

INTRODUCTION

Inguinal Hernia

An inguinal hernia, as seen in figure 1, is a protrusion of the peritoneum, peritoneum fat or abdominal organs through congenital or acquired holes in the abdominal wall (Berndsen et al, 2019). Inguinal hernias occur above the inguinal ligament and are the most common form with a third of men estimated to experience them within their lifetime (Robinson et al, 2013). An inguinal hernia may require surgical repair as bowel herniation may become strangulated and led to necrosis (Patel and Wright, 2021). Hernia diagnosis combines clinical inspection and sonographic assessment. Clinical diagnosis include testing reducibility. The ultrasound appearances include hyperechoic omental tissue and rounded intestinal loops demonstrating peristalsis within the inguinal canal. These features are better visualised using the Valsalva manoeuvre (Brainwood et al, 2020).

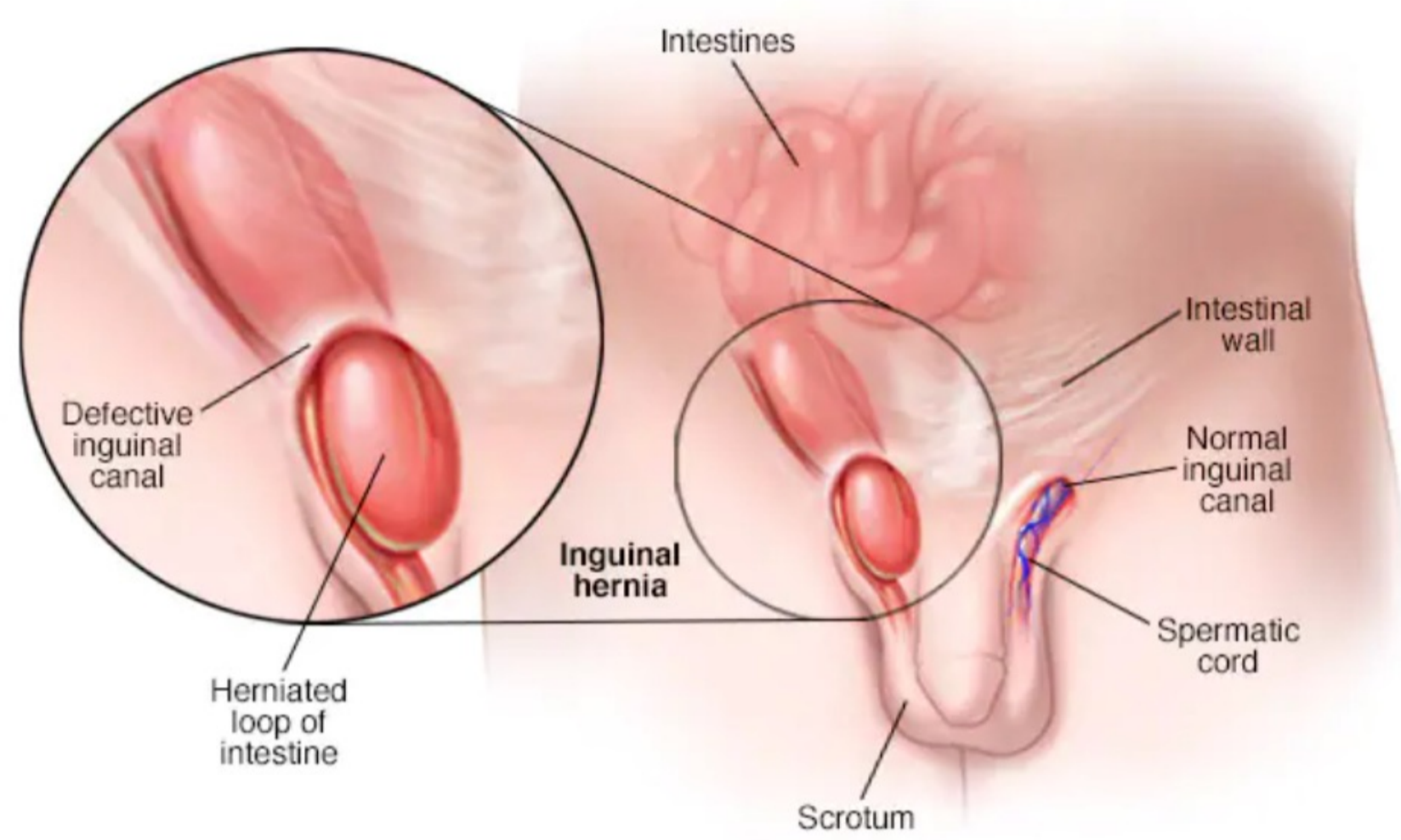


Figure 1: Diagram of the process of inguinal herniation with a herniated loop of intestine demonstrated within the right inguinal canal with a normal appearing left inguinal canal (Mayo Clinic.org, 2020)

Retractile Testicle

A retractile testicle is defined as a testicle that may ascend from the scrotum into the inguinal canal and can be manipulated back to the scrotum without causing pain (Keys and Heloury, 2012). It is considered a result of a hyperactive cremasteric reflex (Keys and Heloury, 2012). Previously, a retractile testicle was considered harmless, but recent studies have indicated there is a risk of further development into an acquired ascending testicle, which is associated with complications such as testicular torsion, infertility and malignancy (Osborn et al, 2017).

