

Cyst of the Canal of Nuck in Pediatric Patients

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Abstract

Background: Cyst of the canal of Nuck is a rare cause of inguinal swelling in female infants and children. **Aim:** The purpose of this study is to discuss the clinical, radiological, and histopathological findings, differential diagnosis, and surgical treatment of this disease in the light of our experience. **Materials and Methods:** This study was conducted in six children who were operated on with cyst of the canal of Nuck at the pediatric surgery clinic in July 1998-March 2013. All information was collected from patient's files and computer records retrospectively. **Results:** Patients were between the ages of 1 and 12 years. Size of the cysts has varied between 23 mm and 55.2 mm. In all cases, cyst was on the right side. In physical examination while five cases had palpable, well-circumscribed, mobile and painless mass, in one case the mass was immobile. In one patient, the mass was reducible; in the other 5 patients the mass was non-reducible. First patient was operated immediately with the early diagnosis of incarcerated inguinal hernia, the second one was operated under elective conditions with early diagnosis of inguinal hernia and it was diagnosed during operation, and in the last 4 patients pre-operative true diagnosis was possible. **Conclusions:** As clinical findings of the cyst of the canal of Nuck are variable, pre-operative true diagnosis can only be related to increasing experience.

Keywords: Canal of Nuck, Cyst, Female hydrocele, Hydrocele, Inguinal swelling

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Introduction

Cyst of the canal of Nuck is an uncommon disorder in a female child. There is no information about this disease in textbooks of pediatric surgery and pediatric gynecology. Searching in English literature, via PubMed and Scopus, we have found that so few cases have been reported that most of them are cases reports in women. In general, radiological findings have been discussed. This disease called hydrocele of the canal of Nuck, cyst of the canal of Nuck and female hydrocele, is accepted equivalent of the spermatic cord cyst (encysted hydrocele) occurring in boys.^[1-5]

In this article, we have presented our patients suffering from cyst of the canal of Nuck who have been treated for

15 years by a pediatric surgeon and we have aimed to discuss the clinical, radiological, and histopathological features, true diagnosis, and surgical strategy of this disease.

Materials and Methods

In July 1998-March 2013, 686 girls at the age of 0-16 years have undergone 787 inguinal operations in our clinic. 777 had inguinal hernia (98.7%), 6 had a cyst of the canal of Nuck (0.76%), 2 had inguinal lymphadenitis (0.25%), 1 had suture abscess (0.12%), and 1 had lipoma (0.12%). For patients suffering from cyst of the canal of Nuck, surgical treatment was carried out by standard skin crease inguinal transvers incision. External oblique aponeurosis was opened on parallel fashion according to its fibers, and then excision of the cyst and high ligation of the processus vaginalis were performed. Pathological examination performed on for five patients.

Results

Patients were between the ages of 1 and 12 years. A total of 5 patients were admitted to the hospital with a complaint of painless swelling in the inguinal region

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and one patient with painful swelling. The delay between swelling and admitting to the hospital varied from 3 days to 6 months. On the physical examination while 5 cases had palpable, well-circumscribed, mobile and painless mass, in 1 case mass was immobile. In one patient, the mass was reducible; in the other 5 patients the mass was non-reducible [Table 1]. In two patients, a mass produced vulvar swelling [Figure 1], the others didn't. In all cases, cyst was on the right side. Previously, 4 patients had an operation of inguinal hernia from the other side. For 5 patients ultrasonography on inguinal surface was possible. Cyst sizes varied between 23 mm and 55.2 mm. One of the patients was operated immediately with the pre-operative diagnosis of incarcerated inguinal hernia. Because, she had admitted to the hospital with the complaint of painful swelling in the inguinal region for three days and she had a palpable hard, tender, non-reducible, and non-mobile mass in this region. Furthermore, on the US examination, it was reported as incarcerated inguinal hernia. However, multi-loculated cyst of the canal of Nuck was diagnosed during the operation. The patient with reducible mass was operated under elective conditions with early diagnosis of inguinal hernia, but cyst of the canal of Nuck was diagnosed during operation [Figure 2a]. For this patient, type 2

cyst of the canal of Nuck was diagnosed [Figure 2a]. This patient did not have ultrasonography. Because we haven't routinely performed US examination in patients with early diagnosis have inguinal hernia. Pre-operative true diagnosis was possible for the last four patients both clinically and ultrasonographically. For these patients, well-circumscribed and homogeneous cyst was defined [Figure 3]. There were no complications including early and late recurrence. In pathological examination of the cyst wall, it was observed that the interior surface of the cyst was covered with mesothelial cells and cyst wall is constituted by vascularized fibrosis tissue [Figure 4a and b]. Characteristics of patients and findings are summarized in Table 1.

