



# CANAL OF NUCK - A PICTORIAL REVIEW

Presenting the pathogenesis, complications  
and radiological assessment

Dr Max Ireland  
Dr Swetha Yatham  
Angela Clough – Lead Ultrasonographer  
Kerry Green – MSK Consultant Ultrasonographer  
Ruby Fox – Illustrator  
Dr Jude Foster  
Dr Adel Abdellaoui

University Hospitals Plymouth

# BACKGROUND

- The Canal of Nuck was first described by Anton Nuck in 1691
- During the first year of life, the processus vaginalis should close
  - Failure to do so results in various pathologies that present clinically as groin lumps
- Pathologies of the Canal of Nuck are rare but important surgical conditions
- Understanding the uncommon pathologies associated with the Canal of Nuck gives healthcare professionals:
  - The ability to confidently assess patients
  - Guide surgical colleagues on the urgency of surgical intervention

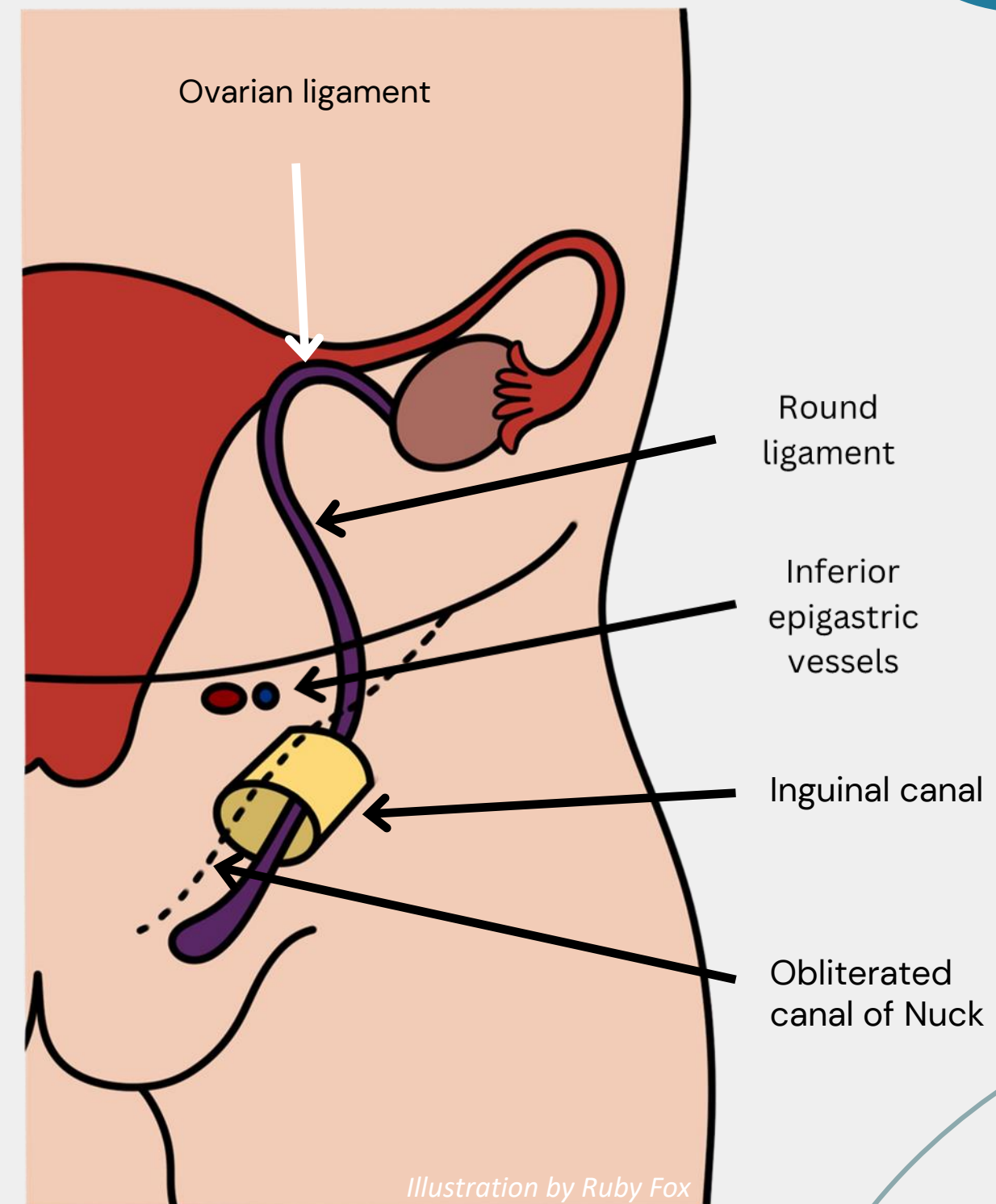


Figure 1: Normal anatomy of the Canal of Nuck.

# EMBRYOLOGY

## In Utero

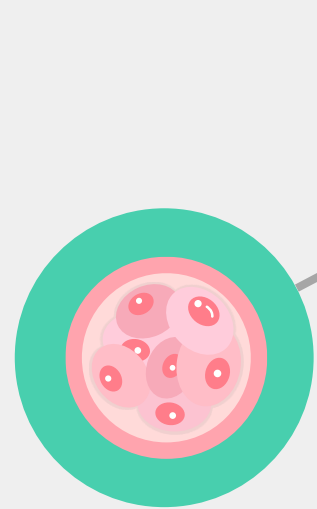
- The processus vaginalis enters the inguinal ring before the gubernaculum

## In Females

- The gubernaculum stops growing and keeps the gonads in the pelvis

## Common Pathologies

- Herniations of intra-abdominal structures
- Hydroceles
- Rarely: tumours, infections, and haematomas



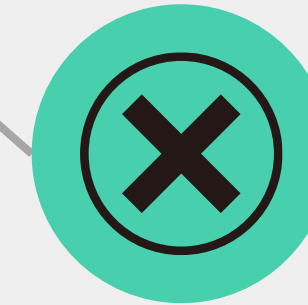
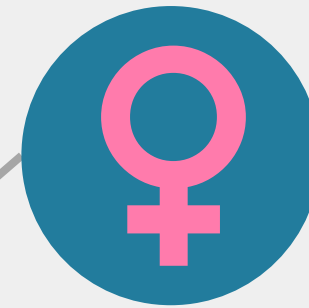
## Key Structures

- The processus vaginalis: an invagination of the parietal peritoneum
- The gubernaculum: a fibromuscular structure
- Both facilitate the inguinal canal



## In Males

- This process creates a passage for testicular descent into the scrotum



## Failure to Close

- If the canal of Nuck fails to close within the first year of life a variety of pathological conditions can occur