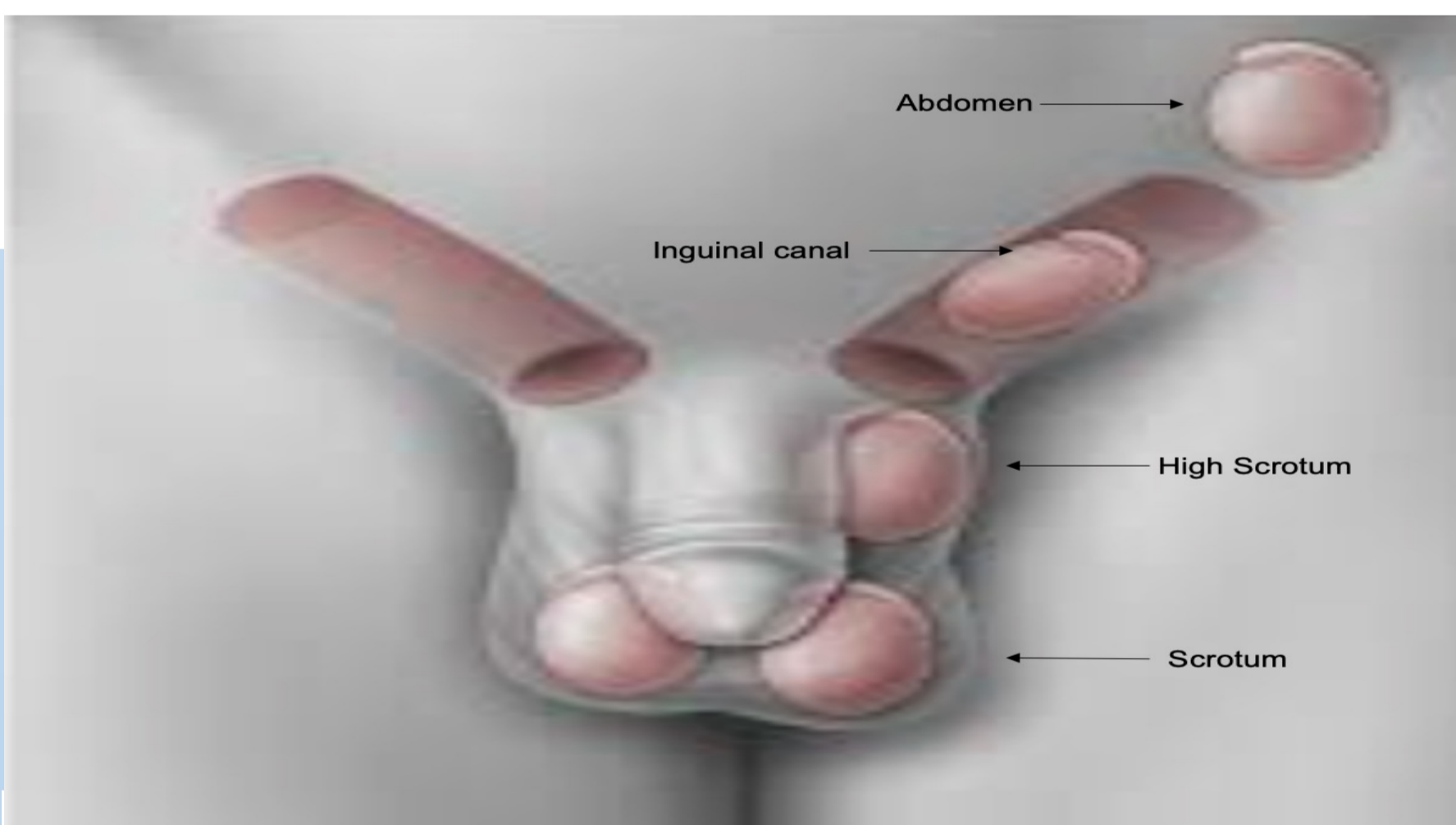


Figure 2: Diagram showing the path of testicular descent indicating the initial position in the abdomen and the descent through the inguinal canal into the scrotum (Children's Hospital of Philadelphia, 2014).

PATIENT BACKGROUND

A 42-year-old male presented to the emergency department complaining of a painful swelling to the right groin. The patient indicated they had noticed the lump for the first time two weeks prior and the pain was intermittent. The patient's blood results were normal except for a mildly elevated white blood cell (WBC) count, measuring $12.8 \times 10^9/L$. The patient had a previous history of a right sided ureteric stone that was removed in the operating theatre. He had not experienced any trauma in the region of interest. A clinical examination of the right groin was performed, which indicated the presence of a reducible inguinal hernia. It is important to note however a assessment of the testicles was not carried out at this time. There was no known familial history of inguinal herniae in this patient. Given the clinical features, a focused ultrasound scan of the right groin was requested to confirm the presence of an inguinal hernia.

ULTRASOUND EXAMINATION

A linear (2-9MHz) transducer was initially used, with the transducer placed in a transverse orientation at the palpable lump. The region of interest in the right groin correlated to an ovoid, well-circumscribed focus with a homogenous ground glass appearance. This was inferred to be testicular tissue as demonstrated in Figure 3.