Discussion

The canal of Nuck was defined by anatomist Anton Nuck from Netherland. In intrauterine period Round ligament, suspensory ligament of the uterus in girls extends over labium majus through the inguinal canal. Peritoneal fold taking down Round ligament is called the canal of the Nuck.^[6]

Cyst of the canal of Nuck is a rare disease in female infants and children causing inguinal and/or swelling *in vulva*. While it is a disease of unknown etiology, generally it is accepted that this disease is caused by the fact that



Figure 1: Large nuck canal cyst filling all inguinal canal and causing swelling *in vulva*

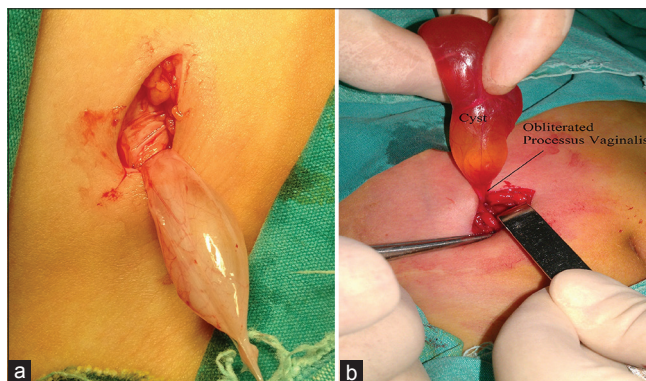


Figure 2: (a) Intraoperative view of cyst with communicated to peritoneum. (b) Intraoperative view of well-circumscribed and non-communicated nuck canal cyst with obliterated processus vaginalis

Table 1: Characteristics of the patients and clinical findings

Age	Complaint	Pain	Physical examination of the mass	Admission time	US	Early diagnosis	Type	Cyst size (mm)	Side
1	IS	-	NR/NM	1 week	CCH	CCH	1	44.9	Right
2	IS	-	NR/M	20 days	CCH	CCH	1	23	Right
4	IS	-	R/M	10 days	-	IH	2	33	Right
6	IS	+	NR/M	3 days	IIH	IIH	1	39	Right
7	IS	-	NR/M	3 months	CCH	CCH	1	55.2	Right
12	IS	-	NR/M	6 months	CCH	CCH	1	28	Right

IS: Inguinal swelling; NR: Non-reducible; NM: Non-mobile; R: Reducible; M: Mobile; CCH: Cyst of the canal of nuck; IIH: Incarcerated inguinal hernia; IH: Inguinal hernia

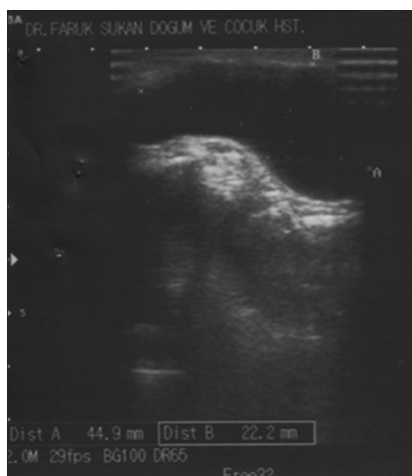


Figure 3: In ultrasonography of inguinal region, in inguinal canal well-circumscribed, homogenous anechoic cyst having size of 44.9 mm × 22.2 mm was observed

processus vaginalis is not closed although it should be closed immediately after birth or at least until 1 year old. As a result, inguinal hernia and rarely cyst of the canal of Nuck in girls and inguinal hernia or hydrocele in boys can occur. Regarding fluid accumulation in cyst, two mechanisms can be put forward. In the first one, as a result of persistent patency of the peritoneal process in the inguinal canal, effusion can be seen. In the second mechanism as a result of the fact that isolated section of the peritoneum causes extreme fluid secretion, that this fluid cannot be absorbed and that proximal region is obliterated, this effusion can cause cyst formation.^[7,8]