# EMBRYOLOGY

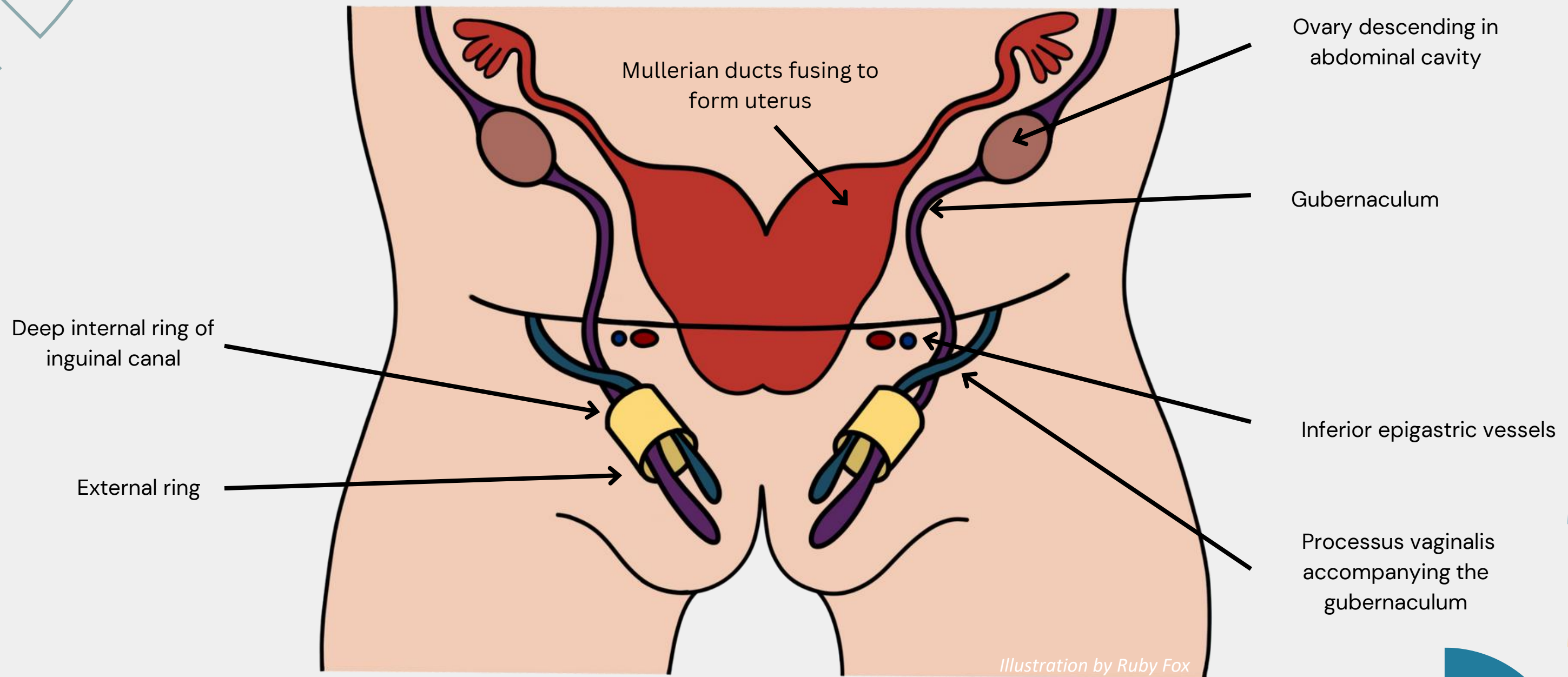


Figure 2: Developmental anatomy of the Canal of Nuck.



# INVESTIGATION

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- Ultrasound is the modality of choice for the assessment of Canal of Nuck and the associated pathology
  - A patent canal of Nuck is a normal finding in under 1-year olds
  - It is usually short in length at around 1 cm, and it may contain a small volume of fluid.
- It is a predictive anatomic risk factor of indirect inguinal hernia in infants

## Ultrasound Investigation:

- Is the Canal of Nuck patent?
- Is there herniation of intrabdominal contents?
- Is there ischaemia of the herniated organs?
- Is the contralateral Canal of Nuck patent?



# HERNIATED OVARIES

## *Is there herniation of intrabdominal contents?*

- Primarily occurs in infants
- Solid lesion with multiple cysts of varying sizes
- The differential would be omental fat or intestines
  - If cysts are present – this is in keeping with ovary
  - If just solid lesion – more likely to be omental fat
  - If intestines – tubular structure with a thin stratified normal wall, peristalsis, and fluid or air content (1)
- Herniation of both ovaries into one hernia has been reported
- Herniation of the uterus can occur



Figure 3: Herniated ovary into a patent canal of nuck. The differential would include omental fat.

# HERNIATED OVARIES



## *Is there ischemia of the herniated contents?*


- Narrowing at the proximal deep ring causes strangulation by inhibiting venous return
- Torsion relates to a twist in the pedicle of 180–360°
- Signs of ischemia:
  - An asymmetrically enlarged ovary
  - Heterogenous or hypoechoic stroma compared with adjacent subcutaneous fat
  - Absent or decreased vascularization of the ovary– this is the most suggestive of ischemic compromise
- Normal doppler signal does not exclude ischemia (1)

## *Is the contralateral Canal of Nuck patent?*

- 15–50% are bilateral
- 10.5% will develop a contralateral hernia
- Ensure the patient is scanned during stress/straining
- Different criteria have been used to assess patency – 2mm diameter at the internal ring and fluid within the canal of nuck has been suggested as a marker (2)

(1) Yang DM, Kim HC, Kim SW, Lim SJ, Park SJ, Lim JW. Ultrasonographic diagnosis of ovary-containing hernias of the canal of Nuck. Ultrasonography. 2014 Jul;33(3):178–83. doi: 10.14366/usg.14010. Epub 2014 Mar 3. PMID: 25038807; PMCID: PMC4104956.

(2) Kaneda H, Furuya T, Sugito K, et al. Preoperative ultrasonographic evaluation of the contralateral patent processus vaginalis at the level of the internal inguinal ring is useful for predicting contralateral inguinal hernias in children: a prospective analysis. Hernia 2015;19(4):595–598.



# HYDROCELE OF CANAL OF NUCK

- This represent fluid within a patent canal of Nuck – this can become apparent at any age.
- **Type 1 – Encysted fluid**
  - This can occur secondary to trapped fluid during forming or peritoneal lining secreting fluid
  - These will remain unchanged in volume on Valsalva
  - They can increase in size – can be secondary to trauma or infection.
- **Type 2 – Communicating hydrocele**
  - Failure of obliteration of canal of Nuck
  - May only be visible on Valsalva
- **Type 3 – Hourglass cyst of canal of Nuck**
  - Proximally obliterated cyst bulging above the deep inguinal ring.

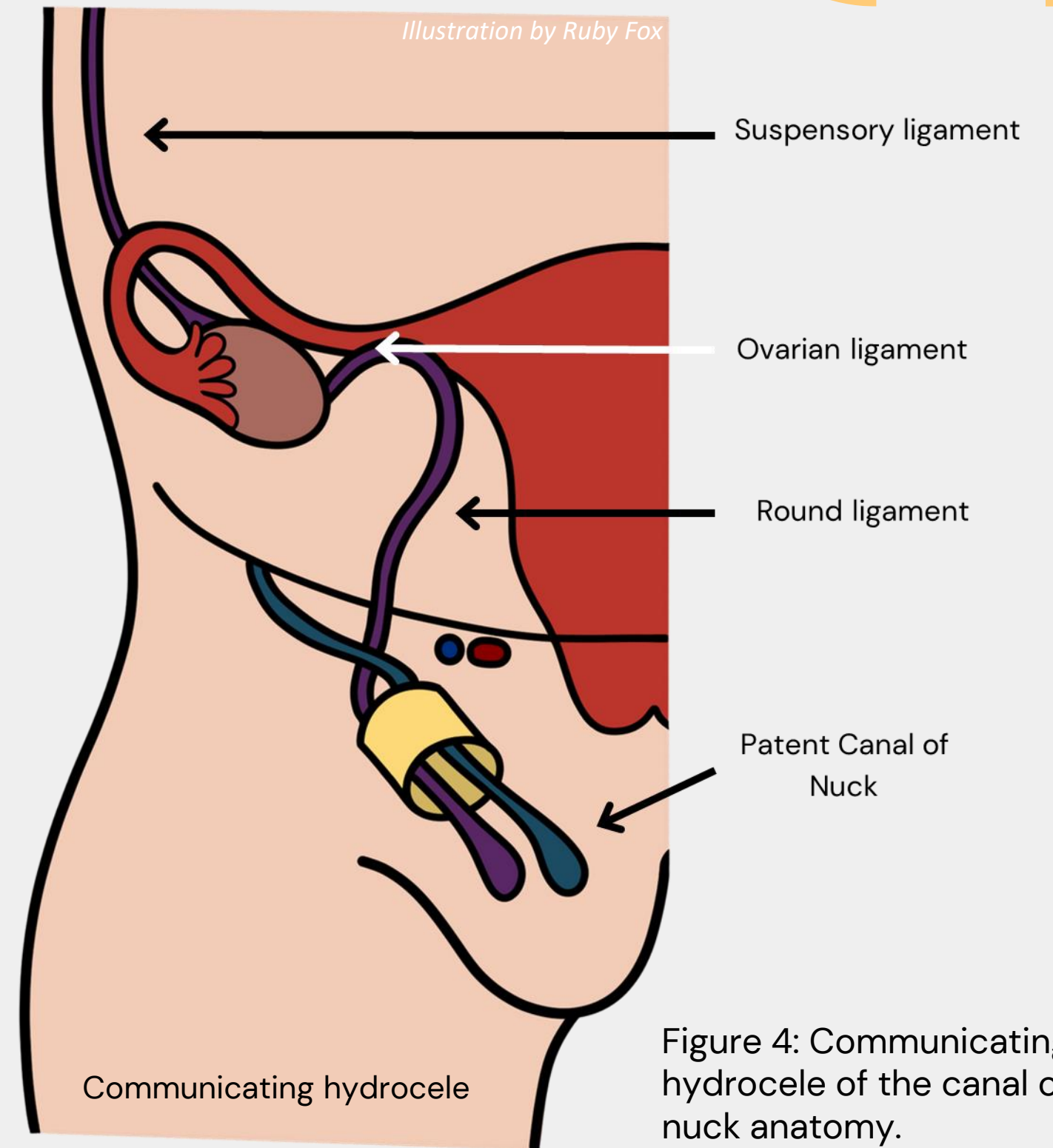


Figure 4: Communicating hydrocele of the canal of nuck anatomy.



