SEGMENTAL TESTICULAR INFARCT– WHAT A RADIOLOGIST SHOULD KNOW AND ITS CLINICAL SIGNIFICANCE

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ABSTRACT: Awareness about the segmental testicular infarct and knowledge about the anatomy and pathophysiology is very essential for a radiologist for confident reporting and to provide reassurance tot the patient and the clinician. Thus, an unnecessary surgical removal of the testis could be avoided.

***Keywords:* Segmental testicular infarct, torsion, testicular artery, torsion-detorsion, bell-clapper, orchidectomy, centripetal arteries.**

1. Background: The very unique location of the testis [1] wrapped in an external body sac and suspended by a vascular pedicle itself is one of the common reason for vascular accident leading to global testicular infarction. However, segmental infarct of testis is rare till this date. Segmental testicular infarction is an uncommon benign finding. It usually occurs in the second and third decades of life. Though various causes like idiopathic, trauma, torsion, epididymitis, orchitis, vasculitis and sickle cell disease can be listed, the cause for segmental infarction is still unclear and a questionable one. [2] Ledwidge et al. and [3] Dogra described a patient with bell-clapper anomaly, [4] suggesting that the cause of segmental infarction was torsion-detorsion of the testis, producing ischemia in the upper pole of the testis and resultant hyperemia in the lower pole. The testicular artery exits via the inguinal ring and branches into anterior and posterior epididymal artery. After piercing the tunica albuginea, it is now known as the capsular artery that branches off into centripetal arteries that enter the septula testis and travel towards the rete testis. The deferens artery provides a second source of blood to the testis since it typically anastomoses with the posterior epididymal artery. Predisposition to a partial infarct occurs, if the arterial flow is compromised due to abnormalities in the centripetal arteries, in the division of the testicular artery, or due to an irregular anterior epididymal artery, especially if there are no significant collateral vessels. This perspective may also explain why the infarction occurred in the upper quadrant of the testis in our case, where the vascularization of the internal testicular artery or superior centripetal arteries may be more fragile. The wedge-shaped lesion should also be explained by this theory.

2. CASE DESCRIPTION:

2.1. Clinical History: 38 years old gentleman presented with complaints of dull scrotal pain and slow stream of micturition for 3 months. No history of trauma/abnormal coagulation profile.

2.2. Imaging Findings:

- Ascending urethrogram revealed no urethral stricture.
- Doppler imaging showed subtle hypo-echogenicity with reduced flow at the upper pole of the right testis.

2.3. MRI study revealed:

1. Increased T2/STIR signal intensity in the upper pole of right testis and the right epididymis is relatively bulky.
2. There is a clear zone of demarcation from the area of abnormal signal intensity to the normal appearing lower pole of the right testes.
3. On contrast imaging, the upper pole of right testis shows hypo-enhancement with a significantly hyper-enhancing rim that demarcates the upper pole from the rest of the testis.
4. The right epididymis shows patchy areas of non-enhancement.
5. Left testis and epididymis appears normal in size and signal intensity.
6. Scrotal wall appears normal. Bilateral spermatic cord appears normal.

3. DISCUSSION:

3.1. Clinical Perspective: Usually, patient present with acute scrotal pain that raises the suspicion of torsion testis unlike our patient who presented with no acute symptoms or signs of inflammation. Followed by, Doppler imaging throws light on wedge shaped or focal area of hypovascularity which has to be further differentiated from low vascular tumors.

3.2. Imaging Perspective: Contrast enhanced MR imaging comes to the rescue of both differentiating a segmental testicular infarct from low vascular tumor as well as from emergency orchidectomy.

3.3. Outcome: In our case, though the patient presented with mere urological symptoms, timely MR imaging guided towards the right diagnosis and hence saved from an unnecessary surgical event.

4. TEACHING POINT AND CONCLUSION:

Although rare, acute/chronic dull aching scrotum with focally decreased testicular flow in Doppler imaging should raise the suspicion of segmental testicular infarct and thus an unnecessary orchidectomy shall be avoided. MRI is the best modality to differentiate segmental testicular infarct from testicular low vascular tumors and sarcoidosis.