ULTRASOUND EXAMINATION

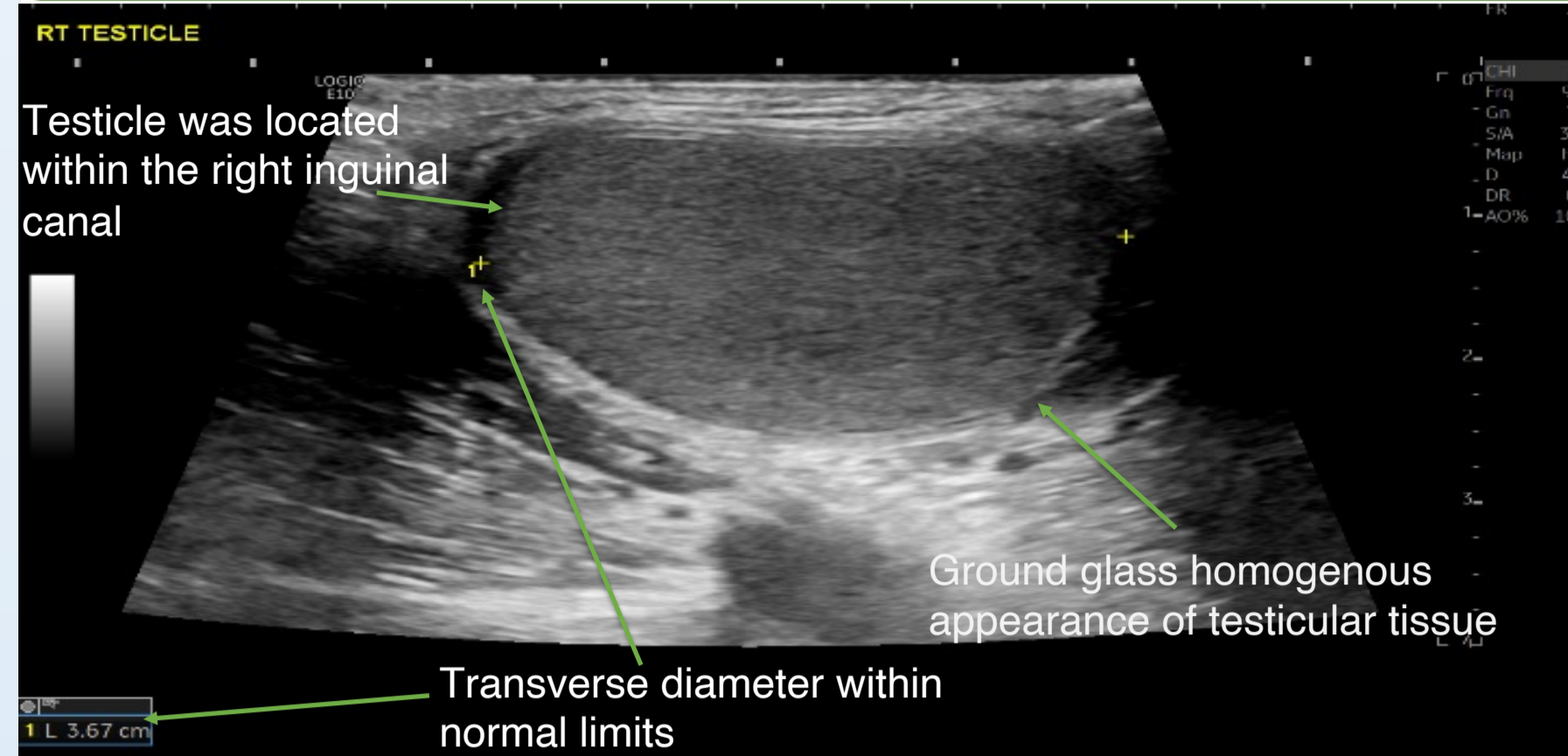


Figure 3: Transverse view of right testicle which was located within the right inguinal canal.

The extra-scrotal testicle was examined in B-mode and was normal in shape and echotexture. It measured 4.75cm x 2.25cm in its long axis, which was within normal limits and showed no signs of atrophy (Bellurkar et al., 2020). The testicle was gently compressed and stayed within the right inguinal canal.