There are three types of cyst of the canal of Nuck. The most frequent type is the type that does not have access way allowing patency between cyst and peritoneal cavity. This is equivalent spermatic cord cyst occurring in male infants and children. In the 2nd type, patency is available. The 3rd type (hourglass type), is rarely seen and is consisted of 2 cysts in which the cyst located in the proximal region is connected to the peritoneal cavity (bi-ocular hydrocele).^[9] Inguinal hernia is seen in girls 8 times less frequently than boys and it is diagnosed by swelling in the inguinal region. Almost all of this swelling is caused by inguinal hernia in girls. In our 15 years period, of the patients operated because of inguinal swelling, inguinal hernia has been diagnosed on 98.7%. However, cyst of the canal of Nuck has caused only by 0.76% of swelling in the inguinal region.

In general in patients with cyst of the canal of Nuck, painless or painful inguinal swelling is seen. Mass is not reducible. The first diagnosis coming to mind is over and/or tuba sliding inguinal hernia. Moreover, it can be difficult to distinguish from inguinal hernia including omental or intestinal segment.^[5,10] It can also be difficult to distinguish from soft-tissue tumors such as

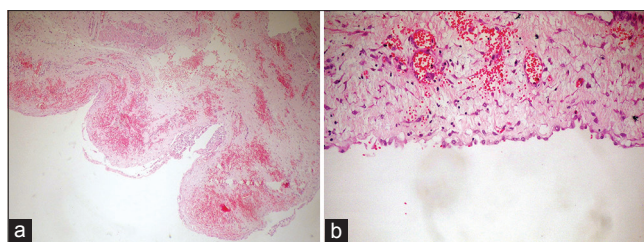


Figure 4: (a) Cyst wall consisted of vascularized fibrosis tissue, ×100 expansion, H and E coloring (b) Mesothelial cells covering inner surface, ×200 expansion, H and E coloring

inguinal lymphadenopathy and lipoma, endometrioma and from femoral hernia.^[7,11-13] We operated our 1 patient immediately with the pre-diagnosis of incarcerated inguinal hernia; however, during the operation we understood that it was multiloculated cyst of the canal of Nuck. The patient with reducible mass got a diagnosis of pre-op inguinal hernia and during operation it was observed that the cyst is connected to peritoneal cavity through patent processus vaginalis. We think that this situation in girls can be accepted equivalent communicated cord hydrocele occurring in boys (Type 2a). The other 4 patients had well-circumscribed and non-communicated cystic mass with obliterated processus vaginalis [Figure 2b].

True diagnosis can be obtained 100% by ultrasonography. This rare disease in literature can be defined as hypochoic or anechoic, in the shape of comma or mushroom, generally unilocular and rarely multilocular (including linear septas) cystic mass. In some patients, magnetic resonance imaging (MRI) was used for diagnosis.^[3,7] In our one patient, it could not be distinguished from incarcerated inguinal hernia by ultrasonography and in this patient multilocular cyst of the canal of Nuck was diagnosed. In our 4 patients, homogenous cystic masses of different size and shapes were defined. In one patient, US wasn't performed, because we thought the diagnosis is inguinal hernia. In other words, we routinely haven't performed US in the diagnosis of inguinal hernia. We didn't require MRI for any patients.

On histological examination, it was reported that cyst wall was lined by low columnar or cuboidal epithelium surrounded by loose cellular fibrous tissue and well-organized bundles of smooth muscle. In some areas of the cyst, the cuboidal epithelium was stratified and up to three layers.^[7] In our patients, on the histologic examination of the cyst wall, it was observed that the inner surface of the cyst was covered with mesothelial cells and that cyst wall is consisted of fibrosis tissue [Figure 4a and b].

In the treatment of the disease, aspiration of the cyst causes recurrence, and this is not suggested.^[10,12]

Surgical excision of the cyst and ligation of the neck of processus vaginalis should be considered as the standard therapy.^[14]

In conclusions, cyst of the canal of Nuck in girls causing inguinal swelling has different clinical and ultrasonographic findings. Therefore, pre-operative true diagnosis may sometimes be difficult and it can only be possible by increasing experience. Surgical excision of the cyst and high ligation of the processus vaginalis via standard inguinal skin crease incision should be considered as the standard treatment.

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