# Complications of Hydrocele

- Type 1 cysts can be subject to inflammation, trauma and infection. Infection can be seen following trauma when the cyst is complicated by hemorrhage.
- Communication with peritoneal cavity in Type 2 cysts allows complication by abnormal peritoneal contents, such as infection from peritonitis, hemorrhage or peritoneal carcinomatosis can occur (1).
- Surgical management is the standard therapy for cysts of the Canal of Nuck. Aspiration can be performed but is considered a temporary method to relieve the patient's symptoms and delay surgery (2).

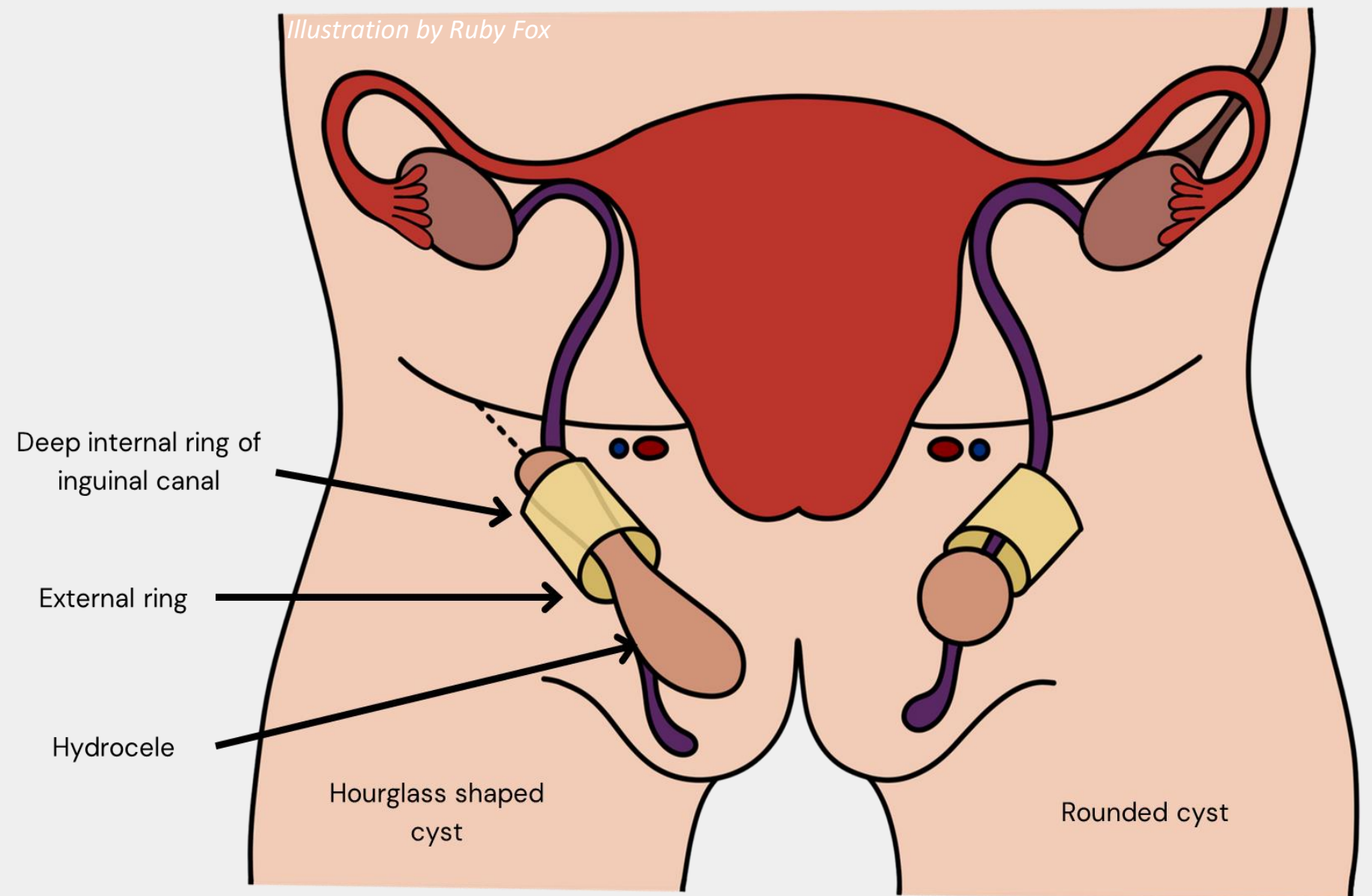


Figure 5: Diagram showing hourglass shaped type 3 cysts and rounded type 1 encysted fluid.

1. Saguintaah M, Eulliot J, Bertrand M, Prodhomme O, Béchard N, Bolivar-Perrin J, Taleb Arrada I, Simon AH, Baud C, Millet I. Canal of Nuck Abnormalities in Pediatric Female Patients. *Radiographics*. 2022 Mar-Apr;42(2):541-558. doi: 10.1148/rg.210145. Epub 2022 Jan 21. PMID: 35061516.

2. Akkoyun I, Kucukosmanoglu I, Yalinkilinc E. Cyst of the canal of nuck in pediatric patients. *N Am J Med Sci*. 2013 Jun;5(6):353-6. doi: 10.4103/1947-2714.114166.

