Images: Ruptured intratesticular arteriovenous malformation

Mario Capitano, MD[1]; Nicola Schieda, MD[2]; Susan J. Robertson, MD[1]; Chris Morash, MD[3]; Rodney H. Breau, MD[3]; Conrad Maciejewski, MD[3]; Trevor A. Flood, MD[1]

[1]Department of Pathology & Laboratory Medicine, The Ottawa Hospital, Ottawa, ON, Canada; [2]Department of Medical Imaging, The Ottawa Hospital, Ottawa, ON, Canada; [3]Department of Urology, The Ottawa Hospital, Ottawa, ON, Canada

Cite as: *Can Urol Assoc J* 2018;12(11):E489-91. http://dx.doi.org/10.5489/cuaj.5049

Published online June 8, 2018

Introduction

The majority of intratesticular masses in men 20–40 years old are malignant germ cell tumours. Although rare, there are several benign entities that also must be considered in the differential diagnosis, including orchitis, hematomas, and vascular neoplasms.[1] Arteriovenous malformations (AVMs) are benign vascular lesions that rarely occur in the testicle. The pathogenesis of intratesticular AVMs may be congenital or post-traumatic.[2] These benign lesions typically present as painless, non-palpable masses and are usually detected incidentally during the workup for infertility.[3] Intratesticular AVMs are associated with characteristic colour Doppler ultrasound and dynamic contrast magnetic resonance imaging (MRI) features. Most reported cases have been managed conservatively, although surgery may be indicated if the patient is symptomatic.[2]

Case report

A healthy 37-year-old male presented to the emergency department with sudden onset of nausea and severe left-sided scrotal pain with associated swelling. He had no previous history of similar episodes and he reported an absence of testicular trauma or lower urinary tract symptoms. Medical, social, and family histories were non-contributory. Physical examination revealed a swollen and tender left testicle. A palpable mass was not appreciated and the remainder of the examination was unremarkable. Serum testicular cancer markers (lactate dehydrogenase [LDH], alpha-fetoprotein [AFP], and beta-human chorionic gonadotropin [hCG]) were within normal limits. The patient was sent for urgent ultrasound for further characterization. Grey-scale ultrasound images depicted a 1.7x1.6x1.5 cm heterogeneously hyperechoic mass extending from the interpolar to upper polar regions of the testicle. The majority of the mass showed no internal flow on colour and power Doppler techniques except for a minute peripheral hypoechoic component. Pulsed Doppler showed low resistive arterial flow (Fig. 1). The urology team reviewed the imaging and felt that a malignant neoplasm could not be fully excluded. The patient consented to a radical orchiectomy if there were no intraoperative signs of testicular torsion. Surgery was routine and there were no additional findings. The specimen was sent to pathology for examination.

Gross examination of the radical orchiectomy specimen showed a testis measuring 5.7x4.7x1.5 cm. The external surface was unremarkable. On cut surface, there was a 2.2x1.8x1.5 cm red-brown mass that was suggestive of clotted blood. The mass was located adjacent to the tunica albuginea and opposite of the epididymis. The remainder of the testicle was unremarkable. The lesion was entirely submitted for microscopic examination (Fig. 2). Slides showed areas of recent hemorrhage that were compressing the seminiferous tubules. There was a focus of arteries and distended, thin-walled veins that were intimately associated with the area of hemorrhage. There was no cellular atypia and germ cell neoplasia in situ was absent. The findings were consistent with a recently ruptured intratesticular AVM with associated hemorrhage.

