

# Nuck Cyst, an Unexpected Amethyst Gem in the Inguinal Canal: A Case Report and Literature Review

*Ann. Ital. Chir.*, 2025 96, 5: 589–601  
<https://doi.org/10.62713/aic.3924>

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**AIM:** Nuck cyst is rare female saccular hydroceles. It appears at birth or months or years later in adulthood, resulting from imperfect closure of the canal of Nuck. Its diagnosis is often incorrect and confused with an inguinal or femoral hernia because of its extreme rarity. Consequently, surgery often leads to intraoperative surprises. We aim to increase knowledge and awareness of this rare pathology to improve the differential diagnosis of female inguinal masses that have been present for several years and to avoid intraoperative surprises. Therefore, with this study we want to highlight the diagnostic and surgical context of this rare pathology of adult women.

**CASE PRESENTATION:** We report the case of a 42-year-old woman who came to our attention for swelling and right inguinal pain that had been worsening for over ten years. Intraoperative abdominal ultrasound reported the presence of a hernia defect and the presence of a hypoechoic mass of uncertain nature, probably of lymph node type. The intraoperative diagnosis of a Nuck cyst was histologically confirmed. The patient underwent Nuck cyst removal and right inguinal hernioalloplasty.

**RESULTS:** The patient was discharged without any complications the same evening of surgery intervention. At the 10-day postoperative check-up, she reported the disappearance of all preoperative symptoms. Subsequently, we reviewed the currently available literature on different diagnostic and surgical approaches to treat this pathology. Our surgical approach gave postoperative results consistent with those reported in the literature.

**CONCLUSIONS:** Nuck cyst is a rare pathology that should always be suspected in women with decades of inguinal pain. It requires an accurate preoperative diagnosis for a perfect surgical removal intervention.

**Keywords:** Nuck cyst (NC); canal of Nuck (CN); cyst of the canal of Nuck; congenital inguinal hernias; inguinal swelling; case report

## Introduction

Absent obliteration of the peritoneal vaginal duct causes congenital inguinal hernias (CIHs) [1]. They are not always present at birth but may appear months later or in adulthood [1]. In women, CIHs are rare [2], caused by the total patency of the canal of Nuck (CN), which is homologous to the male peritoneal-vaginal duct [2,3]. In men, partial patency of the peritoneal-vaginal duct causes a communicating hydrocele, and its segmental closure generates a cyst in the spermatic cord [4]. In women, segmental closure of the CN generates Nuck cyst (NC) [2,3,5].

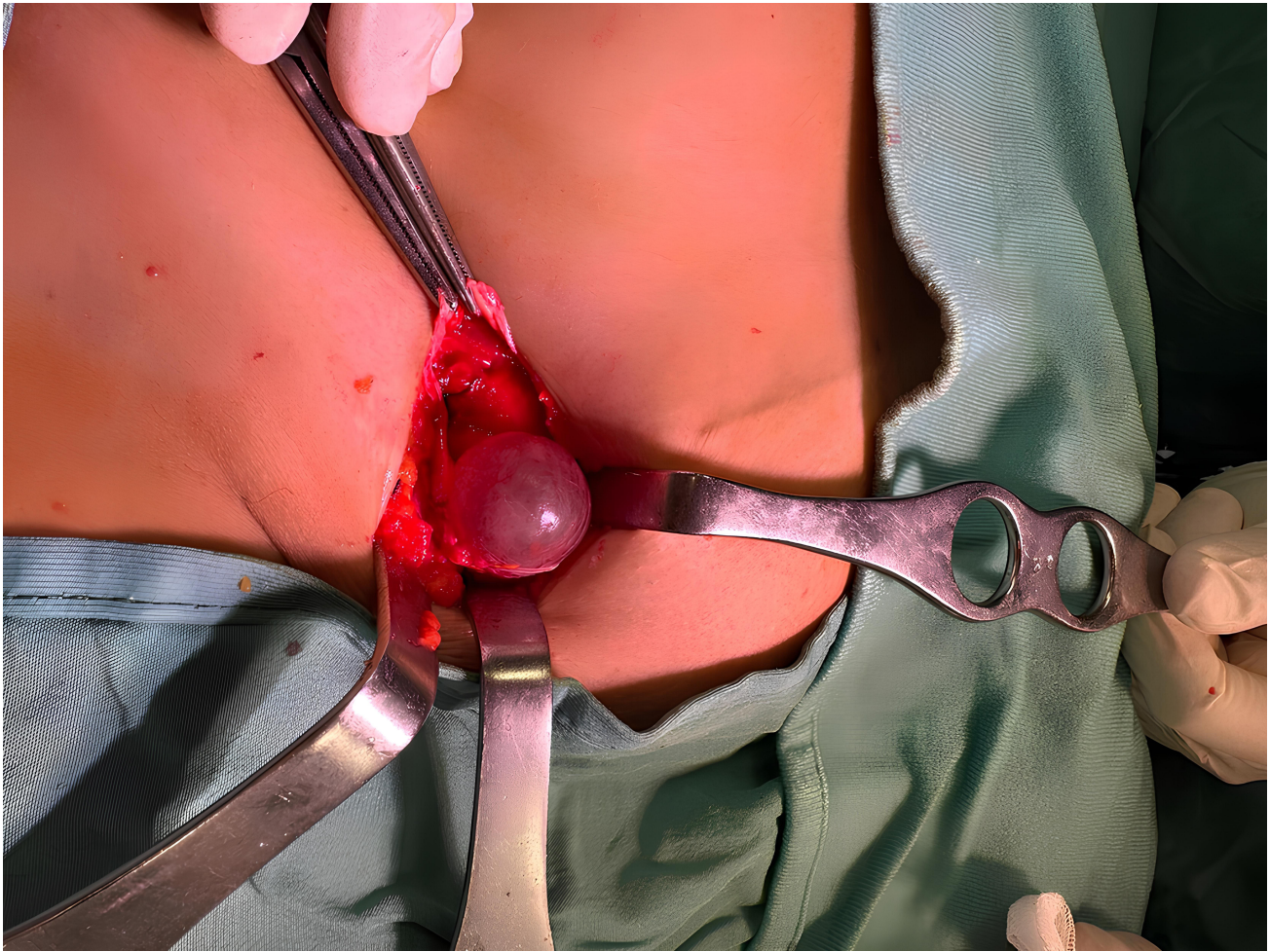
NC is extremely rare [5]. NC is a pathology found mainly in the pediatric age. Being extremely rare in adulthood,

no prevalence rate is officially reported in scientific literature [5]. Consequently, many healthcare professionals are unaware of this issue. Furthermore, the clinical signs are highly non-specific [5]. Women with an NC have a mass or swelling in the groin for several years, sometimes painful and tender during a palpation examination depending on the case [5,6]. The consequence is an incorrect preoperative clinical diagnosis and intraoperative uncertainty regarding the best surgical approach [2–4,7]. Consequently, it is necessary for all surgeons to be able to suspect the possible presence of a NC in an adult woman and to place it in the differential diagnosis with other pathologies of the inguinal canal.

Our primary aim was to present the case of a woman with an NC who was treated surgically. Our secondary aim was to review the scientific literature on this topic to emphasize the importance of accurate differential diagnosis of long-standing female inguinal masses, thus avoiding intraoperative inconveniences.

*Submitted:* 24 December 2024 *Revised:* 17 February 2025 *Accepted:* 21 February 2025 *Published:* 2 April 2025

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**Fig. 1.** Intraoperative image of Nuck cyst (NC) in the right inguinal region. The NC appears spherical in shape and amethyst in color. The orientation is cranio-caudal.