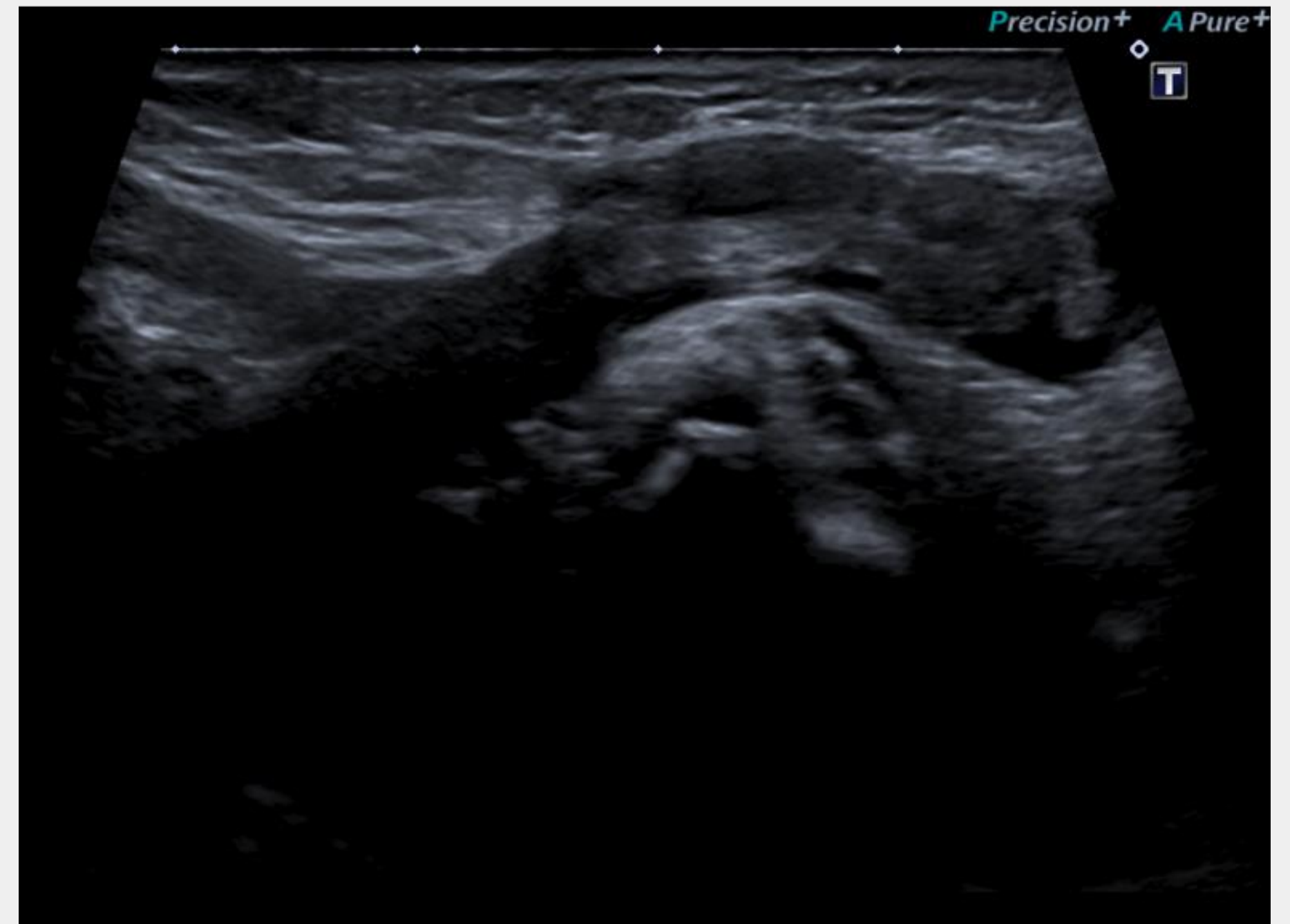
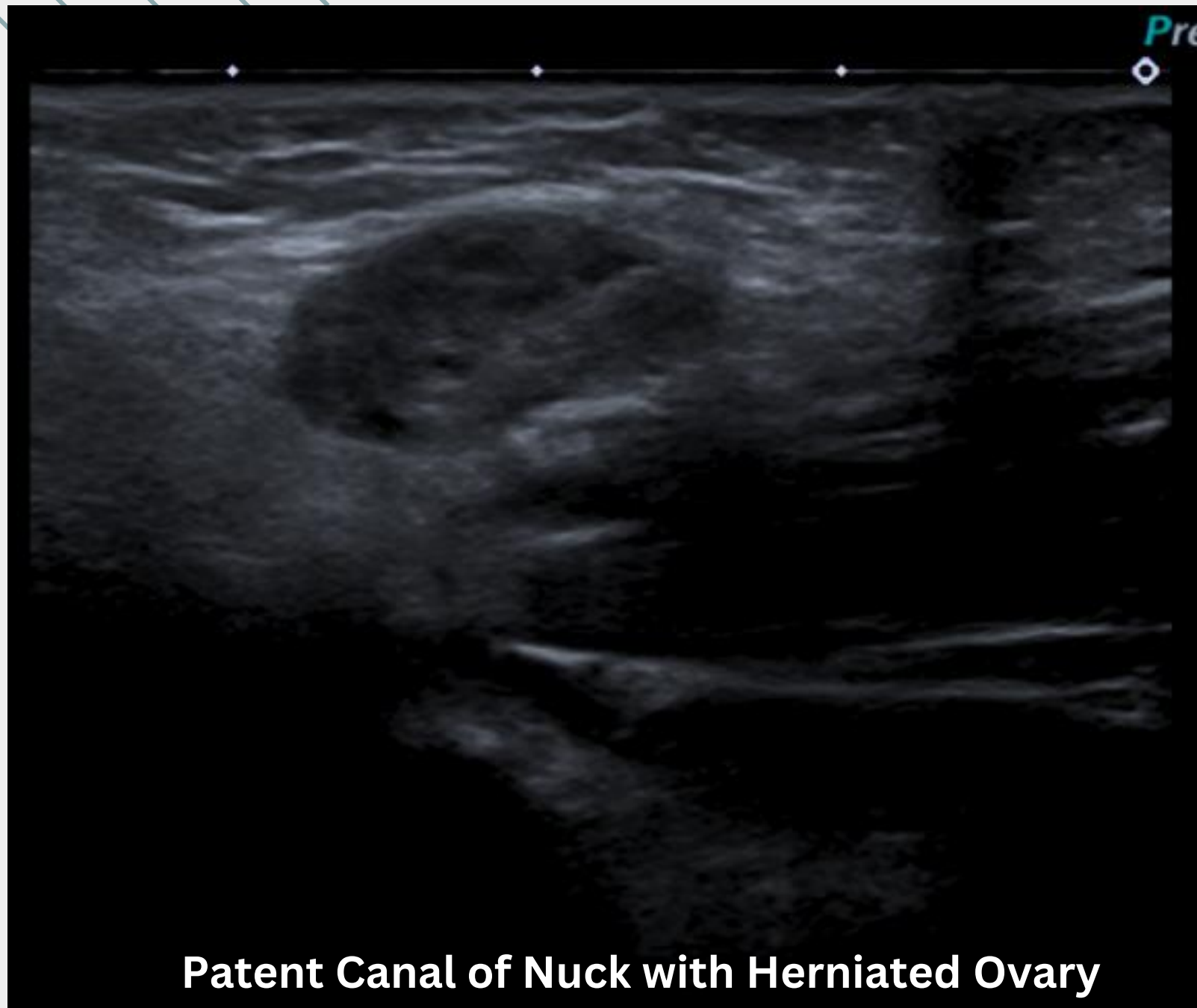
# CASE 1

