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Case Report

Canal of Nuck Cyst vs. Inguinal Hernia: A Case Report and Further Considerations

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Abstract: Background: Abnormalities in the canal of the Nuck are rare clinical entities with presentation in the early adulthood of females. Given their rarity, they can be misdiagnosed with a strangulated inguinal hernia. Methods: Herein, we report a young female with painful swelling of the right inguinal hernia and its surgical approach. Results: A 37-year-old female presented to the emergency department with pain in the right lower abdominal quadrant and an edematous inguinal mass. Physical examination showed a palpable inguinal mass, setting the suspicion for possible incarcerated inguinal hernia. Laboratory exams were within normal ranges. The patient was subsequently treated surgically. During the operation, a cystic well-rounded mass was identified and completely excised. The mesh and plug technique was the chosen technique for the restoration of the inguinal canal. The hospitalization length was one day, and the post-operative course was uneventful. Conclusions: Although a Nuck cyst is a rare entity, it should be taken into consideration in female adults who present with an inguinal mass.

Keywords: canal of Nuck; Nuck cyst; inguinal hernia

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1. Introduction

The canal of Nuck, which was firstly described by Anton Nuck, is an abnormal open pouch into the internal inguinal ring attached to the uterus, and it is the equivalent of the processus vaginalis of the male anatomy [1]. From the embryologic aspect, inside the female inguinal canal, there are two structures, the gubernaculum, which will later develop to the round ligament of the uterus, and the processus vaginalis. Failure of closure of the latter results in the formation of an empty space, the canal of Nuck [2]. Normally, the Nuck canal disappears in the first year of life [3]. In rare cases, this empty anatomic space is susceptible to a formation of a hydrocele or indirect hernia, and most are restored in the first 5 years of life [4].

Symptomatology is characterized by its broad spectrum, as some patients present with a palpable mass, while others present with swelling in the inguinal area or the labia majora. In some cases, these clinical findings may be accompanied by the presence of pain in the inguinal area. These atypical symptoms result into a broad differential diagnosis, which create a burden in the treatment process. Besides inguinal hernia, differential diagnosis includes enlarged lymph nodes, simple cysts, endometriosis, abscesses, or other tumors. Physicians should be aware of this clinical entity in order to be able to diagnose and to treat

it accordingly. Imaging modalities could assist in the diagnostic process. In symptomatic patients, the gold standard is the surgical excision of the mass, while in asymptomatic patients, watch-and-wait could be an option [2]. There are different treatment approaches, which may include a minimally invasive procedure or open approach [1,5–9].

Although a Nuck cyst is a rare entity in female patients, it should be taken into consideration in the differential diagnosis of inguinal masses. Herein, we report a case of a cyst of Nuck in a female patient, with concomitant review of the current literature, emphasizing clinical management, diagnostic modalities, and surgical approach.

2. Case Report

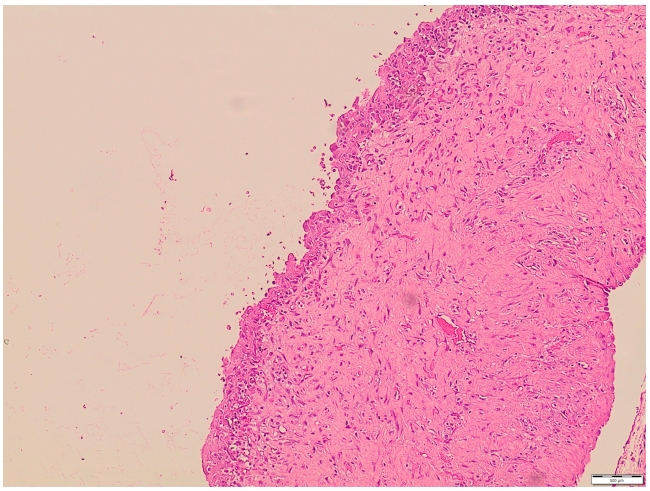
A 37-year-old female patient presented to the Emergency Department with a painful mass in her right inguinal region. The symptoms commenced 3 days prior to presentation. The mass was first noticed 3 months prior to admission, without causing any symptoms such as pain, constipation, vomiting, or neuroapraxia. Due to the nature of her job (gymnast athlete), incarceration of inguinal hernia was suspected. Her medical history was unremarkable, except for a prior cesarean section for child delivery, with no other notable obstetric or gynecological history. Her body mass index was normal. Clinical examination revealed a soft, palpable abdomen with reduced bowel sounds and significant tenderness in the right iliac fossa. A prominent, painful mass approximately 5 cm in size was identified in the same region, without any redness. The mass remained immobile during the Valsalva maneuver. As appropriate in the emergency setting, a full laboratory examination panel was requested, which came back within normal ranges. This being said, no leukocytosis was detected, nor there were increased values of lactate acid or those of C-reactive protein. An abdominal X-ray, in addition to a chest X-ray, were requested as in the case of the protocol of incarcerated hernias to determine possible intestinal obstructions caused by the hernia, which did not provide any substantial information for diagnostic purposes. Therefore, we requested an ultrasound in the right inguinal area described comprehensively with the question of strangulation. The findings were consistent with a non-reducible right inguinal hernia. The contents of the hernia were described as an intestinal loop. The patient was administered opioids and anti-inflammatory agents to facilitate manual reduction in the mass; however, the attempt was unsuccessful.