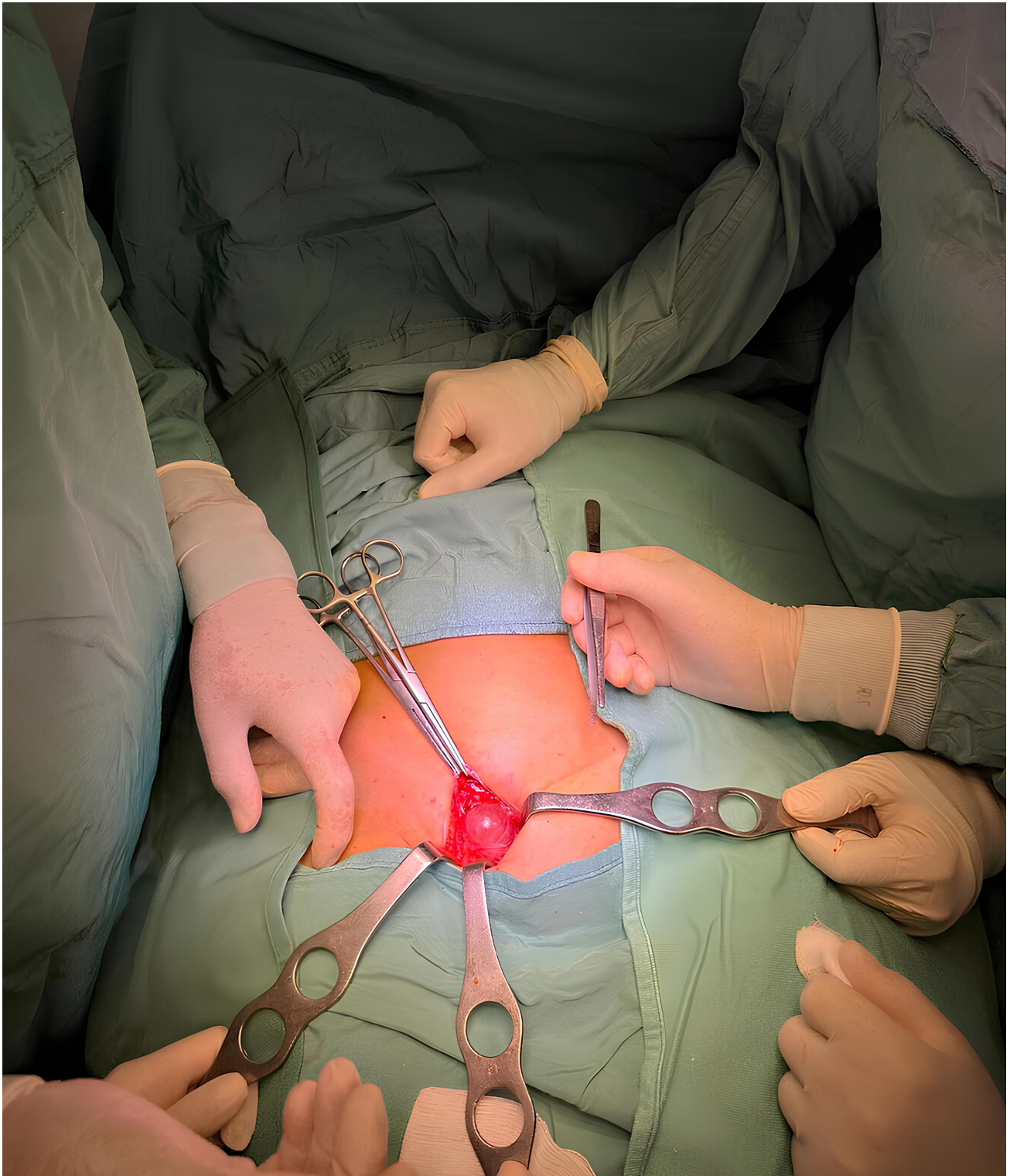
This case has been reported in line with the case report guidelines: **Case Report (CARE) Guidelines** to ensure the accuracy and completeness of the report (**Supplementary material**) [8].

### Case Presentation

A 42-year-old woman was admitted to our General Surgery Department at her attending physician's recommendation. The patient had a palpable mass in the right inguinal region, for approximately ten years, observable in orthostasis. She reported an increase in pain over time and an increase in the size of the inguinal mass. The abdomen appeared manageable, non-painful, and non-tender on superficial and deep palpation. An ultrasound of the right inguinal region revealed a right hernial defect and a suspected hypoechoic mass of undetermined nature, probably of lymph node origin. The patient had undergone a single cesarean section 14 years previously and had no history of pathology. The patient's body mass index was 20.3. Nothing indicated the unexpected intraoperative complication we would encounter. Given the suspected clinical and ultrasound diagnosis of a

right inguinal hernia, the patient was admitted to our hospital for standard right inguinal hernioplasty. Antibiotic prophylaxis and inguinal regional anesthesia were administered. Subsequently, we made an oblique inguinal skin incision near the inguinal region, dissected the subcutaneous tissue, and opened the Scarpa fascia and aponeurosis of the external oblique muscle. Surprisingly, we observed an amethyst-colored, smooth-walled cyst between the external oblique muscle and inguinal ligament, close to the round ligament of the uterus (Figs. 1,2). The cyst was cautiously dissected from the inguinal ligament. Dissection of the mass was easy, with no difficulties encountered. The mass did not present any type of adhesion to the planes of the inguinal canal, and no inguinal hernia was observed ipsilateral to the cyst. We performed a reinforcement plasty of the transversalis fascia with a continuous Prolene suture and subsequently positioned a polypropylene prosthetic mesh. The mesh was secured to the pubic tubercle using a single Prolene stitch. Finally, we closed the aponeurosis of the external oblique muscle with a continuous Prolene suture, followed by subcutaneous closure using interrupted Vicryl stitches and an intradermal absorbable skin suture. We an-



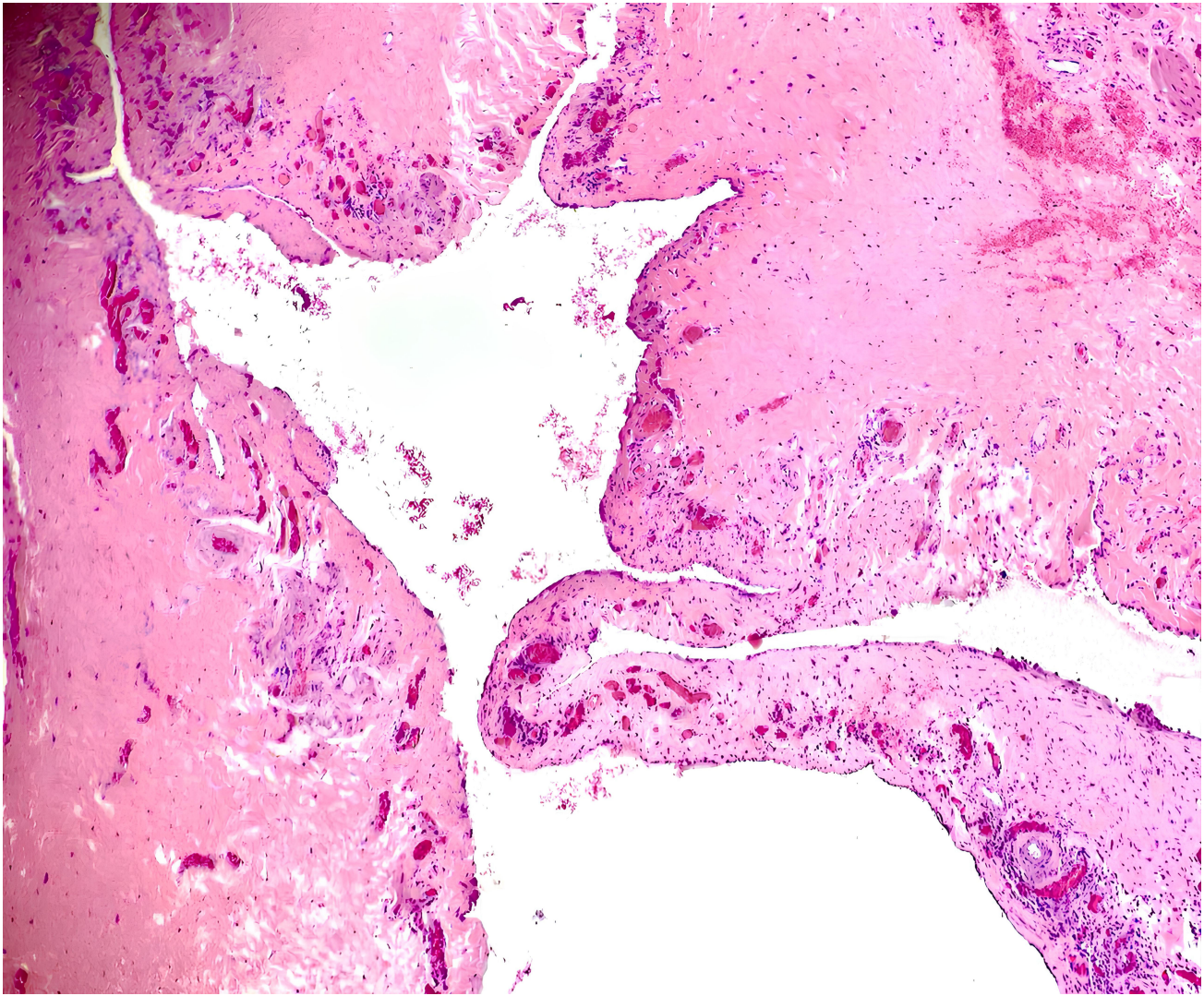


**Fig. 2.** Intraoperative image of the surgeons' position and patient's overview in the cranial-caudal direction. The NC is positioned in the right inguinal region.

alyzed the suspected cyst at the Pathology Department of our hospital. Postoperative histological diagnosis revealed a NC (Figs. 3,4). The cyst, measuring  $5.3 \times 4.2$  cm in size with citrine content, had a fibrous and fibromuscular wall lined by flat cuboidal epithelium.