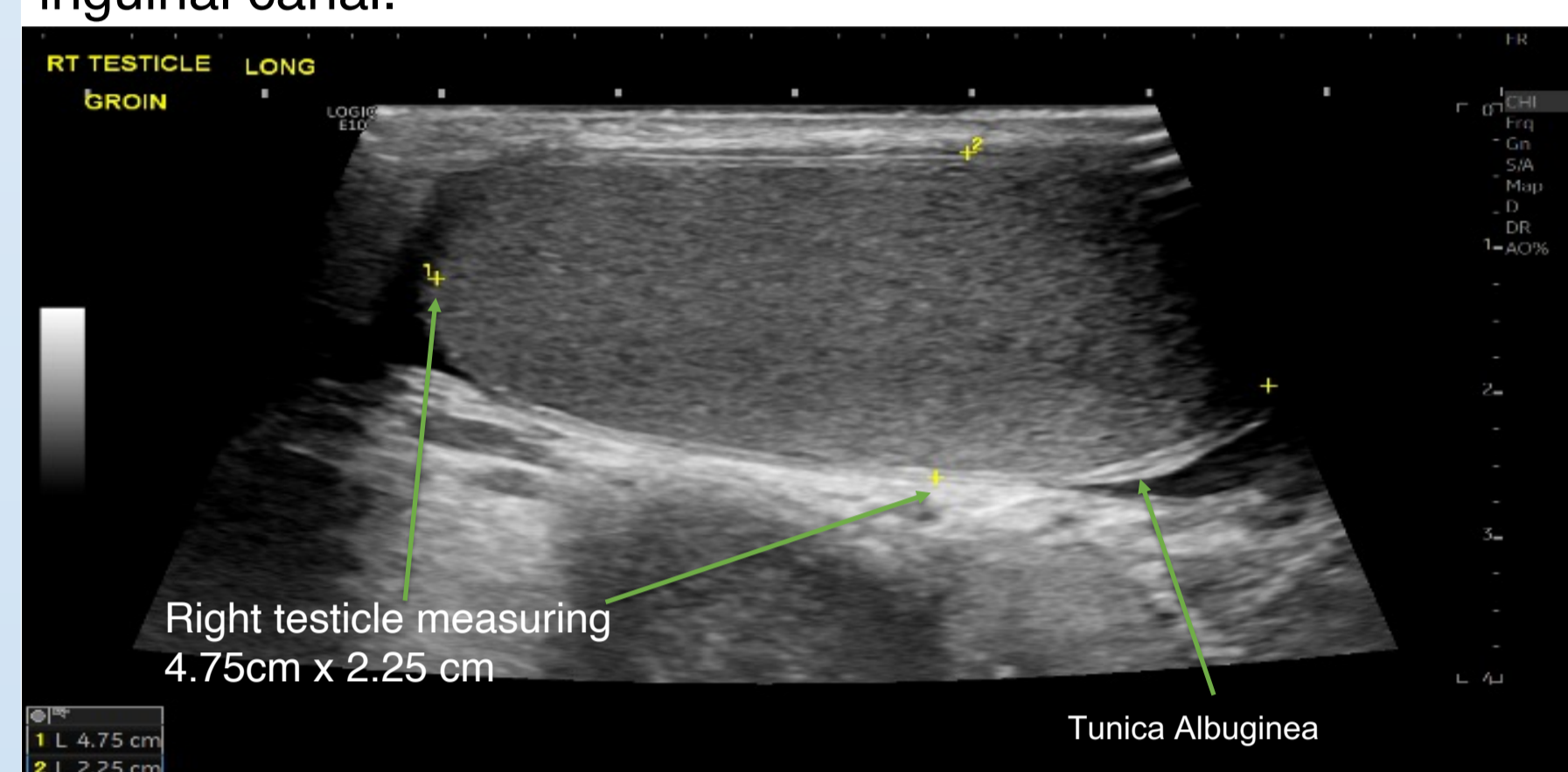


Figure 4: Right testicle within the inguinal canal measuring within normal limits.

DIAGNOSTICS & TREATMENT

An ultrasound examination of the testicles was subsequently performed. The patient was again examined by the referring physician who manipulated the testicle back to the right scrotum. Given the scan findings and patient presentation, a diagnosis of a retractile testicle as well as an indirect inguinal hernia was suggested. The patient did not require any subsequent diagnostic tests. The patient was discharged and scheduled for surgery in theatre for hernia repair using a synthetic mesh. The patient was considered at risk for the development of an acquired ascending testicle due to the period of time the testicle was within the inguinal canal and the pain to the testicle. An orchiopexy was performed, which corrects the testicle's position ensuring it remains within the scrotum (Osborn et al., 2017).

ULTRASOUND EXAMINATION

The testicle was also interrogated using colour Doppler and pulsed wave Doppler, with perfusion demonstrated throughout the testicle. An arterial waveform assessment was performed indicating biphasic flow. Despite its location within the right inguinal canal, the right testicle appeared sonographically normal.