Discussion

Intratesticular AVMs are extremely rare and benign vascular lesions. They tend to be <10 mm in greatest dimension and are composed of complex jumbles of dilated arteries and veins without intervening capillaries. AVMs typically are not painful and tend to be detected incidentally during the evaluation for infertility.[3] In this report, the patient presented with severe scrotal pain of sudden onset. An intratesticular AVM

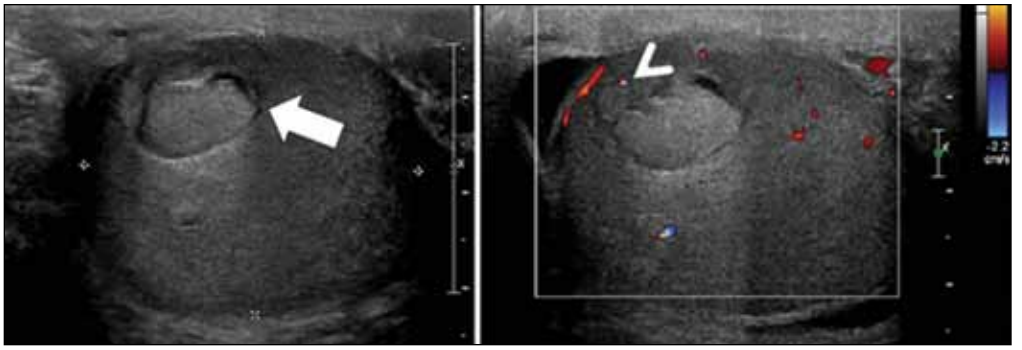

Fig. 1. Pulsed Doppler showing low resistive arterial flow.

presenting with pain has been reported once before in the literature, where the discomfort was described as recurrent and chronic in nature[4] rather than acute, as in this report. The most common disease processes that present with acute scrotal pain include testicular torsion, epididymo-orchitis, and occasionally germ cell tumours when there is associated intralesional hemorrhage or infarction.[5,6] The symptoms of pain that are sometimes associated with intratesticular AVMs have been hypothesized to be secondary to ischemia. This occurs because of the absence of capillaries that exist between tangled arteries and veins. This lack of capillaries allows blood travelling between the arteries and veins to flow rapidly under high pressure, with subsequent bypassing of the target tissue, leading to ischemic changes and subsequent pain.[4] In regard to our patient, the cause of the acute nature of the pain was likely due to the sudden rupture of the AVM, with subsequent mass effect secondary to hemorrhage.

The previously reported cases of intratesticular AVMs are described as being hypoechoic and solid on grey-scale ultrasound.[3,7,8] These grey-scale findings are relatively non-specific and can be seen in both malignant and benign lesions.[9] Notably, the mass in our case was hyperechoic on sonography, in retrospect, due to the large amount of hemorrhage associated with the ruptured AVM. Numerous lesions can be hyperechoic on ultrasound, including teratomas, epidermoid cysts, and "burnt out" germ cell tumours.[10,11] Colour Doppler ultrasound can frequently aid in the identification of AVMs and typically shows prominent vessels throughout the mass with low-resistive, high-velocity bidirectional flow. Occasionally, the presence of a feeding artery and draining vein may be identified.[3,8]

Our case lacked the characteristic ultrasound features because the minute AVM had ruptured and was associated with a large amount of pooling intratesticular hemorrhage that lacked blood flow. Additionally, the large amount of hemorrhage also helps to account for the lesion's relatively large size, given that intratesticular AVMs tend to be less than 1 cm in greatest dimension.[1] Although not used in the current case, dynamic contrast MRI examination can help demonstrate the lesion's vascular nature and shows early and intense enhancement. Serpiginous structures indicative of the feeding vessels may also be identified.[3]

Conclusion

In conclusion, intratesticular AVMs are extremely rare, benign vascular lesions with only a handful of cases reported in the literature. Their clinical presentation can be variable, although typically they are painless, non-palpable masses that are detected incidentally. Colour Doppler ultrasound and dynamic-contrast MRI can highlight the lesion's vascular nature and the presence of a feeding artery with draining vein. In the current case, rupture of the intratesticular AVM with associated hemorrhage clouded some of the expected clinical features usually seen with these lesions.