The patient was discharged on the same evening after surgery, afebrile, painless, and without pain in the right inguinal region. She underwent home therapy with painkillers for the next three days. At the outpatient clinical check-up scheduled ten days after surgery, the patient no





**Fig. 3. Histology of the NC.** The NC is surrounded by fibromuscular tissue. The lining epithelium is cuboidal. Hematoxylin and Eosin staining (100× magnification).

longer had right inguinal pain or any right inguinal mass.

The patient gave their informed consent for inclusion before participating in the study. The study was conducted in accordance with the Declaration of Helsinki. For this type of study, it was not necessary to obtain approval from the Ethics Committee, as this is not an experimental study.

## Methodology

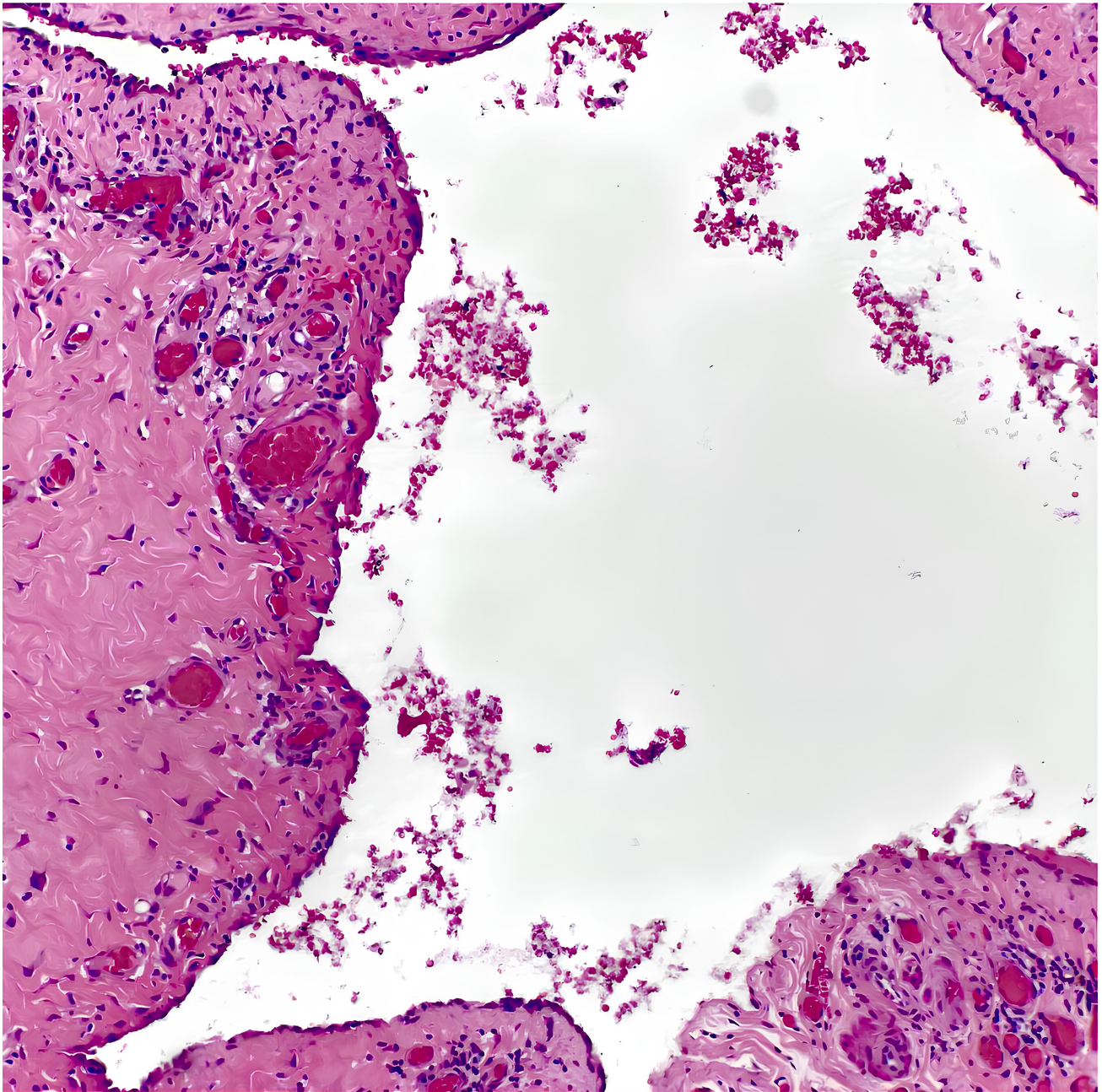
We performed a narrative review of the surgical treatment and correct diagnosis of NC, given its extreme rarity. We searched PubMed, Web of Science, Scopus, and Embase for all studies on NC, published from 1 January 2010, to 31 October 2024, using the following keywords: “Nuck cyst” AND “cyst of the canal of Nuck” OR “cyst of Nuck” OR “Masses in the canal of Nuck” OR “Nuck cyst diagnosis” OR “surgical approach of Nuck cyst” OR “female congenital inguinal hernia”. Only studies published in English were included in the analysis. We excluded incom-

plete and non-peer reviewed preprint articles and articles in which the patients were younger than 18 years. We focused on case reports and case series. The included articles were either prospective or retrospective, monocentric or multicenter studies, and included a variable number of patients. Furthermore, we excluded articles that were duplicated or for which the full text was not available. We screened the scientific literature first by title and abstract, then by analyzing the full text. We included only articles containing both a description of the diagnostic and therapeutic approach to NC. Therefore, we selected 21 articles between Case Reports and Case Series, for a total of 28 cases (Fig. 5).

## Discussion

Dutch anatomist Antonius Nuck van Leiden described a canal of the same name in 1691 [5]. The CN is an embryonic out pouch of the parietal peritoneum that accompanies the round ligament until its insertion into the labia majora





**Fig. 4. Another histology of the same NC.** The NC is positioned within the fibromuscular tissue and its lining epithelium is cuboidal. Hematoxylin and Eosin staining (100× magnification).

[3,5]. Physiologically, the CN is obliterated within the first year of life [7]. When obliteration does not occur, the consequence is a CIH, hydrocele, or NC [9]. Total patency of the CN results in the formation of a CIH. Its partial obliteration forms a hydrocele, and its segmental obliteration generates an NC [9,10].