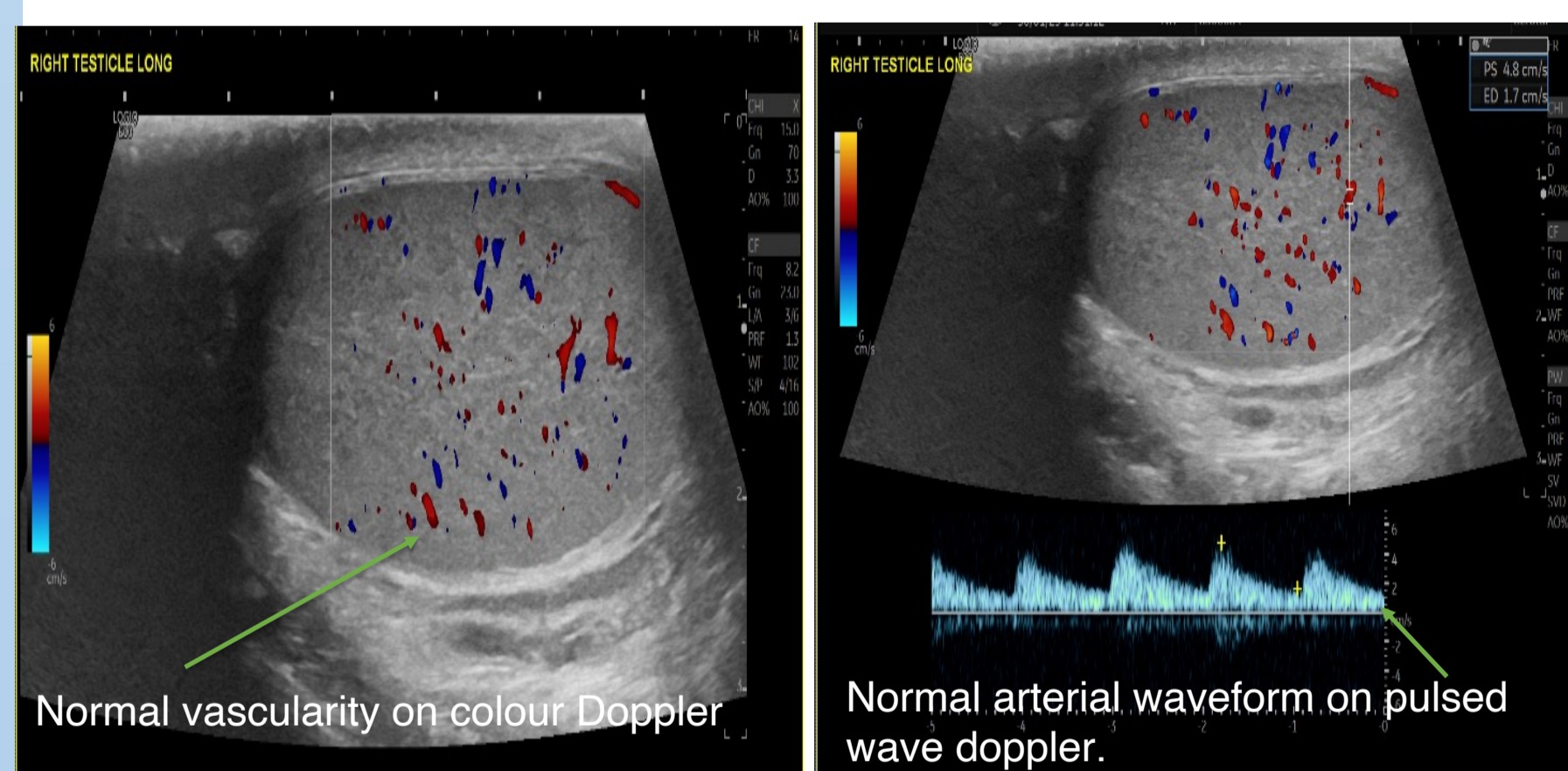


Figure 6: Right testicle displaying normal vascularity despite its position within the right inguinal canal.

The scrotal bed was examined, where a hypochoic, heterogenous vascular structure was found. This was determined to be the base of the penis, which was found in the typical location of the right testicle. Figure 6 indicates the atypical anatomical position of the right testicle.