5. Summary table:

- Etiology: bell clapper deformity, torsion-detorsion, trauma, epididymitis,
- Age predilection: Second to third decade
- Risk factors: vasculitis, sickle cell disease, polycythemia
- Treatment: Treat the root cause. Rest reassurance
- Prognosis: Good

6. Differential table:

DIFFERENTIALS	IMAGING KEY POINTS
Chronic segmental right testicular infarct.	Ultrasound/Doppler: • Segmental area of hypoechogenicity/isoechoic • Poor vascularity MRI: • T1WI usually appears isointense and can show hyperintense foci of hemorrhage • T2 WI shows a hypointense area surrounded by a complete hypointense rim • No infiltration of tunica or vascular structures • Clear zone of demarcation from the area of abnormal signal intensity to the normal appearing segments of testes. • Absence of normal restriction on DWI • T1 C+: Non enhancement of pathological area except for the rim.
Low vascular testicular tumor.	Ultrasound/Doppler: • Segmental area of hypoechogenicity/isoechoic • Poor vascularity MRI: • Differentiating tool • Diffusion restriction + • Heterogeneous enhancement with contrast

Testicular sarcoidosis	Ultrasound:
	• Enlarged epididymis and multiple nodules with decreased echogenicity.
	MRI:
	• **T1 C+**
	  ○ enlarged epididymis
	  ○ may be unilateral and solitary, however, more often are multiple, small, bilateral nodular lesions
	  ○ enhancing with contrast
	• **T2:** as above however lesions show low signal intensity

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8. REFERENCE:

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FIGURES:

Figure 1: Pictorial representation of testicular blood supply. If anterior epididymal artery (*dotted line*) is absent or its flow is impaired (e.g., because of excessive intra-scrotal testicular movement, torsion-detorsion event, unobserved interruption of arterial blood flow during surgeries performed on spermatic cord within the inguinal canal), then the capsular artery will be terminal vessel in upper pole of testis and is not supplied by collaterals. This possibility may make the patient prone to a focal infarct. a = artery.

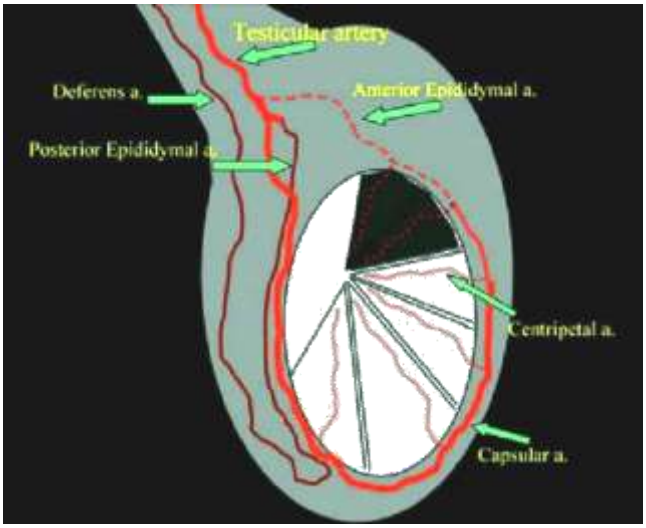

Figure 2: Ascending urethrogram- left posterior oblique view shows smooth contrast opacification of penile, bulbar, membranous and prostatic part of urethra and into the bladder. No evidence of stricture or contrast extravasation.

Figure 3: B-mode ultrasound of right testis (A) shows subtle hypo-echogenicity at the upper pole; followed by the corresponding area shows reduced flow in Color doppler (B).