In 1892, Coley first described an NC [5]. However, the etiopathogenesis of NC remains unclear [1,4,6]. Infections, inflammation, or trauma may alter the physiological balance between the secretion and reabsorption of peritoneal fluid by the NC membranes [11]. These unabsorbed fluid sacs become trapped in cysts in CN [11]. Currently, epi-

demiological data on NC in adult women are unavailable [12]. In fact, the literature has only a few case reports of NC in adult women [12]. The rarity of NC in adulthood is the basis of this epidemiological gap [6,11]. However, some authors have reported the prevalence of NC in patients aged between 1 and 14 years [5], with a prevalence of 1% according to Huang *et al.* [13], 0.74% according to Papparella *et al.* [14], and 0.76% according to Akkoyun *et al.* [15]. Currently, NC is classified by two methods [13–15]. Counselor and Black proposed the first classification for NC [16], which provides three types of NC: in the first, the NC is located near the round ligament and does not communicate

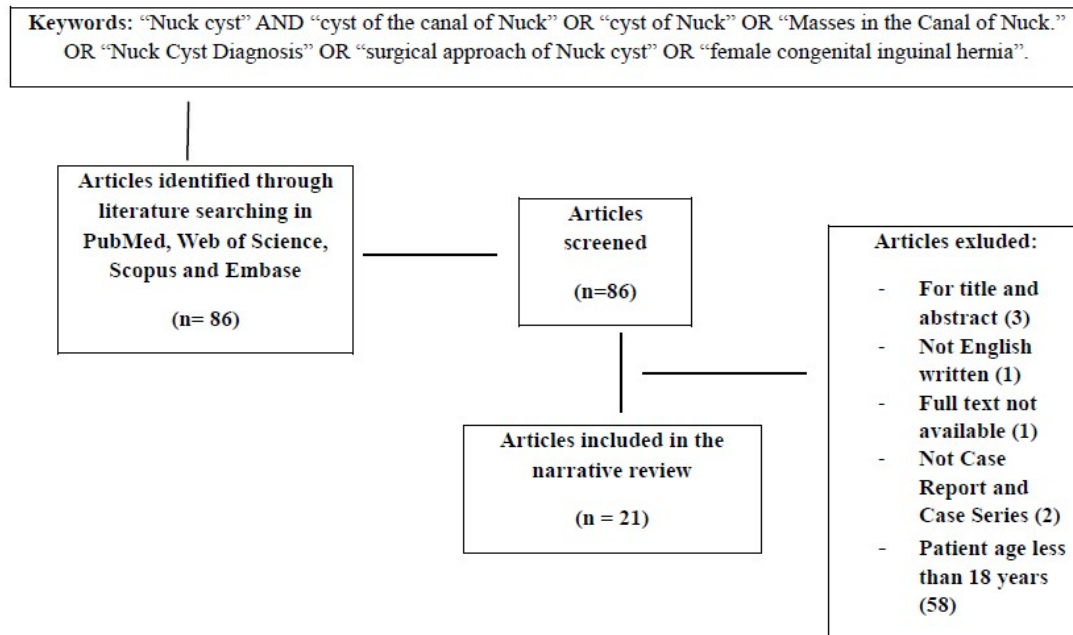


Fig. 5. Flowchart for literature screening.

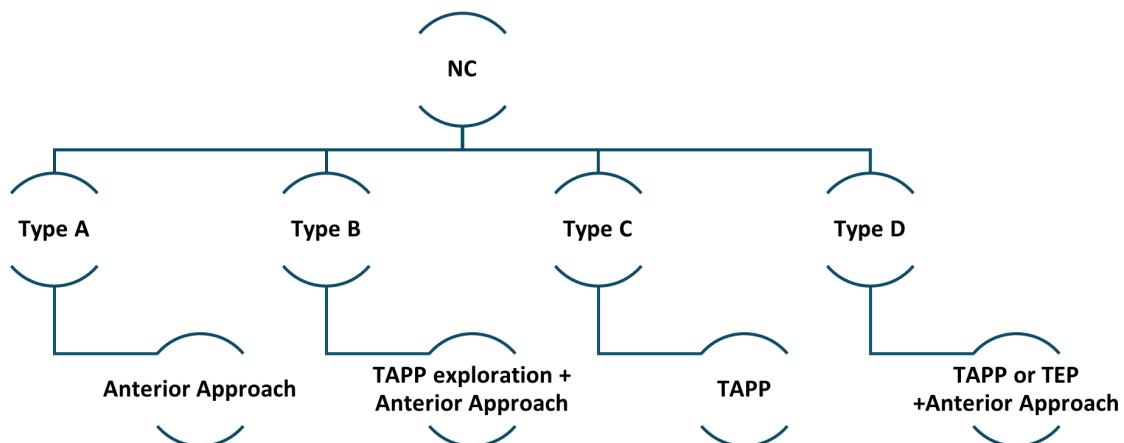


Fig. 6. Wang's classification. TAPP, Trans Abdominal Pre Peritoneal; TEP, Totally Extra Peritoneal.

with the peritoneal cavity; in the second, the NC communicates totally with the peritoneal cavity; and in the third, the NC, shaped like an hourglass, communicates only partially with the peritoneal cavity, near the internal inguinal ring.

Kohlhauser *et al.* [5] proposed a more recent NC classification. According to this classification, in *Type A* the location of the NC is in the subcutis superior to the inguinal canal; in *Type B* the NC is in the inguinal canal; in *Type C* the NC is at the internal inguinal ring; in *Type D* the NC is distributed between the internal inguinal ring, the inguinal canal and the subcutis. In Fig. 6, we report the surgical approach that Kohlhauser *et al.* [5] propose for each Type of NC.

Clinically, patients with NC have non-specific symptoms that are difficult to distinguish from those of classic inguinal hernias [6,7]. Patients may present with an inguinal or genital mass of different shapes and sizes, reducible or irre-

ducible, stable or changing over time, present since birth or only in adulthood [1,2,6]. Pain may be present or absent, modifiable, or not present in a particular body position [13]. NC appears anechoic or hypoechoic, tubular or dumbbell-shaped, and well-defined, with a unilocular or multilocular cystic structure and internal vascularity on Ultrasonography [17]. Therefore, ultrasound examinations are non-specific [17]. Bartholin's cysts have characteristics similar to those of NC and are anechoic or hypoechoic with a cystic wall, as observed on ultrasounds [5]. Ganglion cysts appear as asymptomatic or symptomatic inguinal or genital swellings and are hypoechoic on ultrasounds [18,19]. Another hypoechoic formation is round ligament endometriosis, which has ill-defined limits [20]. Clinically, round ligament endometriosis is characterized by a painful or painless swelling in the groin area [20].



Using Ultrasonography, NC is more easily distinguishable from inguinal lymphadenopathies [21,22]. The latter is oval, isoechoic, and has a barely visible hilum if benign, and is round with clear boundaries and an absent hilum if malignant [21,22]. Therefore, further tests are required for a more accurate preoperative diagnosis of NC. Magnetic Resonance Imaging (MRI) is an optimal modality for this purpose [5]. In fact, NC appears thin-walled, hypointense on T1-weighted sequences, and hyperintense on T2-weighted sequences. Bartholin cysts appear hyperintense on T1- and T2-weighted images [23]. Ganglion cysts appear oval or round, hypointense on T1, and hyperintense on T2 [18]. Endometriosis of the round ligament appears hypointense on T1- and T2-weighted sequences if fibrous and hyperintense on T1-weighted sequences if hemorrhagic in nature [20]. Radiologically, the differential diagnosis is easier in cases of inguinal hernia. Ultrasonography is often sufficient to resolve diagnostic doubts because it is very sensitive for identifying hernias [5]. Furthermore, the Valsalva maneuver allows an increase in the hernia size to show its movement. MRI is useful in doubtful cases [5]. On MRI, inguinal hernias appear as protrusions of enteric material into the inguinal canal or as an increase in the diameter of the inguinal canal [5]. On Computed Tomography (CT), NC appears as cystic lesions containing fluid located along the round ligament [5]. The NC were not filled with contrast medium after administration on either CT or Magnetic Resonance Imaging (MRI) [5].

Currently, there is no surgical gold standard treatment for NC because of its extreme rarity, especially in adult women [5]. Some authors have proposed sclerotherapy or aspiration for NC; however, these procedures are associated with the risk of recurrence [5,24]. Therefore, hydrocelectomy appears to be the best treatment option [25]. Some authors associate a hydrocelectomy with sectioning of the round ligament of the uterus, whereas others also perform repair of any defects in the wall of the inguinal canal [26–28]. Sectioning the round ligament can prevent necrosis [9]. In our case, we did not perform resection of the round ligament because the patient was young and of childbearing age. Furthermore, not sectioning the round ligament allows uterine stabilization, reducing the risk of excessive posterior inclination [29]. Therefore, for these reasons, our advice is to avoid sectioning the round ligament of the uterus in young patients or in any case under the age of 65. Furthermore, this suggestion already applies to classic inguinal hernioplasties in young women or in any case still of childbearing age [28]. Therefore, as a precaution, we avoided iatrogenic damage to the round ligament. We repaired the inguinal canal wall by reinforcing the transversalis fascia with a continuous Prolene suture and positioned a polypropylene prosthetic mesh, anchoring it with a single Prolene stitch to the pubic tubercle. In our case, the NC was classified as Type 1 according to the *Counseller and Black classification*, and as Type C according to the *Wang classification*. Therefore,