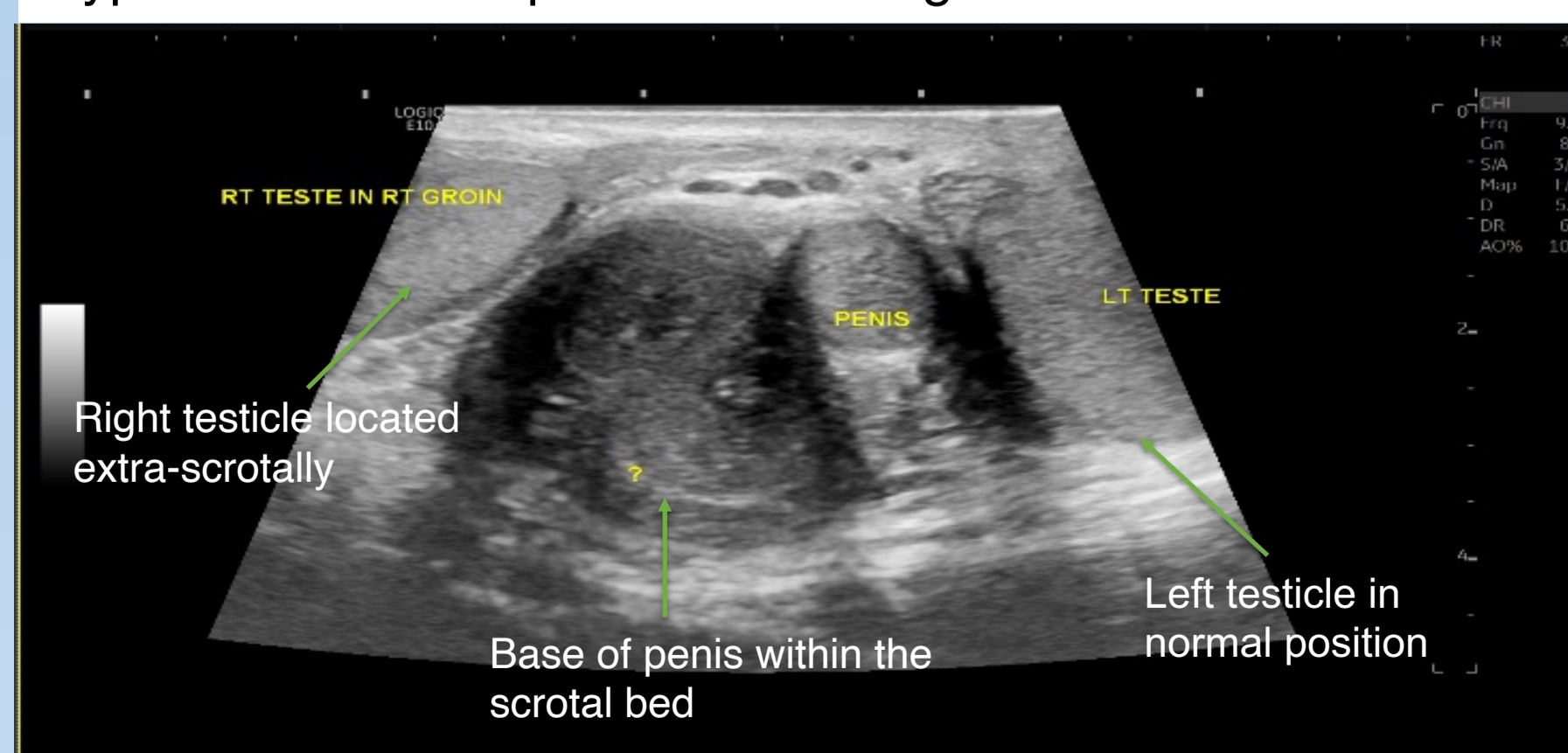


Figure 6: Transverse view demonstrating the right testicles position within the right groin

ULTRASOUND EXAMINATION

Valsalva Technique

While scanning within the inguinal canal an abdominal wall defect was apparent. The patient was asked to place a strain on the lower abdomen, and the Valsalva manoeuvre was employed. This produced a "mushroom cloud" appearance of hyperechoic peritoneal fat protruding toward the near field into the inguinal canal. The hernia was lateral to the inferior epigastric vessels, suggestive of an indirect inguinal hernia. The hernia is seen within the deep inguinal ring in figure 7.

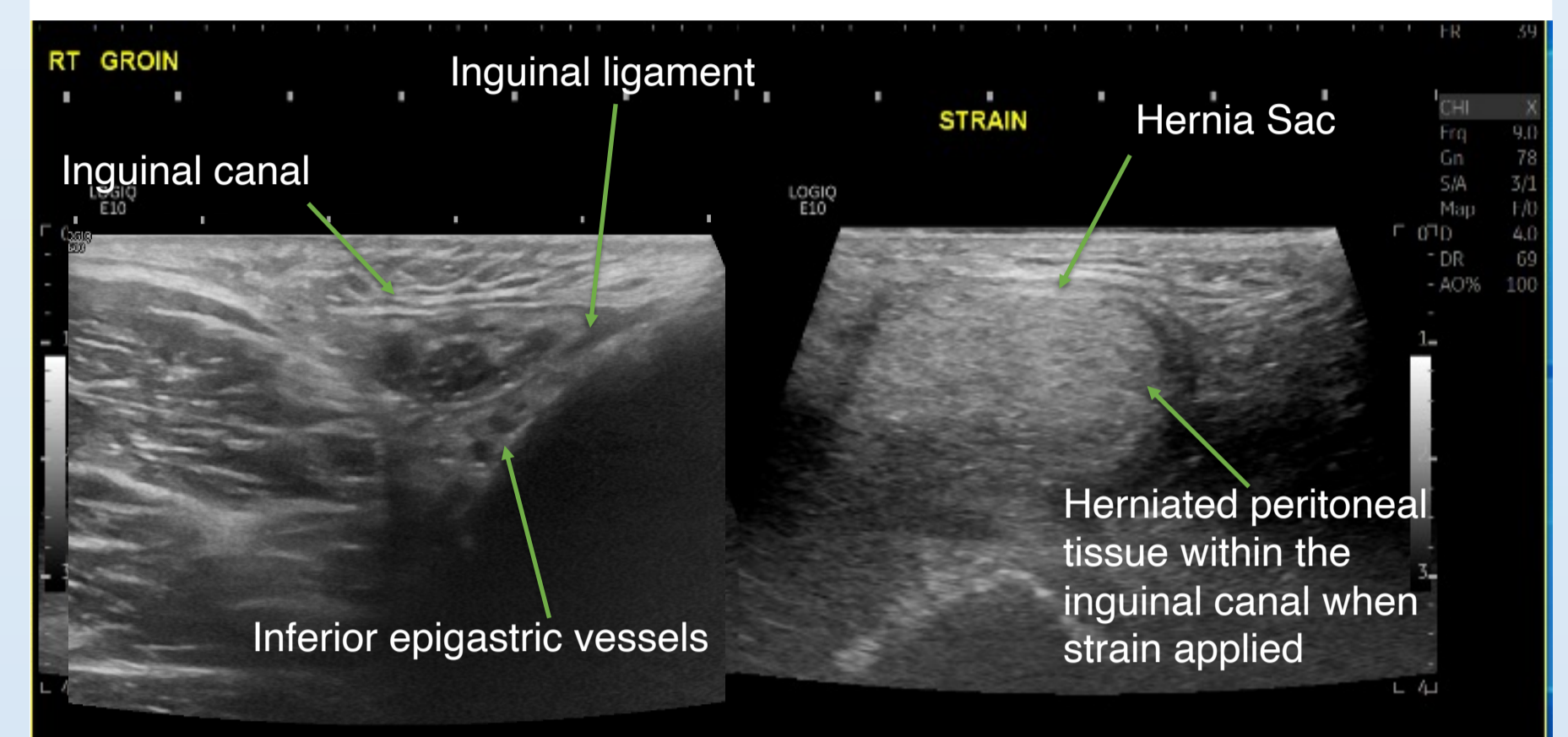


Figure 7: An indirect inguinal hernia demonstrated with herniated bowel protruding in an anterior direction toward the transducer.