**Patient Demographics:** 9 month old female

**Presenting Complaint:** Swelling in the left inguinal region, increasing in size.

**On Examination:** Tender left mons pubis swelling, non-reducible, abdomen soft non-tender

**Ultrasound Findings:** Left sided inguinal hernia containing a normal appearing ovary



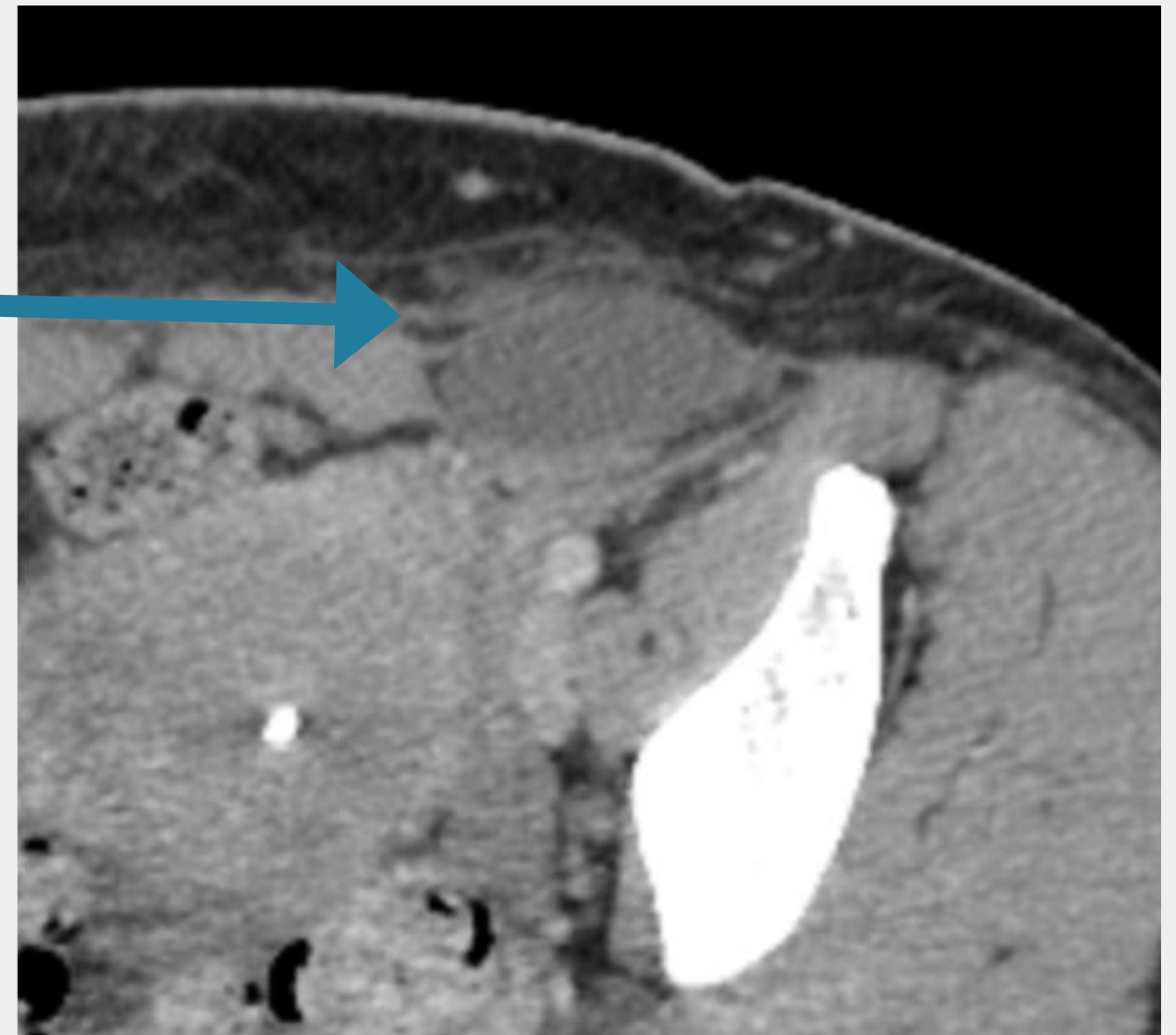
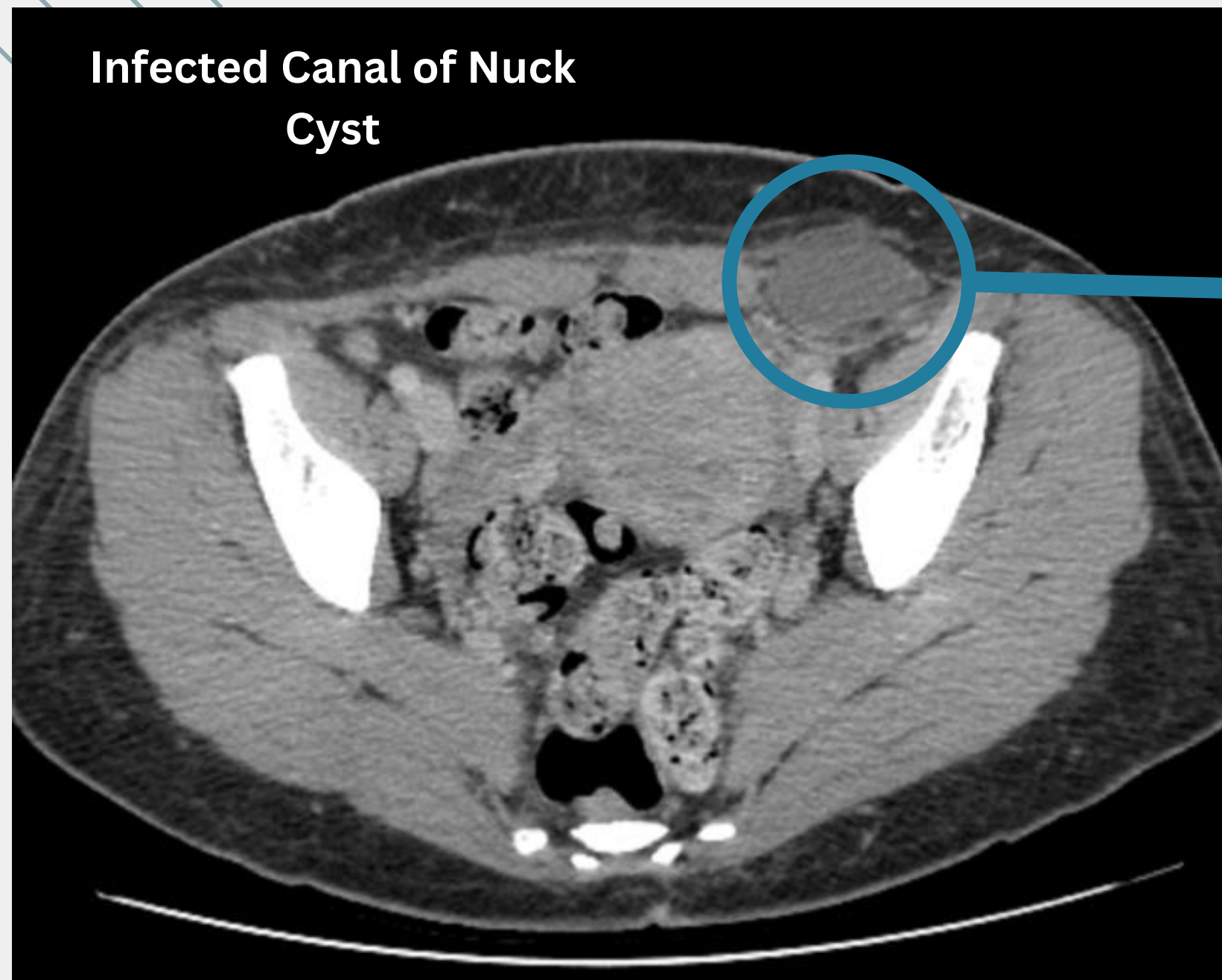


# CASE 2

**Patient Demographics:** 38 year old female

**Presenting Complaint:** Swelling in the left iliac fossa, increasing in size and pain intensity

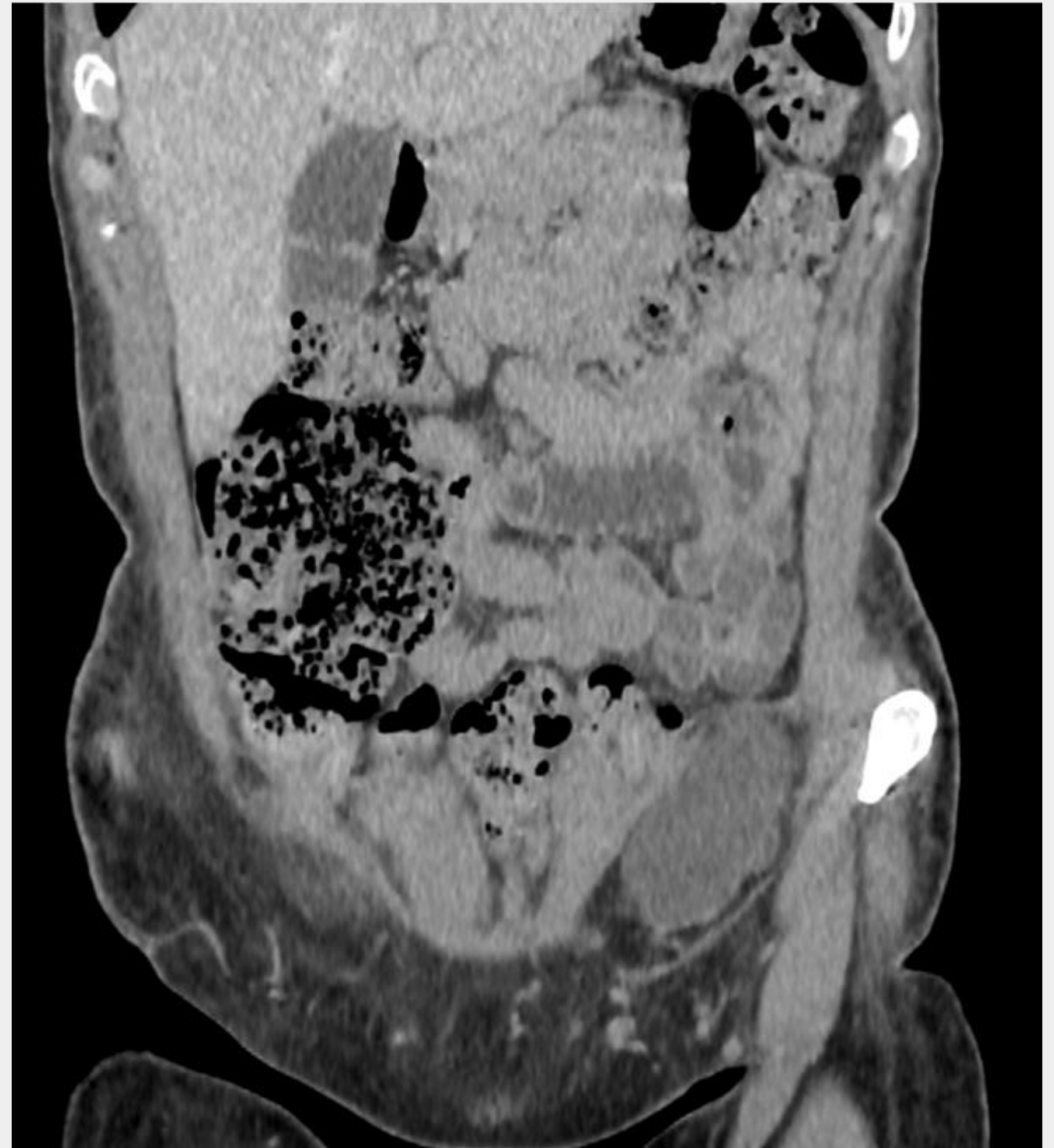
**On Examination:** ?Inguinal Hernia - reducible lump, febrile (38.1C), WBC 8.1, Normal U&Es



# CASE 2 - CORONAL SECTION

## IMAGING FINDINGS

- 4.2 x 2.8 x 7.2 cm cystic abnormality within the left inguinal canal
- There is some soft tissue density seen herniating into the inguinal canal just below the described cystic abnormality
- The left ovary is identified on the left side
- Appearances are suspicious of a canal of Nuck cyst
- The differential diagnosis includes infected collection in the clinical context of sepsis.