we repaired the defect at the internal inguinal ring and subsequently placed a prosthetic reinforcement mesh. We also felt it necessary to apply a polypropylene prosthetic mesh to avoid any recurrence of the hernia defect, especially near the internal inguinal ring. Therefore, in cases of NC, we recommend reinforcing the inguinal canal with a prosthetic mesh after performing the transversalis fascia plasty, when possible. We performed anterior inguinal hernia surgery under local anesthesia due to our reduced awareness of the NC diagnosis in the preoperative period and the surgical team's experience with the open technique for treating possible primary unilateral inguinal hernias. In our case, performing an open inguinal hernioplasty did not negatively impact the surgery or postoperative recovery. We easily isolated the venous or nervous vessels, and the patient had a normal postoperative period without any complications. We believe it is important to identify and isolate the iliohypogastric and ilioinguinal nerves to avoid postoperative paresthesia. Instead, we suggest performing their section only in cases where we believe we may have caused iatrogenic damage to the nerves. In general, these suggestions are in line with what has been done by other authors, both in cases of classic inguinal hernioplasty and in cases of NC. During the procedure, we always recommend performing careful control of hemostasis and avoiding in any way the opening of the NC. Therefore, we recommend performing the ligation of the vascular vessels and gently detaching the NC from the anatomical context in which it is inscribed, preferably using a sterile gauze pad and avoiding cauterizing synthesis instruments.

At the outpatient checkup, the woman no longer had a mass or inguinal pain. Some NCs have been associated with concomitant inguinal hernias. In these cases, the authors repaired the hernial defect using a polyurethane mesh [28]. Other authors sectioned the round ligament in cases where the NC was hemorrhagic or was discovered close to the delivery site [5,6,27,28,30]. Additionally, the round ligament was sectioned in cases of suspected endometriosis, particularly when associated with the presence of a NC [27]. We also agree with this suggestion, in cases like this.

In addition to the anterior approach, some authors Trans Abdominal Pre Peritoneal (TAPP) or Totally Extra Peritoneal (TEP), TEP hernioplasty [31,32]. Wang *et al.* [33] proposed specific surgical approaches for each type of NC (Fig. 6). The main advantage of TAPP is its intraoperative diagnostic accuracy in cases of inguinal hernia possibly associated with NC, because intraperitoneal observation is easy [5,33,34]. This advantage is even greater in cases of hernial viscus incarceration [5]. The main disadvantage of TAPP is the possible interference of the inferior epigastric vessels with the vision of the surgical field [5]. Conversely, TEP is associated with a lower risk of abdominal adhesions because the peritoneal flap is not opened [5,29,32]. Similar to TAPP, TEP has the advantage of enabling intraoperative diagnoses [5,32]. Furthermore, the risk of injury to

the abdominal organs is lower than that with TAPP, and detachment of the NC from the inguinal canal is easier [5,29]. The main disadvantage of TEP is the inability to achieve intraperitoneal vision [5,32,35]. Finally, both TAPP and TEP have a lower incidence of postoperative pain than the anterior approach, and both techniques have a reduced risk of intraoperative blood loss, resulting in less drainage at the surgical site [5,9,29,35]. According to Wang *et al.* [33], the laparoscopic approach requires the placement of a prosthetic mesh after the removal of the NC.

Based on the literature review, it is necessary to adapt each case of an NC removal to the surgeon's experience and the type of NC [2,5,31,33–40]. The authors who chose an anterior approach are divided into those who used a prosthetic mesh and those who did not. In one case, the lack of laparoscopic instruments forced the surgeon to use an anterior approach [41]. The authors who chose an anterior approach are divided into those who used a prosthetic mesh and those who did not. In one case, the absence of laparoscopic instruments forced the surgeon to use an anterior approach [41]. In other cases, the authors chose a non-laparoscopic approach due to preoperative ignorance of the NC, which was mistakenly diagnosed as an inguinal hernia [42,43]. In general, the authors often do not describe the rationale for using a prosthetic mesh. Our review shows that the prosthetic mesh was used in cases where the NC was associated with an inguinal canal hernia or when the defect at the internal inguinal ring, where the NC was located, was to be reinforced [44]. When the preoperative diagnosis of NC was certain, the anterior approach was preferred to the laparoscopic one when the NC was superficial (*Type A* according to Wang's classification) [24]. From our review we deduced that the authors who approached NC laparoscopically had already a preoperative suspicion of NC or suspected of concomitant gynecological pathology. In these cases, laparoscopy provided first the advantage of a better and complete exploration of the abdominal cavity [35,37,45]. Furthermore, the removal of NC located entirely in the inguinal canal or the internal inguinal ring (respectively, *Type B* and *Type C* according to the Wang classification) was safer since laparoscopy allowed a more precise identification of the epigastric vessels and anatomical structures near the NC [31,35]. This resulted in a reduction of the risk of intraoperative iatrogenic lesions [31,35,45]. All NC excision procedures via TAPP were always completed with the placement of a prosthetic mesh, before the closure of the two peritoneal flaps by continuous suture. The single case of NC removal via TEP was associated with the section of the round ligament of the uterus to avoid iatrogenic injury of the epigastric vessels from excessive tension using laparoscopic coagulating shears [46]. Furthermore, the aspiration of the NC is not recommended because it could cause its recurrence, therefore removal is always the best surgical choice [43].

Preoperative imaging is essential to guide the surgeon to a conscious choice of surgical technique [13,15,47]. Women with inguinal masses present for years, whether painful or not, should always be examined at least by ultrasound [13,14]. In cases with discrepant ultrasound findings, an MRI is the best test to differentially diagnosis inguinal masses [20,27]. The recent use of preoperative radiological techniques has improved the general understanding of this rare pathology from both preoperative diagnostic and surgical perspectives [5]. From this review, it emerges how the preoperative study of the patient is fundamental. In fact, what could seem like an inguinal or femoral hernia in the woman, could instead hide an unsuspected NC. For this reason, we believe that it is necessary for the general surgeon to at least suspect the presence of NC, especially in women with a palpable inguinal mass, with pain and worsening size over time. However, those inguinal masses that the patient reports having since childhood and that have become painful over time should also be considered suspicious. In this regard, the review of the literature shows the importance of performing specific preoperative tests. In particular, the first level radiological test is ultrasound. Ultrasound could in some cases be nonspecific and not resolve the clinical doubt. For this reason, most of the authors performed MRI as a second level test, which is decisive in the differential diagnosis [9,17,25,35,48–53]. Other authors performed CT as a second level test [12,29,33,44,47]. As for the level of sensitivity and specificity, we recommend performing ultrasound as a first-level examination after a thorough clinical objective examination and MRI as a second-level examination.

Histologically, our case report is in line with all those present in the literature. In fact, the NC is always described as partly covered by flattened or cuboidal cells and in some cases also by mesothelial cells [41].

Although NC remains a rare pathological anatomical anomaly, the number of published cases is slowly increasing [5]. Therefore, NC should be suspected in patients presenting with anamnestic clinical features [5]. This narrative review has limitations. In fact, it included only articles published in English and excluded publications in other languages. Furthermore, we did not assess the quality of the included studies. However, the exploratory nature of our review provides a meaningful synthesis of the literature on the main topics concerning NC. A limitation of this study was the absence of postoperative radiological examinations. In fact, we only physically examined the patient, who presented no signs or symptoms during the outpatient clinical checkup, which is why we chose not to subject her to further radiological examinations. Similarly, other authors have previously chosen not to subject their patients to postoperative radiological examinations for the same clinical reasons. In Table 1 (Ref. [9,12,17,25,29,31–33,35,41–44,47–52,54,55]), we report the different types of diagnoses