Figure 3A

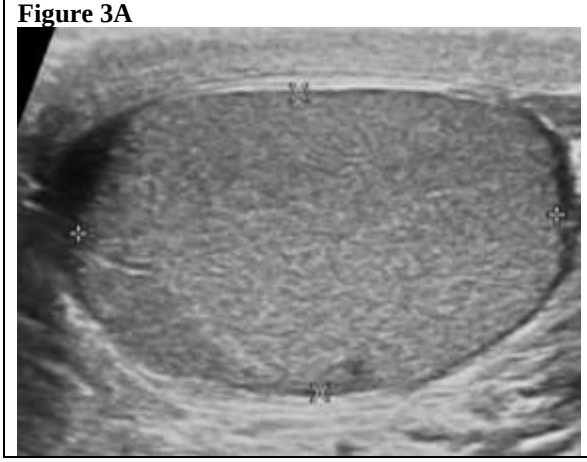

Figure 3B

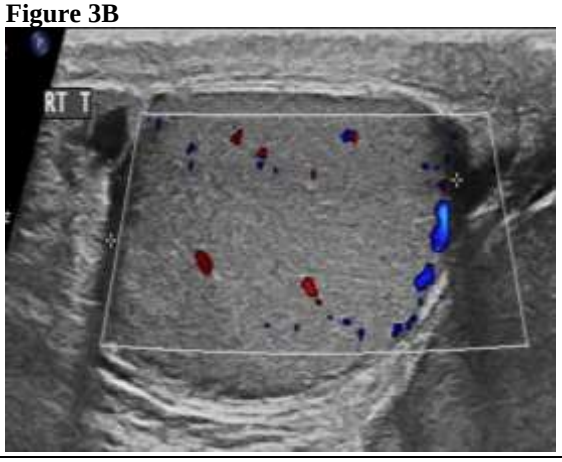

Figure 4: MRI pelvis coronal section T2 (A) and T2 SPIR (B). shows area of increased signal intensity in the upper pole (red arrow) of right testis with clear line of demarcation (yellow arrow) from the rest of the normal appearing testis. MRI pelvis T1 FS Post Contrast Coronal (C) and Sagittal (D) shows segmental area of non- enhancement (red arrow) involving the upper pole of the right testis with hyperenhancing thin rim (yellow arrow) clearly demarcating the viable zone (lower pole).

Figure 4A

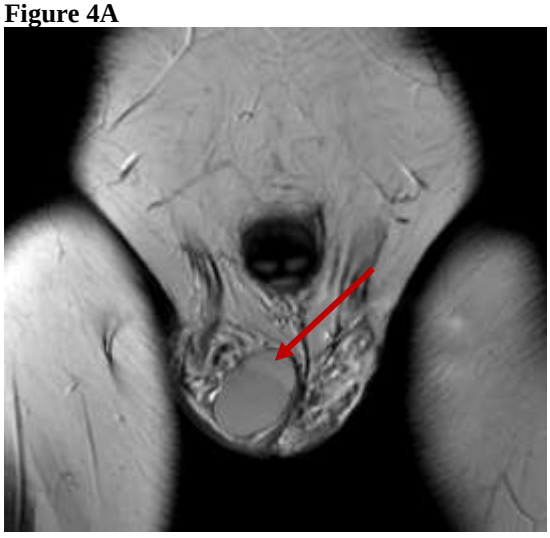

Figure 4B

Figure 4C

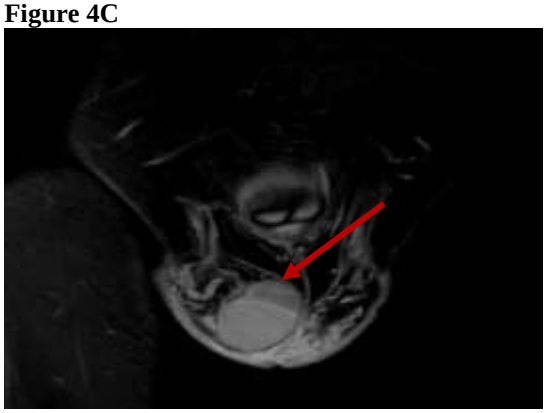

Figure 4D