Based on clinical manifestation and the radiological findings, we decided to proceed with the emergency surgical operation. The patient was admitted to the operation room. An open surgical procedure was selected since the mass had a longstanding protrusion and it was suspected as incarcerated hernia. During the operation, a cyst-like mass, with smooth and well-defined margins and no signs of infection, was dissected and excised completely from the round ligament. The specimen was sent to pathology for further examination; see Figure 1.

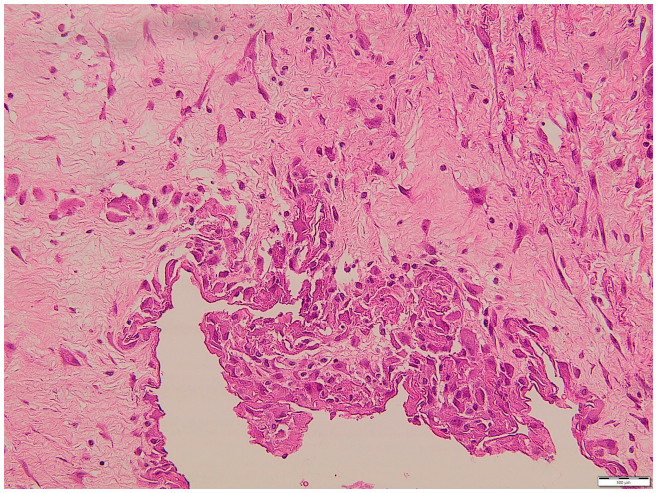
There was no evidence of herniation of the intraabdominal structures (intestinal loops or omentum). The defect of the inguinal canal was repaired with the mesh and plug technique using a polypropylene-made mesh. The post-operative course of the patient was uneventful, and the hospitalization length was one day. The histology examination reported a cystic mass, which measured 6.5 × 2.1 cm. Microscopical examination described a single-layer lining, comprising cuboid cells with eosinophilic cytoplasm; see Figure 2A,B.



Figure 1. Surgical specimen.



(**A**)



(**B**)

Figure 2. (**A**,**B**) Histopathological examination (Hematoxylin & eosin staining ×10 scale (**A**), Hematoxylin & eosin staining ×40 scale (**B**), respectively).

3. Discussion

In female patients, the canal of Nuck is a rare clinical entity equivalent to the processus vaginalis in males. It usually disappears during infancy. It is defined as a fold of the peritoneum, secondary to the uterus and on the course of the round ligament. By definition, it protrudes through the deep inguinal ring and goes down alongside the round ligament into the labia majora [10]. The embryologic basis of the disease is the improper closure of the processus vaginalis. This manifestation could be the cause of both hydrocele canal of Nuck cysts and inguinal hernias. The main cause is suspected to be a discrepancy in lymphatic drainage, which in most cases are idiopathic. Infections and trauma are uncommon causes [11]. Its prevalence is presumed to be up to 1% of pediatric patients, but there are insufficient data to calculate prevalence in adult population [10].