**Table 1. Diagnosis and Surgical Approach to NC.**

Author	Country	Year	Signs and symptoms	Diagnosis	Age (y.o.):	Surgical approach
Bunting <i>et al.</i> [49]	UK	2013	Left painless groin swelling, prominent during activity, improving at rest, and disappeared with the patient lying supine for one month	Physical examination + Ultrasonography + MRI	42 y.o.	TAPP – Polypropylene mesh placement
Qureshi and Lakshman [35]	India	2014	Pain and irreducible, tender, cystic and fluctuant swelling in left inguinal region for 1 month	Physical examination + Ultrasonography	28 y.o.	TAPP – Polypropylene mesh placement
Patnam <i>et al.</i> [29]	India	2016	Right inguinal cystic and non-tender swelling for 3 months	Physical examination + Ultrasonography + CT	38 y.o.	Anterior – No mesh placement
Sethi and Patel [47]	USA	2016	Subcutaneous and round-to-oval in shape mass in the right labial region	Physical examination + CT	21 y.o.	Anterior – No mesh placement
Kim <i>et al.</i> [50]	Korea	2016	Painless swelling in right groin that had first appeared 4 months previously and had grown since then	Physical examination + CT + MRI	51 y.o.	Anterior – No mesh placement
Okoshi <i>et al.</i> [42]	Japan	2017	Painful mass overlying in right pubis	Physical examination	44 y.o.	Anterior – Mesh placement
Lai <i>et al.</i> [17]	Canada	2017	Case 1: Palpable mass within her left labium	Case 1: Physical examination + Ultrasonography	Case 1: 25 y.o.	Drug treatment; surgical removal proposed but refused by the patients
			Case 2: Painful right groin mass worsening after vigorous exercise. Physical examination revealed a cystic, compressible mass in the lower right groin	Case 2: Physical examination + MRI	Case 2: 41 y.o.	
			Case 3: Painless, rounded swelling of her left labium that enlarged after intercourse	Case 3: Physical examination + Ultrasonography + MRI	Case 3: 27 y.o.	
Ferreira <i>et al.</i> [43]	Portugal	2017	Painless and gradually conspicuous vulval swelling for 4 months	Physical examination + Ultrasonography	23 y.o.	Anterior – No mesh placement
Shahid <i>et al.</i> [51]	Qatar	2020	Painful small swelling in the right groin for 3 months	Physical examination + Ultrasonography	36 y.o.	TAPP + Mesh placement
Lucas <i>et al.</i> [52]	USA	2019	Painful and exceedingly worse left inguinal mass for two years.	Physical examination + Ultrasonography + CT	33 y.o.	Laparoscopic exploration + Anterior repair
Kojima and Sakamoto [32]	Japan	2020	Painful inguinal mass that had been gradually increasing in size for 3 months	Physical examination + Ultrasonography	43 y.o.	TEP
Fikatas <i>et al.</i> [9]	Germany	2020	Case 1: Right-sided painful swelling in inguinal region for one week. Painful swelling and impossible manual reduction	Case 1: Physical examination + Ultrasonography	Case 1: 29 y.o.	Case 1: TAPP + Mesh placement
			Case 2: Right-sided inguinal mass and local pain after doing sports for six years	Case 2: Physical examination + Ultrasonography + MRI	Case 2: 29 y.o.	Case 2: TAPP + Mesh placement
			Case 3: Cystic structure in the left inguinal region. Painful swelling to touch and increased in size over the last two months	Case 3: Physical examination + Ultrasonography	Case 3: 44 y.o.	Case 3: TAPP + Mesh placement

Table 1. Continued.

Author	Country	Year	Signs and symptoms	Diagnosis	Age (y.o.):	Surgical approach
			Case 4: Right-sided inguinal mass over the last two years prior	Case 4: Physical examination + Ultrasonography + MRI	Case 4: 35 y.o.	Case 4: Anterior – Lichtenstein hernioplasty with mesh placement
			Case 5: Pain in the inguinal area and irreducible mass	Case 5: Physical examination + Ultrasonography	Case 5: 41 y.o.	Case 5: TAPP + Mesh placement
			Case 6: Recurrent groin pain for eight years	Case 6: Physical examination + Ultrasonography + MRI	Case 6: 34 y.o.	Case 6: Anterior – Open hydrocelectomy and fascial suture
Prodromidou <i>et al.</i> [25]	Greece	2020	Painful mass in right inguinal region and swelling first noticed for two months. Any history of local trauma	Physical examination + MRI	40 y.o.	Anterior – No mesh placement
Scott and Helmy [44]	Scotland	2020	Left iliac fossa bulge associated with lower abdominal pain. The abdominal pain elapsed 4 days but was progressively worsening in frequency and sharpness	Physical examination + Ultrasonography + CT	32 y.o.	Anterior – Mesh placement
Baral <i>et al.</i> [41]	Nepal	2020	Irreducible bilateral inguinal swelling extending up to the labia majora for 25 days. Cystic lesion on the left side	Physical examination	25 y.o.	Anterior – No mesh placement
Chihara <i>et al.</i> [54]	Japan	2020	Painless reducible lump in the right groin, increase in the size of lump for 5 months	Physical examination + CT	38 y.o.	TAPP + Mesh placement
Cheng <i>et al.</i> [55]	Australia	2021	Right inguinal swelling and discomfort when seated for two weeks. small fluctuant Swelling of 2 cm in diameter was found located along the right inguinal ligament	Physical examination + Ultrasonography	26 y.o.	Drug treatment with analgesics
Wang <i>et al.</i> [33]	Japan	2021	Occasional pain during exercise and an asymptomatic left groin swelling	Physical examination + Ultrasonography + CT	56 y.o.	TAPP + Mesh placement
Aldhafeeri <i>et al.</i> [12]	Saudi Arabia	2023	A one-month history of right-sided painful palpable inguinolabial swelling	Physical examination + Ultrasonography + CT	25 y.o.	Anterior – Mesh placement
Rasmussen <i>et al.</i> [48]	Denmark	2023	Bilateral groin swelling debuted during her pregnancy	Physical examination + MRI	34 y.o.	Anterior – No mesh placement
Alghofeali <i>et al.</i> [31]	Saudi Arabia	2024	Right inguinal swelling, tender and non-reducible with a mild cough impulse	Physical examination + CT	20 y.o.	TAPP + Mesh placement

TAPP, Trans Abdominal Pre Peritoneal; TEP, Totally Extra Peritoneal; MRI, Magnetic Resonance Imaging; CT, Computed Tomography.



and surgical approaches for NC. In the postoperative period, we believe it is important to have a clinical check-up of the patient 10 days after surgery. In this context, we recommend a careful objective examination of the inguinal region and then remove the stitches. A postoperative radiological check-up may not be necessary in cases where the patient declares the total disappearance of previous symptoms and the histological report of NC is already available. In the literature, many authors do not describe the postoperative radiological examinations performed on patients, considering the objective examination sufficient. In other cases, the postoperative radiological examination performed was only a control ultrasound. Of course, given the small number of cases reported in the literature, a greater number of NC will be needed in the future to be able to draw up guidelines for the treatment of NC. However, our suggestions combined with what has already been found in the literature could be an important starting point for future diagnostic and surgical choices.

## Conclusions

NC is rare anatomical anomalies of the CN, and only a few cases have been reported in scientific literature. Therefore, many surgeons are unaware of this pathology, resulting in an incorrect preoperative differential diagnosis and subsequent uncertainty regarding the best surgical approach. Therefore, planning a surgical intervention for the removal of an NC requires a complete physical examination accompanied by an inguinal ultrasound. In cases with doubtful ultrasound findings, an MRI is definitive. Our case report and literature review provide insights on NC and could be useful for building future guidelines for the treatment of this rare anatomical anomaly.

## Availability of Data and Materials

All experimental data included in this study can be obtained by contacting the corresponding author if needed.

## Author Contributions

AF: Conceptualization, Data curation, Funding acquisition, Investigation, Methodology, Resources, Visualization, Writing-original draft, AC: Data curation, Formal analysis, Writing-original draft, GPa: Data curation, Formal analysis, Writing-original draft, GPe, MP, MSo, EC and AP: Software, Visualization, Formal analysis, NC: Formal analysis, Validation, Writing-review & editing, MSa: Formal analysis, Validation, Writing-review & editing. All authors contributed to important editorial changes in the manuscript. All authors read and approved the final manuscript. All authors have participated sufficiently in the work and agreed to be accountable for all aspects of the work.

## Ethics Approval and Consent to Participate

The patient gave their informed consent for inclusion before participating in the study. The study was conducted in accordance with the Declaration of Helsinki. For this type of study, it was not necessary to obtain approval from the Ethics Committee, as this is not an experimental study.

## Acknowledgment

Not applicable.

## Funding

This research received no external funding.

## Conflict of Interest

The authors declare no conflict of interest.

## Supplementary Material

Supplementary material associated with this article can be found, in the online version, at <https://doi.org/10.62713/aic.3924>.

