A case of epididymoorchitis without testicular infarction presenting with reversal of diastolic testicular flow on Doppler ultrasonography

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ABSTRACT
An acute scrotum is a common clinical scenario prompting urologic involvement. Scrotal ultrasonography with Doppler is the main imaging modality utilized for the evaluation of an acute scrotum and can help distinguish testicular torsion from epididymoorchitis, two common causes of testicular pain. Testicular infarction is a rare but potential complication of epididymoorchitis. We report a case of epididymoorchitis presenting with reversal of testicular diastolic flow concerning for impending testicular infarction but with a non-ischemic testis on scrotal exploration and repeat scrotal ultrasonography post-operatively.

Introduction
Acute scrotum is a common consultation seen by urologists in the Emergency department that requires prompt evaluation, as a delay in diagnosis of testicular torsion and ischemia can lead to testicular loss. Epididymitis is a common cause of acute testicular pain that can mimic the signs and symptoms of testicular torsion. We present a rare case of epididymoorchitis presenting with reversal of testicular diastolic flow on scrotal Doppler ultrasonography concerning for impending infarction, but with a non-ischemic testis on scrotal exploration.

Case presentation
A 68-year-old man with hypertension and gout presented to the hospital with 18 hours of acute right testicular pain associated with swelling. He had no systemic or urinary symptoms and reported voiding normally. He had no history of trauma. He had known large volume prostatomegaly (160 g) with several episodes of urinary retention over the last 4 months managed with tamsulosin, finasteride, and as-needed clean intermittent catheterization with plans for bladder outlet procedure. He had a history of urinary tract infections with Serratia marcescens but no sexually transmitted diseases.

He was afebrile with stable vitals. Labs showed leukocytosis to 23,700/μL (normal range, 4000-11,000/μL), elevated glucose to 137mg/dL (normal range, 70–100mg/dL), hyponatremia to 134mmol/L (normal range, 135–145mmol/L), normal blood urea nitrogen and creatinine. Urinalysis showed 51-100 RBC/HPF, 11-30 WBC/HPF, positive bacteria, 1+ leukocyte esterase, and negative nitrites.

His examination revealed an enlarged and firm right testicle, tender to palpation. A scrotal Doppler ultrasonography showed an edematous epididymis with hyperemia and an edematous right testis (4.5 x 3.0 x 3.2cm) with increased vascular flow and reversal of diastolic flow concerning for impending testicular infarction [Fig. 1, Fig. 2].

Given the rarity of the ultrasound finding, we performed a literature review and noted that all case reports of reversal of diastolic flow resulted in eventual testicular infarction and loss. We thus counseled the patient regarding the need for scrotal exploration with possible right orchiectomy and future procedures. He provided consent and was taken urgently to the operating room. Intra-operatively, there was no evidence of testicular torsion or ischemia. A small amount of right hydrocele fluid was sent for culture, which was negative for infection. An enlarged right epididymis and congested right testicle was seen. He was continued on IV cefepime for 2 days, his symptoms improved, and he was discharged with 2 weeks of oral sulfamethoxazole-trimethoprim for a Serratia marcescens urine culture.

Scrotal Doppler ultrasonography on post-operative day 24 revealed a hypervascular right testicle slightly smaller in size (4.5 x 2.6 x 1.5cm) with areas of hypoechoic appearance suggestive of scarring and inflammatory changes from chronic orchitis [Fig. 3]. There was no reversal of diastolic flow or signs of ischemia seen. A prominent right epididymis was again noted. He was seen in clinic on post-operative day 30 at which time the right testis was slightly enlarged and mildly tender.

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but the patient reported feeling well and voiding without requiring clean intermittent catheterization. Repeat urine culture revealed persistent *Serratia marcescens* and the patient was given three additional weeks of sulfamethoxazole-trimethoprim based on culture sensitivities.

**Discussion**

The presentation of acute scrotum to the Emergency department at any age requires prompt evaluation. It is critical to rule out the diagnosis of testicular torsion and ischemia, as the time to surgical intervention for testicular torsion is directly correlated to the likelihood of testicular viability and salvage. Missing an infarction of the testis can lead to significant morbidity for the patient and lead to irreversible testicular loss.

Acute epididymitis and epididymoorchitis may present with similar clinical signs and symptoms as testicular torsion. In the setting of acute

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**Fig. 1.** Initial scrotal Doppler ultrasonography obtained 18 hours after onset of acute right testicular pain. (A) Gray scale transverse image of both testes showing an enlarged and edematous appearance of the right testis compared to the contralateral left testis. (B) Color Doppler transverse image of both testes showing relatively increased vascular flow within the right testis. (C) Color Doppler image of the right epididymal body and (D) epididymal tail showing edema and hyperemia. (For interpretation of the references to color in this figure legend, the reader is referred to the Web version of this article.)

**Fig. 2.** Initial Spectral Doppler ultrasound image of the (A) right testis showing reversal of arterial diastolic flow and (B) left testis showing normal arterial flow.
scrotum, imaging is done with color Doppler ultrasonography to characterize epididymal and testicular flow to differentiate between testicular torsion and epididymoorchitis. The detection of intratesticular blood flow using Doppler sonography is 86% sensitive, 100% specific, and 97% accurate for the diagnosis of torsion and testicular ischemia in this scenario.

Testicular infarction has been reported as a rare but serious potential complication of epididymoorchitis, and has been described in cases of bacterial epididymoorchitis complicated by abscess formation despite appropriate antibiotic treatment. Sanders et al. describes the coexistence of epididymoorchitis with testicular ischemia in a patient with epididymoorchitis who on scrotal Doppler ultrasonography had reversal of testicular diastolic flow likely secondary to infarction. Surgical exploration showed a non-viable testis, and pathology from the orchiectomy confirmed suppurative epididymoorchitis with ischemic necrosis of the testis.

The reversal of Doppler diastolic flow in acute epididymoorchitis is suggestive of testicular venous infarction. Gerscovich et al. describes a patient with epididymoorchitis that had reversal of diastolic flow to the ipsilateral testicle in addition to forward arterial flow on ultrasonography who was discharged home with antibiotics but remained symptomatic. Repeat ultrasonography 3 weeks later showed no intratesticular flow, and a gangrenous left testis and epididymitis was discovered upon scrotal exploration.

A similar patient was taken immediately for scrotal exploration for findings of reversal of diastolic flow on ultrasonography, but no evidence of testicular ischemia was found intraoperatively. Repeat ultrasound on post-operative day 1 performed for persistent testicular pain demonstrated absent flow to the testicle, and he underwent orchiectomy for an infarcted testis.

Conclusion

Infarction of the involved testicle can be a morbid complication from epididymoorchitis. The detection of the reversal of diastolic flow on Doppler ultrasonography may be an indicator of impending testicular infarction in certain cases; however, this was not demonstrated with our patient. In these case reports of testicular infarction, patients remained persistently symptomatic without resolution despite appropriate antibiotic therapy. In contrast, our patient showed clinical and symptomatic improvement on antibiotics, and repeat scrotal ultrasonography showed no sign of testicular ischemia. Despite our negative finding, we believe it would still be advisable to surgically explore patients who are found to have reversal of testicular diastolic flow, as the risk of missing a testicular infarction can lead to significant morbidity. In the setting of a negative surgical exploration, patients should be closely monitored for symptomatic improvement and repeat ultrasound(s) should be obtained to rule out testicular infarction.

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Ethics approval

Verbal and written informed consent was obtained from the patient.
Declaration of competing interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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