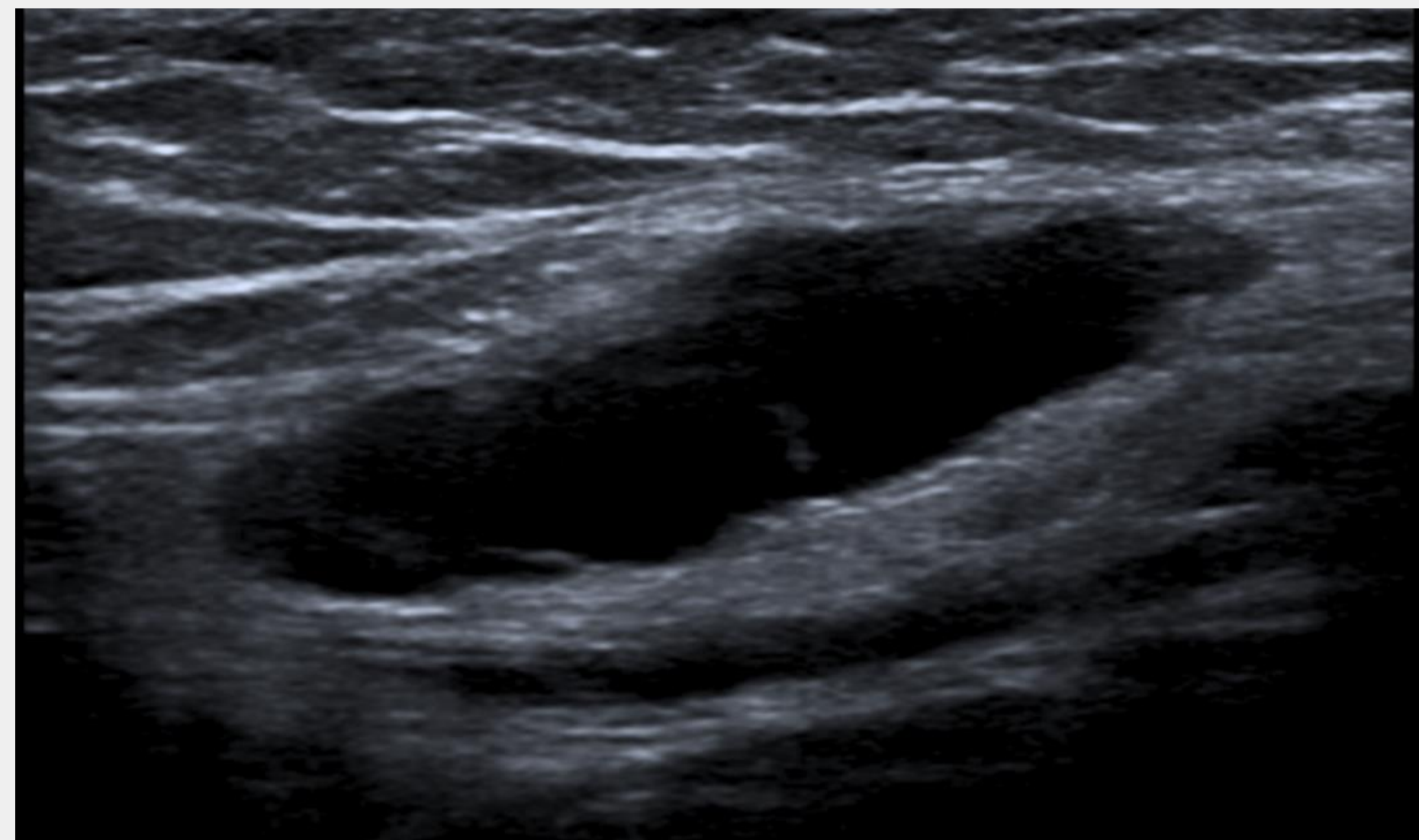
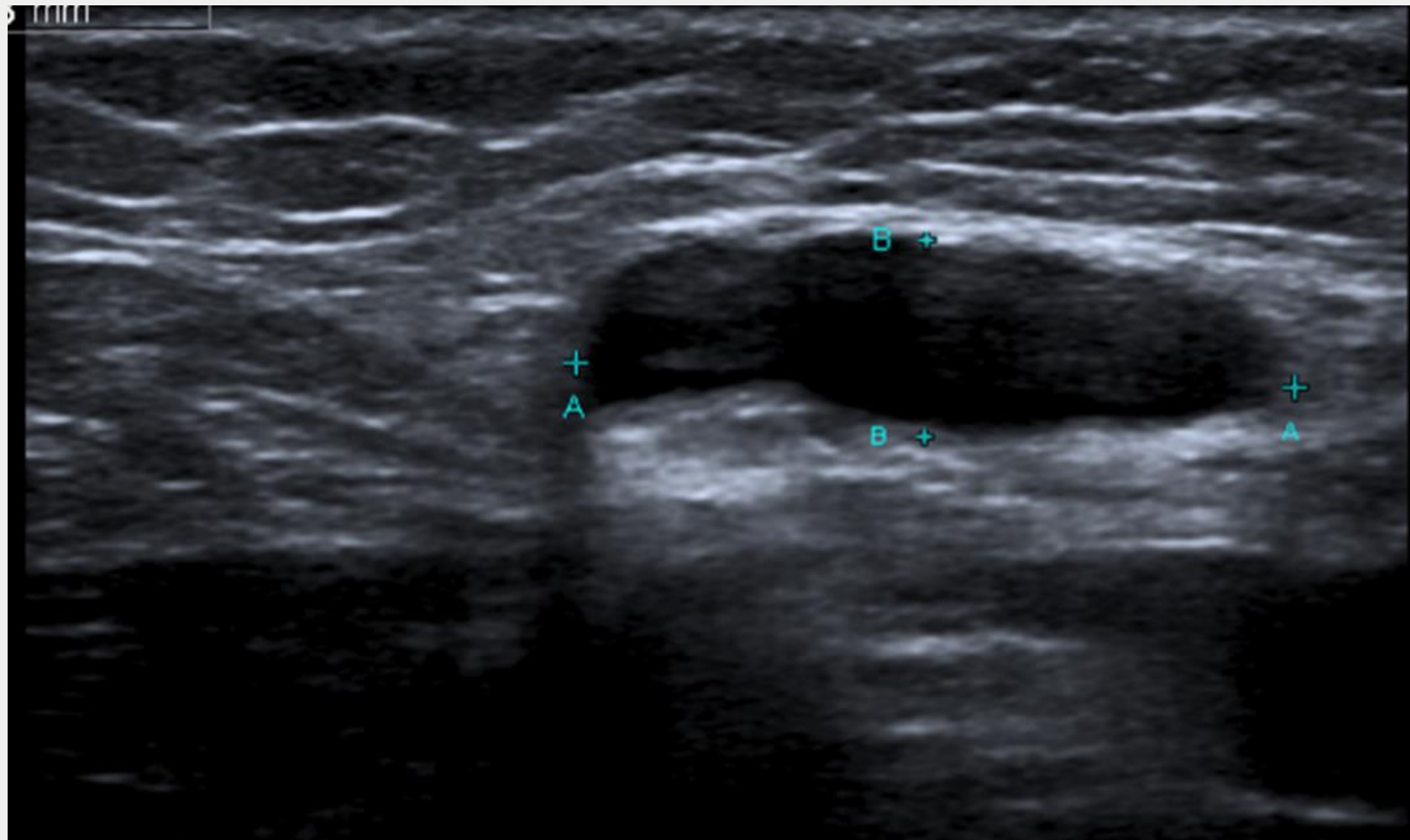


# CASE 3

**Patient Demographics:** 9 month old female

**Presenting Complaint:** Lump below the skin of the right pubis

**Ultrasound Findings:** There is a small cystic area which appears to arise within the inferior aspect of the right inguinal canal. No evidence of a right sided inguinal or femoral hernia. the appearance is thought to be consistent with a hydrocele of the Canal of Nuck. There is no evidence of dilation of this with valsalva. Please note a cyst within a cyst can be seen in a hydrocele of the Canal of Nuck.