## References

- [1] Erol T, Uner MB, Karakoc D, Hamaloglu E. Cyst of the canal of nuck: A rare cause of inguinal swelling in women. *Nigerian Journal of Clinical Practice*. 2019; 22: 1457–1458. [https://doi.org/10.4103/njcp.njcp\\_588\\_18](https://doi.org/10.4103/njcp.njcp_588_18).
- [2] Tanyel FC, Dağdeviren A, Müftüoğlu S, Gürsoy MH, Yürüker S, Büyükpamukçu N. Inguinal hernia revisited through comparative evaluation of peritoneum, processus vaginalis, and sacs obtained from children with hernia, hydrocele, and undescended testis. *Journal of Pediatric Surgery*. 1999; 34: 552–555. [https://doi.org/10.1016/s0022-3468\(99\)90071-4](https://doi.org/10.1016/s0022-3468(99)90071-4).
- [3] Hutson JM, Kearsley I. Is the ovary in an inguinal hernia 'descended' like a testis or not? *Journal of Pediatric Surgery*. 2016; 51: 1197–1200. <https://doi.org/10.1016/j.jpedsurg.2015.09.014>.
- [4] Jiang ZP, Yang B, Wen LQ, Zhang YC, Lai DM, Li YR, et al. The etiology of indirect inguinal hernia in adults: congenital or acquired? *Hernia: the Journal of Hernias and Abdominal Wall Surgery*. 2015; 19: 697–701. <https://doi.org/10.1007/s10029-014-1326-5>.
- [5] Kohlhauser M, Pirsch JV, Maier T, Viertler C, Fegerl R. The Cyst of the Canal of Nuck: Anatomy, Diagnostic and Treatment of a Very Rare Diagnosis-A Case Report of an Adult Woman and Narrative Review of the Literature. *Medicina (Kaunas, Lithuania)*. 2022; 58: 1353. <https://doi.org/10.3390/medicina58101353>.
- [6] Elsayed MI, Ibrahim R, Khatri A, Palliyil M. A Canal of Nuck Cyst Presented as a Femoral Hernia: A Rare Case Report With Diagnostic Dilemma. *Cureus*. 2024; 16: e51908. <https://doi.org/10.7759/cureus.51908>.
- [7] Husaric E, Hotic N, Halilbasic A, Husaric S, Rahmanovic E, Suljendic S. Cyst of the canal of nuck in a two year old girl. *Medical Archives (Sarajevo, Bosnia and Herzegovina)*. 2014; 68: 289–290. <https://doi.org/10.5455/medarh.2014.68.289-290>.
- [8] Agha RA, Franchi T, Sohrabi C, Mathew G, Kerwan A, SCARE Group. The SCARE 2020 Guideline: Updating Consensus Surgical CAsE REport (SCARE) Guidelines. *International Journal of Surgery (London, England)*. 2020; 84: 226–230. <https://doi.org/10.1016/j.ijssu.2020.10.034>.
- [9] Fikatas P, Megas IF, Mantouvalou K, Alkatout I, Chopra SS, Biehl M, et al. Hydroceles of the Canal of Nuck in Adults-Diagnostic, Treatment and Results of a Rare Condition in Females. *Journal*

- of Clinical Medicine. 2020; 9: 4026. <https://doi.org/10.3390/jcm9124026>.
- [10] Kono R, Terasaki H, Murakami N, Tanaka M, Takeda J, Abe T. Hydrocele of the canal of Nuck: a case report with magnetic resonance hydrography findings. *Surgical Case Reports*. 2015; 1: 86. <https://doi.org/10.1186/s40792-015-0086-5>.
- [11] Nasser H, King M, Rosenberg HK, Rosen A, Wilck E, Simpson WL. Anatomy and pathology of the canal of Nuck. *Clinical Imaging*. 2018; 51: 83–92. <https://doi.org/10.1016/j.clinimag.2018.02.003>.
- [12] Aldhafeeri S, Aalaqoul A, Sabaa F, Alkhalidi M, Alqahtani M, Alghazwi A. The Rarest Variant Type Of Groin Cystic Mass In Adult Female: Encysted Hydrocele Canal Of Nuck. *International Journal of Surgery Case Reports*. 2023; 104: 107921. <https://doi.org/10.1016/j.ijscr.2023.107921>.
- [13] Huang CS, Luo CC, Chao HC, Chu SM, Yu YJ, Yen JB. The presentation of asymptomatic palpable movable mass in female inguinal hernia. *European Journal of Pediatrics*. 2003; 162: 493–495. <https://doi.org/10.1007/s00431-003-1226-7>.
- [14] Papparella A, Vaccaro S, Accardo M, DE Rosa L, Ronchi A, Noviello C. Nuck cyst: a rare cause of inguinal swelling in infancy. *Minerva Pediatrics*. 2021; 73: 180–183. <https://doi.org/10.23736/S2724-5276.18.05205-2>.
- [15] Akkoyun I, Kucukosmanoglu I, Yalinkilinc E. Cyst of the canal of nuck in pediatric patients. *North American Journal of Medical Sciences*. 2013; 5: 353–356. <https://doi.org/10.4103/1947-2714.114166>.
- [16] Counsellor VS, Black BM. HYDROCELE OF THE CANAL OF NUCK: REPORT OF SEVENTEEN CASES. *Annals of Surgery*. 1941; 113: 625–630. <https://doi.org/10.1097/00000658-194104000-00012>.
- [17] Lai I, Page A, Hamidinia F, Rahmani R. Cysts of the canal of Nuck: A rare sonographic diagnosis. *Journal of Clinical Ultrasound: JCU*. 2017; 45: 175–178. <https://doi.org/10.1002/jcu.22390>.
- [18] Wang J, Shao J, Qiu C, Chen Y, Liu B. Synovial cysts of the hip joint: a single-center experience. *BMC Surgery*. 2018; 18: 113. <https://doi.org/10.1186/s12893-018-0450-z>.
- [19] Angelini A, Zanotti G, Berizzi A, Staffa G, Piccinini E, Ruggieri P. Synovial cysts of the hip. *Acta Bio-medica: Atenei Parmensis*. 2018; 88: 483–490. <https://doi.org/10.23750/abm.v88i4.6896>.
- [20] Gui B, Valentini AL, Ninivaggi V, Marino M, Iacobucci M, Bonomo L. Deep pelvic endometriosis: don't forget round ligaments. Review of anatomy, clinical characteristics, and MR imaging features. *Abdominal Imaging*. 2014; 39: 622–632. <https://doi.org/10.1007/s00261-014-0091-3>.
- [21] Işık P, Belen Apak FB, Demir TA. Evaluation of Peripheral Lymphadenopathies in Children in a Single Center: Predictive Factors for Malignancy. *Klinische Padiatrie*. 2024; 236: 173–179. <https://doi.org/10.1055/a-2266-0722>.
- [22] Hanzalova I, Matter M. Peripheral lymphadenopathy of unknown origin in adults: a diagnostic approach emphasizing the malignancy hypothesis. *Swiss Medical Weekly*. 2024; 154: 3549. <https://doi.org/10.57187/s.3549>.
- [23] Eppel W, Frigo P, Worda C, Bettelheim D. Ultrasound imaging of Bartholin's cysts. *Gynecologic and Obstetric Investigation*. 2000; 49: 179–182. <https://doi.org/10.1159/000010242>.
- [24] Caviezel A, Montet X, Schwartz J, Egger JF, Iselin CE. Female hydrocele: the cyst of Nuck. *Urologia Internationalis*. 2009; 82: 242–245. <https://doi.org/10.1159/000200808>.
- [25] Prodromidou A, Paspala A, Schizas D, Spartalis E, Nastos C, Machairas N. Cyst of the Canal of Nuck in adult females: A case report and systematic review. *Biomedical Reports*. 2020; 12: 333–338. <https://doi.org/10.3892/br.2020.1295>.
- [26] Adhikari S, Bhatta OP. Hydrocele of the Canal of Nuck: A report of five cases. *International Journal of Surgery Case Reports*. 2023; 112: 108993. <https://doi.org/10.1016/j.ijscr.2023.108993>.
- [27] Rees MA, Squires JE, Tadros S, Squires JH. Canal of Nuck hernia: a multimodality imaging review. *Pediatric Radiology*. 2017; 47: 893–898. <https://doi.org/10.1007/s00247-017-3853-6>.
- [28] Lukanova T, Takorov I, Todorova E, Dzakova A. Cyst of the Canal of Nuck: a case report. *Journal of Surgical Case Reports*. 2024; 2024: rjae374. <https://doi.org/10.1093/ijscr/rjae374>.
- [29] Patnam V, Narayanan R, Kudva A. A cautionary approach to adult female groin swelling: hydrocoele of the canal of Nuck with a review of the literature. *BMJ Case Reports*. 2016; 2016: bcr2015212547. <https://doi.org/10.1136/bcr-2015-212547>.
- [30] Topal U, Sarıtaş AG, Ülkü A, Akçam AT, Doran F. Cyst of the canal of Nuck mimicking inguinal hernia. *International Journal of Surgery Case Reports*. 2018; 52: 117–119. <https://doi.org/10.1016/j.ijscr.2018.09.053>.
- [31] Alghofeali OK, Alwabel WK, Alharbi MA, Alhajress GI, Al Babbain IT. Laparoscopic Approach To Treat a Hydrocele of the Canal of Nuck: A Case Report. *Cureus*. 2024; 16: e68475. <https://doi.org/10.7759/cureus.68475>.
- [32] Kojima S, Sakamoto T. Laparoscopic total extraperitoneal treatment for a hydrocele of the canal of Nuck located entirely within the inguinal canal: A case report. *Asian Journal of Endoscopic Surgery*. 2020; 13: 453–456. <https://doi.org/10.1111/ases.12769>.
- [33] Wang L, Maejima T, Fukahori S, Shun K, Yoshikawa D, Kono T. Laparoscopic surgical treatment for hydrocele of canal of Nuck: A case report and literature review. *Surgical Case Reports*. 2021; 7: 121. <https://doi.org/10.1186/s40792-021-01205-8>.
- [34] Nakamura K, Higashiguchi T, Chikaishi Y, Matsuo K, Endo T, Morohara K, et al. Totally laparoscopic surgery for a hydrocele of the canal of Nuck extending from the abdominal cavity to the subcutaneous space: a case report. *Surgical Case Reports*. 2024; 10: 31. <https://doi.org/10.1186/s40792-024-01825-w>.
- [35] Qureshi NJ, Lakshman K. Laparoscopic excision of cyst of canal of Nuck. *Journal of Minimal Access Surgery*. 2014; 10: 87–89. <https://doi.org/10.4103/0972-9941.129960>.
- [36] Jedrzejewski G, Osemlak P, Wiecezorek AP, Nachulewicz P. Nuck Canal Hernias, Typical and Unusual Ultrasound Findings. *Ultrasound Quarterly*. 2019; 35: 79–81. <https://doi.org/10.1097/RUQ.0000000000000409>.
- [37] Venkateswaran R, Ansari K, Bhondve S, Bhandarwar A, Padekar HD, Dandge S, et al. Laparoscopic Versus Open Surgical Management of Hydrocele of the Canal of Nuck: A Retrospective Analysis of 20 Cases. *Cureus*. 2024; 16: e56584. <https://doi.org/10.7759/cureus.56584>.
- [38] Gesuete FP, Molle M, Izzo P, Izzo S, Gubitosi A, Nicoletti GF, et al. Nuck Cyst Presenting as a Recidive Inguinal Hernia: A Rare Case Treated in Plastic Surgery. *Plastic and Reconstructive Surgery*. 2023; 11: e5335. <https://doi.org/10.1097/GOX.0000000000005335>.
- [39] Cornacchia C, Dessalvi S, Boccardo F. Surgical treatment of cyst of the canal of Nuck and prevention of lymphatic complications: A single-center experience. *Lymphology*. 2019; 52: 143–148.
- [40] De Meulder F, Wojciechowski M, Hubens G, Ramet J. Female hydrocele of the canal of Nuck: a case report. *European Journal of Pediatrics*. 2006; 165: 193–194. <https://doi.org/10.1007/s00431-005-0067-y>.
- [41] Baral S, Bajracharya P, Thapa N, Chhetri RK. Bilateral Hydrocele of the Canal of Nuck: A Rare Presentation in an Adult Female. *International Medical Case Reports Journal*. 2020; 13: 313–316. <https://doi.org/10.2147/IMCRJ.S260367>.
- [42] Okoshi K, Mizumoto M, Kinoshita K. Endometriosis-associated hydrocele of the canal of Nuck with immunohistochemical confirmation: a case report. *Journal of Medical Case Reports*. 2017; 11: 354. <https://doi.org/10.1186/s13256-017-1522-x>.
- [43] Ferreira AF, Marques JP, Falcão F. Hydrocele of the canal of Nuck presenting as a sausage-shaped mass. *BMJ Case Reports*. 2017; 2017: bcr2017221024. <https://doi.org/10.1136/bcr-2017-221024>.
- [44] Scott M, Helmy AH. Rare encounter: hydrocoele of canal of