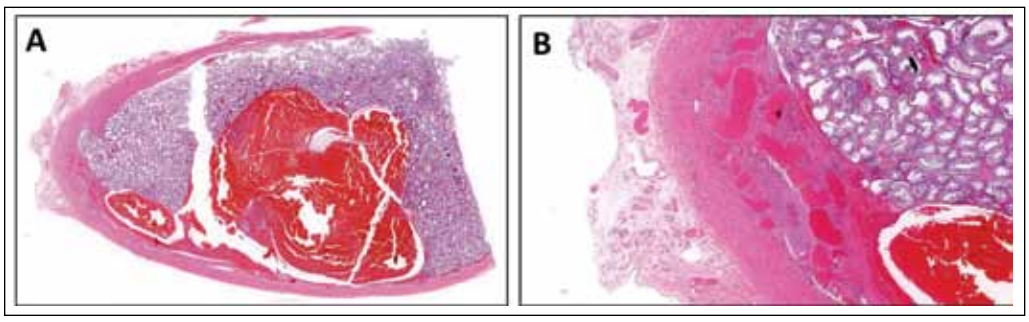

Fig. 2. Microscopic examination of the lesion.

Competing interests: Dr. Morash has attended advisory boards for AbbVie, Astellas, Ferring, Janssen, and Sanofi; and participated in the CRONOS II trial, supported by AbbVie. Dr. Maciejewski has attended advisory boards for Paladin, and has received grants/honoraria from Astellas and Pfizer. The remaining authors report no competing personal or financial interests.

This paper has been peer-reviewed.

References

1. Gulsen F, Mihmanli I, Kantarci F, et al. Testicular arteriovenous malformation: Gray-scale and color Doppler ultrasonography features. *Case Rep Med* 2011;2011:876206. https://doi.org/10.1155/2011/876206
2. Bhatt S, Jafri SZ, Wasserman N, et al. Imaging of non-neoplastic intratesticular masses. *Diagnostic Intervent Radiol (Ankara, Turkey)* 2011;17:52-63.
3. Skiadas V, Antoniou A, Primetis H, et al. Intratesticular arteriovenous malformation. Clinical course, ultrasound, and MRI findings of an extremely rare lesion on a 7-year followup basis. *Int Urol Nephrol* 2006;38:119-22. https://doi.org/10.1007/s11255-005-0916-7
4. Sountoulides P, Bantis A, Asouhidou I, et al. Arteriovenous malformation of the spermatic cord as the cause of acute scrotal pain: A case report. *J Med Case Rep* 2007;1:110. https://doi.org/10.1186/1752-1947-1-110
5. Dogra V, Bhatt S. Acute painful scrotum. *Radiol Clinic North Am* 2004;42:349-63. https://doi.org/10.1016/j.rcl.2003.12.002
6. Carver BS, Sheinfeld J. Germ cell tumours of the testis. *Ann Surg Oncol* 2005;12:871-80. https://doi.org/10.1245/ASO.2005.01.013
7. Bhatt S, Rubens DJ, Dogra VS. Sonography of benign intrascrotal lesions. *Ultrasound Q* 2006;22:121-36. https://doi.org/10.1097/00013644-200606000-00025
8. Kutlu R, Alkan A, Soylu A, et al. Intratesticular arteriovenous malformation: Colour Doppler sonographic findings. *J Ultrasound Med* 2003;22:295-8. https://doi.org/10.7863/jum.2003.22.3.295
9. Ma W, Sarasohn D, Zheng J, et al. Causes of avascular hypoechoic testicular lesions detected at scrotal ultrasound: Can they be considered benign? *AJR American journal of Roentgenol* 2017;209:110-5. https://doi.org/10.2214/AJR.16.17333
10. Woodward PJ, Sohaey R, O'Donoghue MJ, et al. From the archives of the AFIP: Tumours and tumour-like lesions of the testis: Radiologic-pathologic correlation. *Radiographics* 2002;22:189-216. https://doi.org/10.1148/radiographics.22.1.g02ja14189
11. Rocher L, Ramchandani P, Belfield J, et al. Incidentally detected non-palpable testicular tumours in adults at scrotal ultrasound: Impact of radiological findings on management. Radiologic review and recommendations of the ESUR scrotal imaging subcommittee. *Eur Radiol* 2016;26:2268-78. https://doi.org/10.1007/s00330-015-4059-7

Correspondence: Dr. Trevor A. Flood, Department of Pathology & Laboratory Medicine, The Ottawa Hospital, Ottawa, ON, Canada; tflood@toh.on.ca