The neck of the inguinal hernia was examined and measured 0.59cm in longitudinal orientation. A narrow hernia neck as demonstrated in this case may be associated with a higher risk of hernia strangulation which may lead to necrosis and is a medical emergency. (Brainwood et al., 2020)

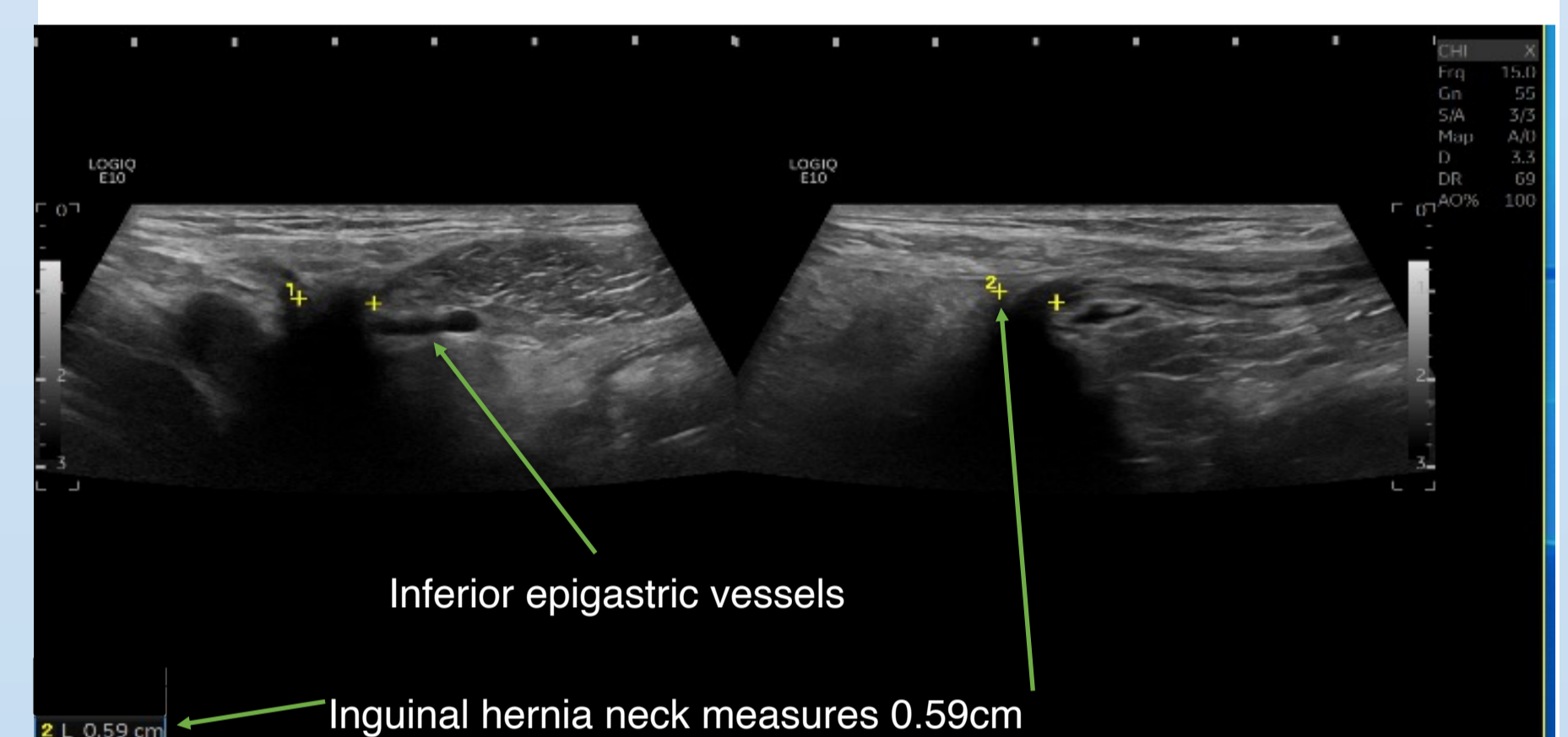


Figure 8: Longitudinal view demonstrating the neck of the inguinal hernia

The left testicle which was located within the scrotum was assessed and had a homogenous echotexture. The testicle was assessed in LS and TS and showed normal vascularity on colour Doppler. The left testicle measured 4.45cm x 1.95cm x 3.15cm.