- Nuck in a Scottish rural hospital during the COVID-19 pandemic. *BMJ Case Reports*. 2020; 13: e237169. <https://doi.org/10.1136/bcr-2020-237169>.
- [45] Fujita M, Nakauchi M, Iida M, Koide K, Inoue S, Goto A, et al. Laparoscopic repair of concurrent direct and indirect inguinal, femoral, and obturator hernias on the same side: A case report. *Asian Journal of Endoscopic Surgery*. 2024; 17: e13326. <https://doi.org/10.1111/ases.13326>.
- [46] Lee SR. Laparoscopic Hydrocelectomy of Encysted Hydrocele of the Canal of Nuck with High Ligation in Children or Iliopubic Tract Repair in Adults. *Journal of Laparoendoscopic & Advanced Surgical Techniques. Part a*. 2022; 32: 684–689. <https://doi.org/10.1089/lap.2022.0044>.
- [47] Sethi V, Patel H. Hydrocele in the Canal of Nuck - CT appearance of a developmental groin anomaly. *Journal of Radiology Case Reports*. 2016; 10: 29–33. <https://doi.org/10.3941/jrcr.v10i11.2521>.
- [48] Rasmussen L, Farooqui W, Ries A, Stadeager MW. Synchronic development of hydrocele and groin hernia during pregnancy: a case report. *Journal of Medical Case Reports*. 2023; 17: 433. <https://doi.org/10.1186/s13256-023-04099-2>.
- [49] Bunting D, Szczebiot L, Cota A. Laparoscopic hernia repair—when is a hernia not a hernia? *JSLS: Journal of the Society of Laparoendoscopic Surgeons*. 2013; 17: 654–656. <https://doi.org/10.4293/108680813X13794522667481>.
- [50] Kim KS, Choi JH, Kim HM, Kim KP, Kwon YJ, Hwang JH, et al. Hydrocele of the Canal of Nuck in a Female Adult. *Archives of Plastic Surgery*. 2016; 43: 476–478. <https://doi.org/10.5999/aps.2016.43.5.476>.
- [51] Shahid F, El Ansari W, Ben-Gashir M, Abdelaal A. Laparoscopic hydrocelectomy of the canal of Nuck in adult female: Case report and literature review. *International Journal of Surgery Case Reports*. 2020; 66: 338–341. <https://doi.org/10.1016/j.ijscr.2019.11.040>.
- [52] Lucas JW, Shete KC, Schermer C, Perosio P, Sterious S. Canal of Nuck hydrocele in an adult female. *Urology Case Reports*. 2019; 23: 67–68. <https://doi.org/10.1016/j.eucr.2019.01.004>.
- [53] Matsumoto T, Hara T, Hirashita T, Kubo N, Hiroshige S, Orita H. Laparoscopic diagnosis and treatment of a hydrocele of the canal of Nuck extending in the retroperitoneal space: A case report. *International Journal of Surgery Case Reports*. 2014; 5: 861–864. <https://doi.org/10.1016/j.ijscr.2014.08.016>.
- [54] Chihara N, Taniai N, Suzuki H, Nakata R, Shioda M, Yoshida H. Use of a Novel Open Posterior Wall Technique for Laparoscopic Excision of Hydrocele of the Canal of Nuck in an Adult Female: Case Report. *Journal of Nippon Medical School = Nippon Ika Daigaku Zasshi*. 2020; 86: 345–348. [https://doi.org/10.1272/jnms.JNMS.2019\\_86-601](https://doi.org/10.1272/jnms.JNMS.2019_86-601).
- [55] Cheng EM, Sarkar A, Perera DS. Hydrocoele in the canal of Nuck in an adult female: a rare cause for inguinal swelling. *ANZ Journal of Surgery*. 2021; 91: E210–E211. <https://doi.org/10.1111/ans.16279>.

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