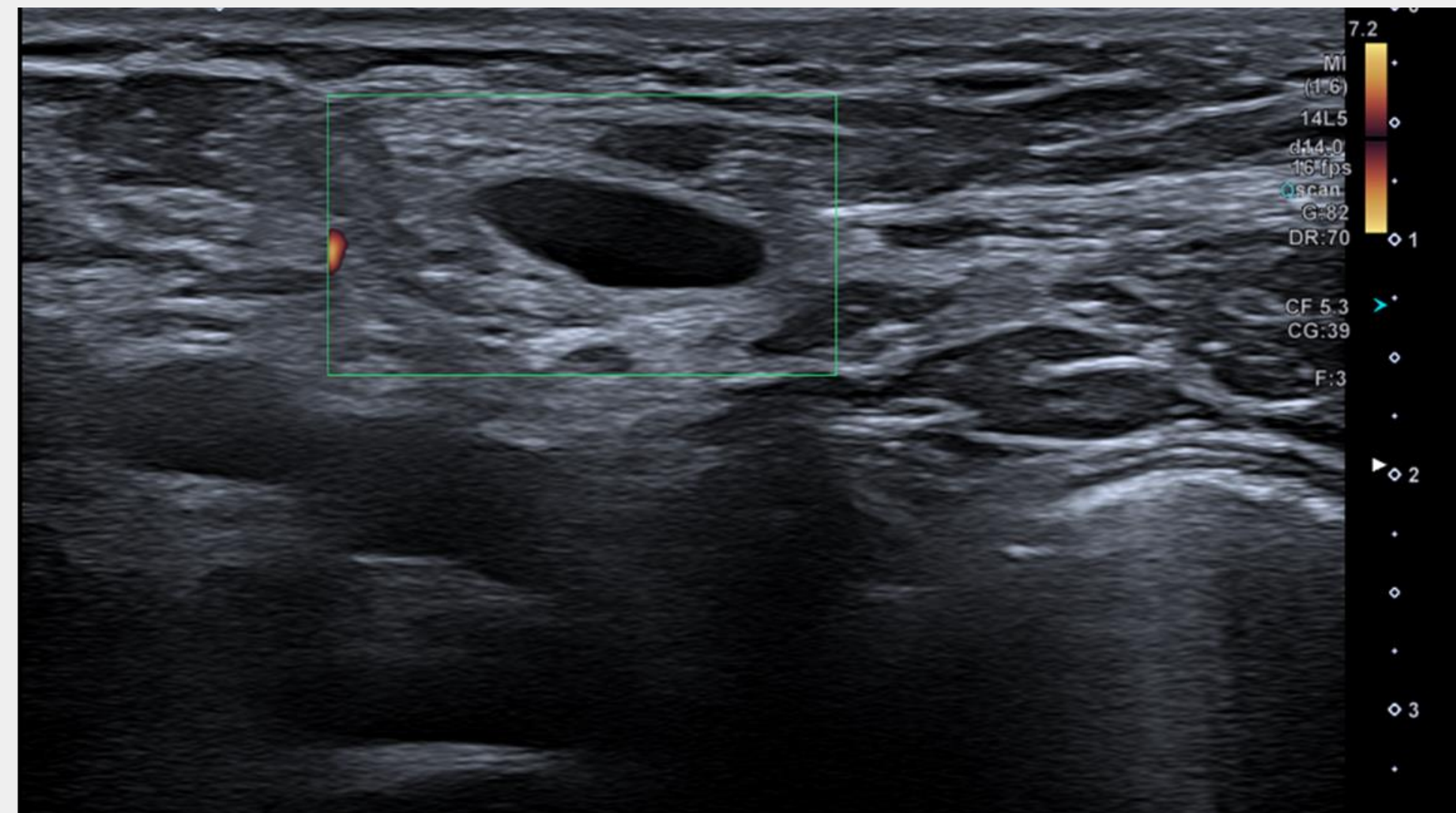
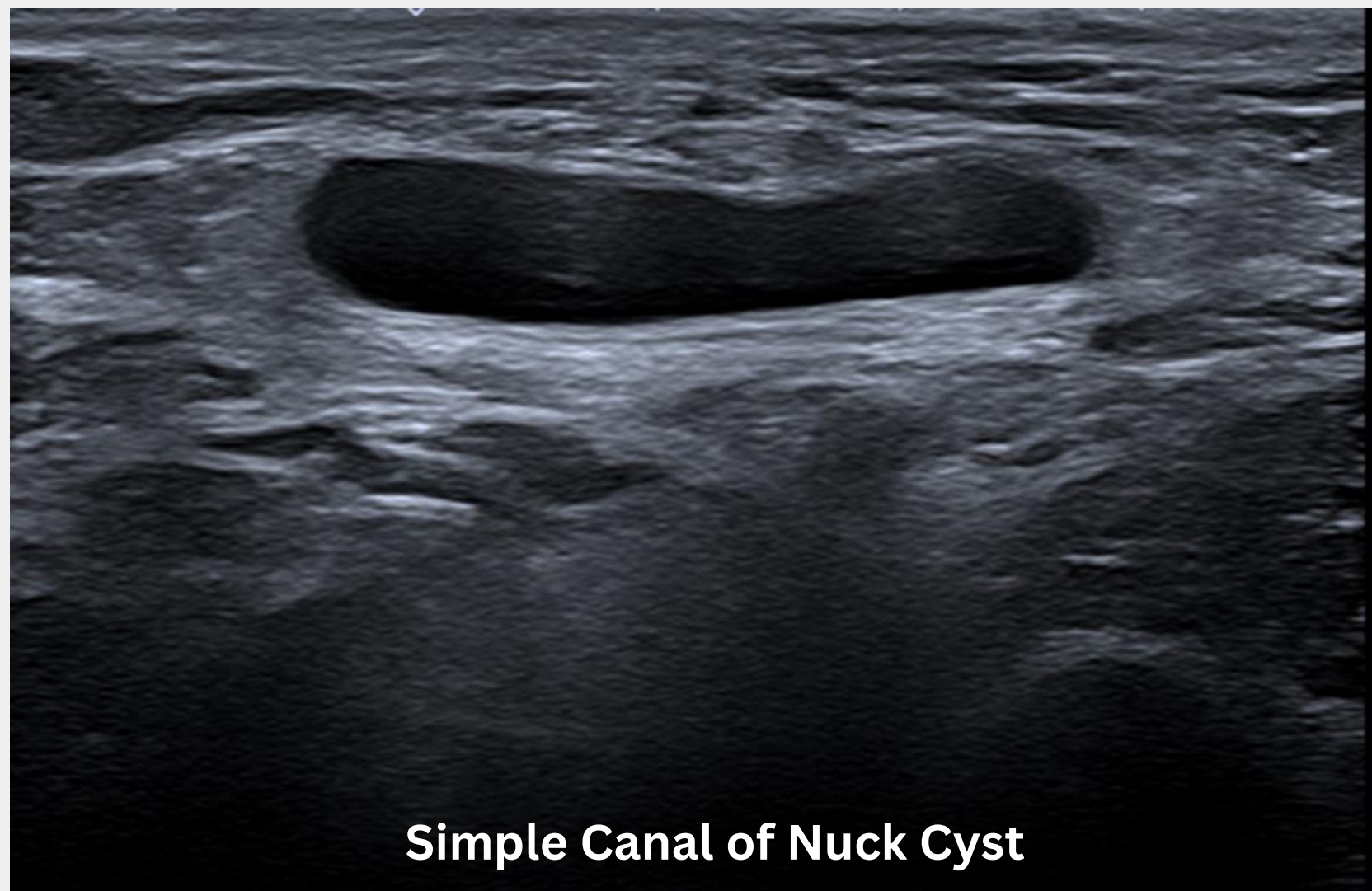
# CASE 4

**Patient Demographics:** 45 year old female

**Presenting Complaint:** Persistent right groin swelling, otherwise well. Concerns regarding lymphoma

**On Examination:** 2 cm lump in the right groin

**Ultrasound Findings:** The lump corresponds with a fluid area in the right inguinal canal. This does not change with valsalva. There is no evidence of an inguinal hernia. The appearances are in keeping with a persistent patent processus vaginalis or Canal of Nuck cyst.





