i> . 2015	1	Inguinal swelling with hernia	MRI	Open Hydrocelectomy, Hernia Repair with Mesh
Jagdale., <i>et al</i> . 2012	1	Inguinal swelling	Ultrasound	Open Hydrocelectomy
Matsumoto., <i>et al</i> . Oct 2014	1	Inguinal swelling with hernia	Ultrasound, MRI	Laparoscopic Hydrocelectomy, TEP
Qureshi., <i>et al</i> . June 2013	1	Inguinal swelling with hernia	Ultrasound	Laparoscopic Hydrocelectomy, TAPP
Ozel., <i>et al</i> . 2009	1	Inguinal swelling	Ultrasound	Open Hydrocelectomy
Ryan., <i>et al</i> . 2009	1	Inguinal swelling	Ultrasound	Open Hydrocelectomy
Bhattacharjee and Gosh 2006	1	Inguinal swelling	Ultrasound	Open Hydrocelectomy
Yen., <i>et al</i> . 2001	1	Inguinal swelling with hernia	None	Laparoscopic Hydrocelectomy, Inguinal Ring Ligation

Table 1: List of Published Case Reports and Case Series.

Hydrocele in females usually present as a painless palpable mass in the groin area [4]. Symptoms can be acute or chronic and inguinal swelling is the most common complaint of patients. Suspicion may arise if the mass is translucent, does not disappear in supine position, or if it becomes more pronounced with Valsalva – as was seen in our patient. Other possible disease entities to consider include hernia, lymphadenopathy, abscess, Bartholin cyst, and hematoma formation [3]. Imaging is important to distinguish one from the other.

Ultrasonography is the first imaging of choice due to its low cost and wide availability. MRI is done in some cases that are complex and has an equivocal diagnosis and needs further investigation¹. In our patient's case, she has a type 1 canal of Nuck hydrocele. Ultrasound was definitive for diagnosis of this patient and so no other imaging was requested. Surgical options were discussed, and the patient underwent laparoscopy as the treatment of choice for her condition. Mesh placement was done to cover the indirect inguinal hernia defect seen intraoperatively.

Complete excision is warranted to have a successful clinical outcome after surgery. If hernia is noted intraoperatively, as seen in our patient, a TAPP approach with mesh placement is done in cases of laparoscopy. In an open approach, Lichtenstein repair is equivalent and can be used as treatment for the canal of Nuck hernia. In this case, laparoscopy seems to be the better approach since the orientation of the hydrocele in relation to its surrounding structures is better visualized. TAPP has the advantage of identifying anatomic landmarks and is therefore more suitable for exploration compared to other approaches. There has been no study comparing the open approach to laparoscopic approach, in part due to the rarity of this condition. To date, there are also no published case reports on surgical repair of the canal of Nuck hydrocele in adults in the Philippines [5].

Conclusion

Although infrequent, Nuck's hydrocele should be included in the differential diagnosis of inguinal swelling in females. Ultrasonography is a useful initial treatment modality for distinguishing the hydrocele of the canal of Nuck from other conditions. The treatment of choice is always surgical and laparoscopy offers a better technique in terms of visualizing and correlating nearby structures of the hydrocele. Hernias found intraoperatively can also be addressed at the time of surgery by mesh placement. This is the first reported case on surgical repair of the canal of Nuck hydrocele in an adult female in the Philippines. As such, its contribution to global literature is important in order to gain a more holistic understanding of such a rare disease entity in females.

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Ethics Approval and Consent to Participate

The case report was submitted to the Research and Biotechnology Department. Informed Consent and Consent for publication was signed and secured.

Conflicts of Interest Statement

The authors declare that they have no conflicts of interests.

Authors Contribution

JP contributed to the conception, drafting and revision of the article. MM contributed to the drafting and revision of the article. WA obtained the patient's consent from the case. All authors approved the final manuscript.

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