As Prodromidou et al. summarized, the clinical manifestation of a cyst of the canal of Nuck is characterized by a palpable inguinal mass, mostly painless or with mild discomfort. The mass could be either fixed to the canal or susceptible to reduction (spontaneous or manual). Up to one-third of patients may present an inguinal hernia as well [5]. Since the embryologic basis of an inguinal hernia and a cyst of the canal of Nuck is common, they should both be considered in the differential diagnosis of inguinal masses in females, but one must be aware that other clinical entities such as soft tissue tumors, endometriosis, and lymphadenopathy should be considered. To establish a diagnosis, clinical examination and palpation using the Valsalva maneuver are highly beneficial, as a cyst does not change size during this procedure [5,11].

As diagnosis in most cases is set during surgery for predisposed inguinal hernias, the need for diagnostic modalities is raised. The correct preoperative diagnosis could alter treatment options. Preoperative imaging could be considered in the suspicion of a canal of Nuck cyst [5]. Ultrasound is the cornerstone of imaging, as it is an easily repeatable examination with limited costs and could easily depict this clinical entity, as it is a cystic lesion with smooth and well-defined margins, without any inner vascularization. In clinical examination, the Valsalva maneuver assists to differentiate from inguinal hernias [12]. In the case of diagnostic dilemmas, magnetic resonance could provide further and more accurate information about the lesion, while is some cases, these findings could be correlated to those of computed tomography to rule out the presence of intra-abdominal contents inside the lesion [5,12].

In most cases, surgery in an emergency setting is not required for most cases of a canal of Nuck cyst. The acute onset of symptoms and signs of infection are the indications for immediate surgical intervention. During the operation, the cyst is excised, and any inguinal defects are repaired, with or without meshes. The possible concomitant presence of inguinal hernia is an indication for the use of mesh [13]. In the literature, in the vast majority of cases, the surgical approach was chosen [5]. The operation could be performed using either an open or laparoscopic approach, if the surgeon has the appropriate training [5,13]. Laparoscopy is a useful tool that may even act as a diagnostic modality as well, as the presence of pneumoperitoneum clarifies a possible inguinal hernia. However, in the case of a canal of Nuck cyst, its excision is a challenging operation due to the limited space and angle of movements. A skilled surgeon could choose between a Totally Extraperitoneal Procedure (TEP) or Trans-Abdominal Preperitoneal Procedure (TAPP), based on their preferences and expertise [7,9]. This being said, in the absence of an inguinal hernia, the trans-abdominal preperitoneal approach is considered much more invasive than other therapeutic options [9]. The optimal approach is different based upon individualization, with regard to the repair of possible defects after excising the cyst [13]. In some cases, even hybrid techniques could be useful, such as a combination of both the laparoscopic and open approach, as proposed by Chihara et al. [14].

In our case, while the patient first noticed the mass months before, it only became symptomatic briefly before seeking medical assistance. The acute onset of pain, in addition to the gradual worsening, caused diagnostic dilemmas in favor of an inguinal hernia. We proceeded with an open surgical approach, having in mind a potential enterectomy for incarcerated hernia and based on the availability of resources at the time. We underline that the diagnosis of the canal of Nuck cyst was set intraoperatively. A preoperative ultrasound with the Valsalva maneuver could have shown evidence of the presence of the cyst, but this finding is highly examiner-dependent. We proceeded with the excision of the cyst, repairing any defects in the inguinal canal, aligned with the already-published literature.

Our case highlights the importance of versatility. We recognized the cyst during the operation, meaning that one should be aware of every possible diagnosis. As soon as the correct diagnosis was set, our surgical plans altered, as they should have, and then, we continued with repairing defects of the inguinal canal to ensure the prevention of the incidence of inguinal hernia later.

4. Conclusions

A canal of Nuck cyst is a rare diagnosis, but still, a physician should be aware of the clinical entity and consider it as a possible diagnosis in females presenting with inguinal masses. Thorough clinical examination provides substantial information to differentiate this cyst from inguinal hernias. However, if in doubt, imaging can further assist in the preoperative assessment to design a proper surgical treatment. The approach is up to the surgeon in charge to decide based on each case requirement and their expertise. The important endpoint is that a surgeon should be able to recognize a rare disease and be able to treat it effectively, even if the procedure plan was different. The ability to adapt to each patient's need is of utmost importance.

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