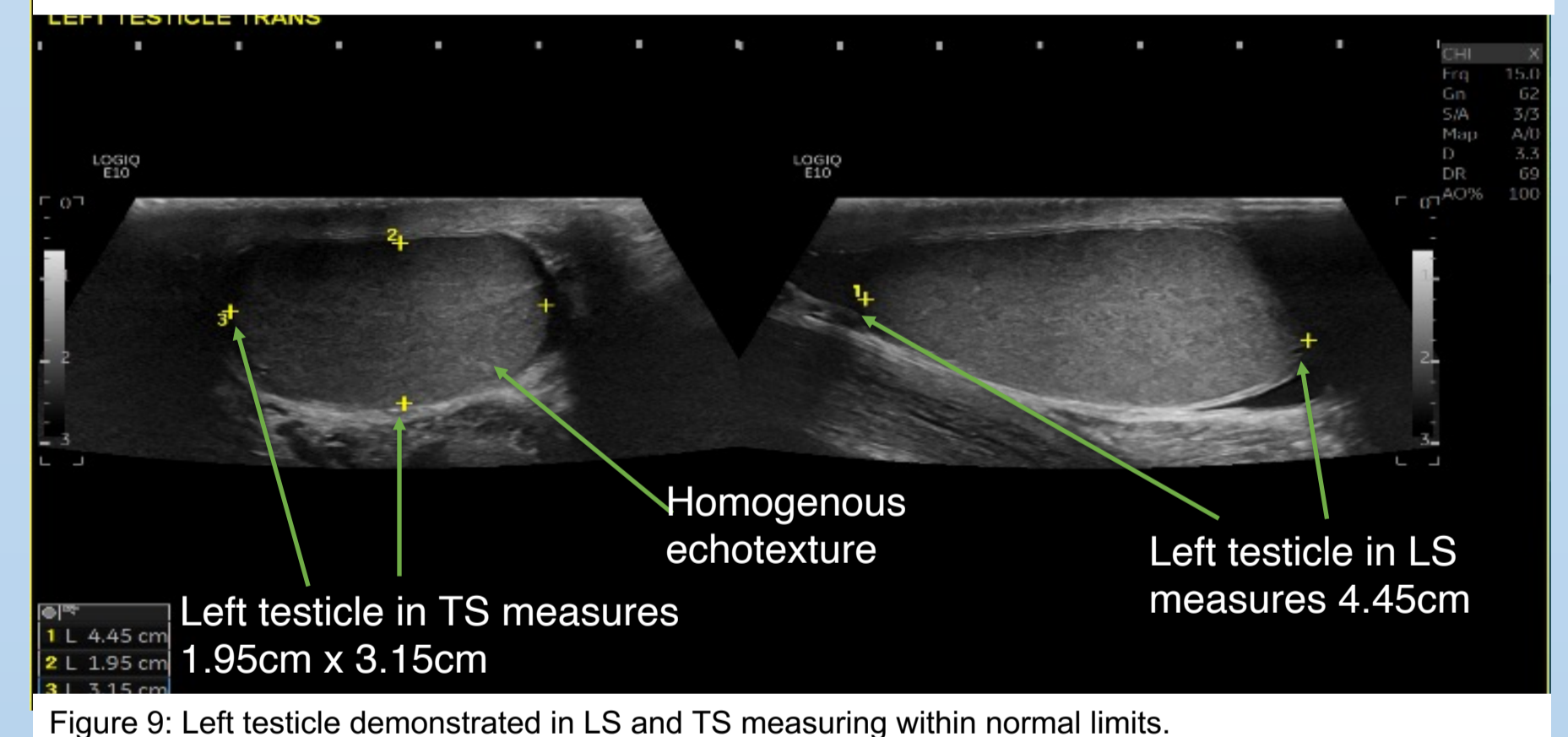


Figure 9: Left testicle demonstrated in LS and TS measuring within normal limits.

CONCLUSION

Superficial soft tissue lumps are well inferred on ultrasound. A retractile testicle is usually associated with pre-pubescence although it is possible in adulthood. A thorough scrotal examination should be performed when a palpable lump is noted within the inguinal canal to rule the presence of retractile testicle or acquired cryptorchidism. The sonographic features of an inguinal hernia are useful in determining the future risk of hernia strangulation. The relationship between inguinal hernias and retractile testicles on the same patient has not been heavily investigated in literature. This was considered an atypical presentation of retractile testicle due to the presence of an underlying inguinal hernia and the length of time the testicle was within an extra scrotal position.

REFERENCES

- Bellurkar, A., Patwardhan, S., Patil, B., Kanbur, A., Jain, H., & Velhal, R. (2020). Role of Testicular Size as a Parameter for Predicting Infertility in Indian Males. *Journal of human reproductive sciences*, 13(2), 114-116. https://doi.org/10.4103/jhrs.jhrs_7_20
- Berndsen, M. R., Gudbjartsson, T., & Berndsen, F. H. (2019). Laeknabladid. 105(9), 385-391. <https://doi.org/10.17992/ibl.2019.09.247>
- Brainwood, M., Beirne, G., & Fenech, M. (2020). Persistence of the processus vaginalis and its related disorders. *Australasian Journal of Ultrasound in Medicine*, 23(1), 22-29. <https://doi.org/10.1002/ajum.12195>
- Keys, C., & Heloury, Y. (2012). Retractable testes: A review of the current literature. *Journal of Pediatric Urology*, 8(1), 2-6. <https://doi.org/10.1016/j.jpurol.2011.03.016>
- Mayo Clinic.org (2023) Inguinal hernia. Available at: <https://www.mayoclinic.org/diseases-conditions/inguinal-hernia/multimedia/inguinal-hernia/img-20007189>.
- Osborn, D. J., Martinez, A. J., & Jezior, J. R. (2017). Surgical Management of the Adult Symptomatic Retractable Testicle. *Urology*, 100, 246-248. <https://doi.org/10.1016/j.urology.2016.10.013>
- Patel, V. H., & Wright, A. S. (2021). Controversies in Inguinal Hernia. *The Surgical clinics of North America*, 101(6), 1067-1079. <https://doi.org/10.1016/suc.2021.06.005>