# CASE 5

**Patient Demographics:** 75 year old female

**Presenting Complaint:** Soft lump in the groin

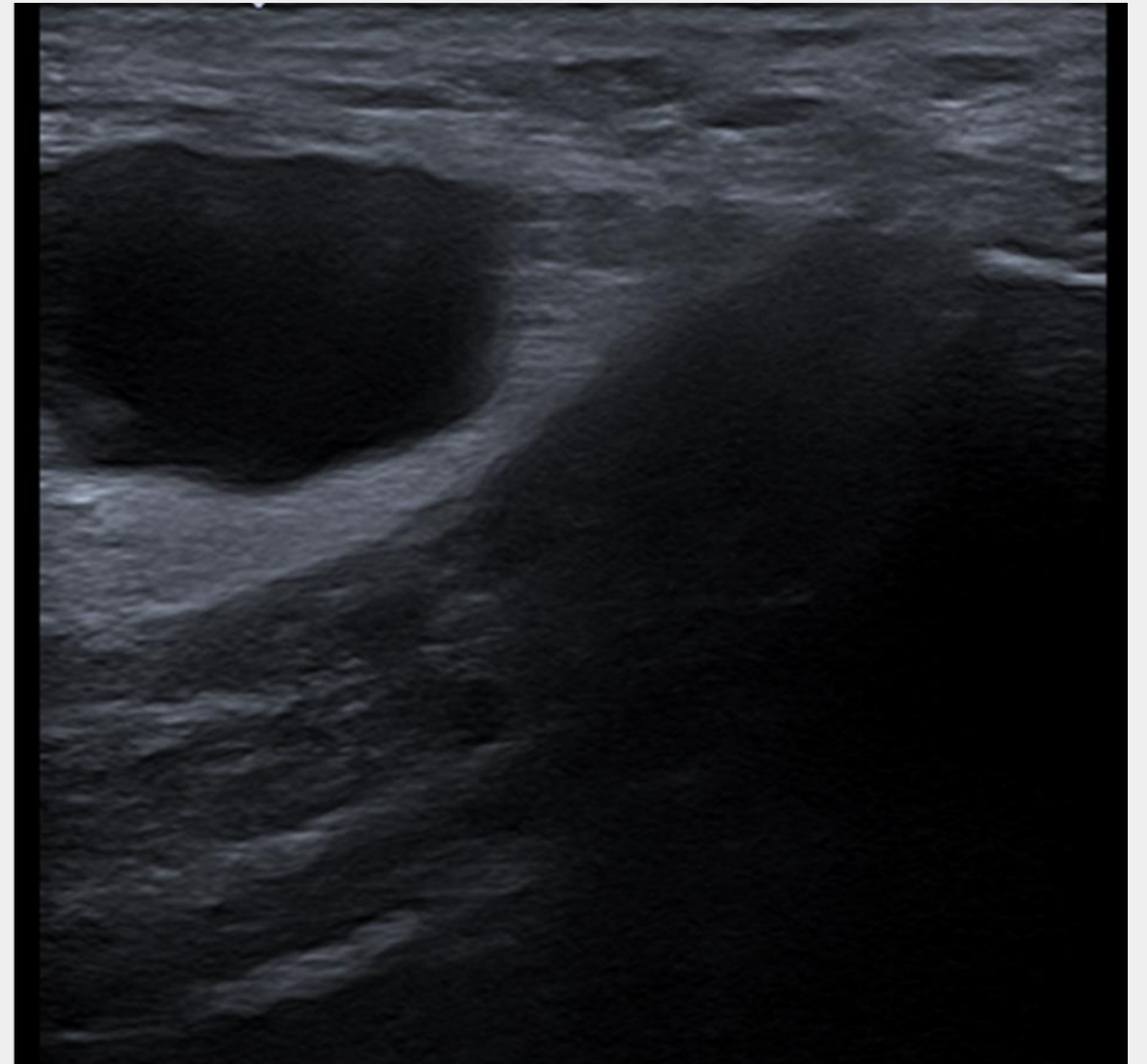
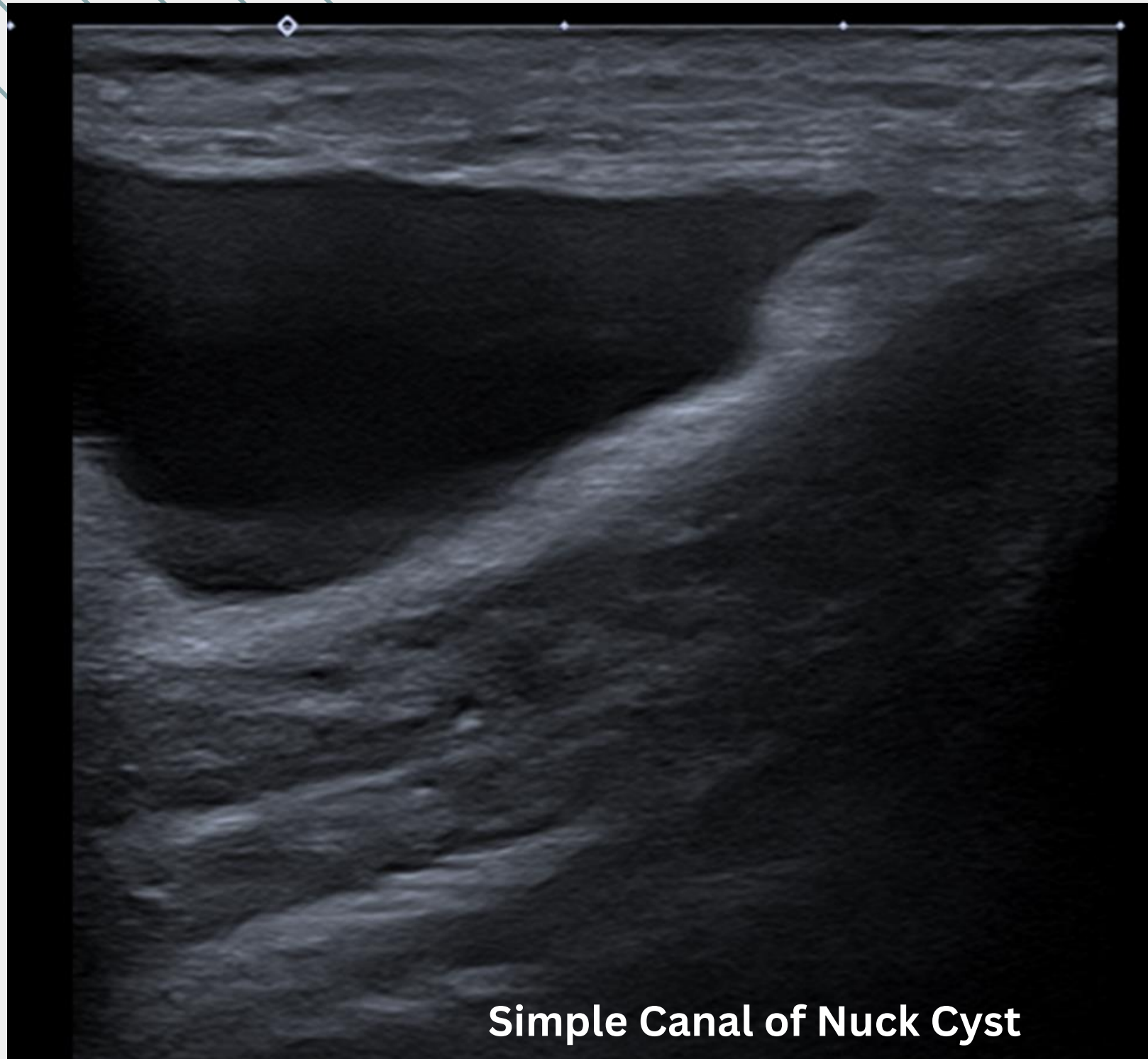
**On Examination:** 3x2 cm soft groin lump - not pulsatile, no cough impulse. ?Lipoma

**Previous Imaging:** CT from 3 years prior was normal



# CASE 5

**Ultrasound Findings:** Well defined cystic lesion in the groin intimately related to the pubic tubercle/inguinal canal. This does not change on straining, however the patient had difficulty performing valsalva. No abnormality on the left, no lymphadenopathy, no evidence of an inguinal or femoral hernia. The lesion most likely represents a benign hydrocele of the Canal of Nuck



**Thank you**

