



Conservative management of pubertal segmental testicular infarction associated with epididymitis

Hidenori Nishio^a, Kentaro Mizuno^{a,*}, Daisuke Matsumoto^b, Akihiro Nakane^c, Takahiro Yasui^b, Yutaro Hayashi^a

^a Department of Pediatric Urology, Nagoya City University Graduate School of Medical Sciences, Nagoya, Japan

^b Department of Nephro-urology, Nagoya City University Graduate School of Medical Sciences, Nagoya, Japan

^c Education and Research Center for Community Medicine, Nagoya City University Graduate School of Medical Sciences, Nagoya, Japan

ARTICLE INFO

Keywords:

Acute scrotal pain
Color Doppler ultrasound
Epididymitis
Segmental testicular infarction

ABSTRACT

Urgent scrotal exploration is performed for segmental testicular infarction (STI) because malignant testicular tumors cannot be ruled out even when STI is suspected on color Doppler ultrasound (US). This report describes the case of a 14-year-old boy who was successfully diagnosed with STI associated with epididymitis using color Doppler US to avoid radical orchiectomy. To our knowledge, this is the first report of STI being diagnosed during puberty and managed using color Doppler US and contrast-enhanced magnetic resonance imaging-guided conservative treatment.

1. Introduction

Segmental testicular infarction (STI) is a lesser-known and rare testicular disorder with characteristics similar to other acute scrotal diseases. Radical orchiectomy is performed because STIs cannot be diagnosed using scrotal ultrasound (US), and the possibility of necrotic tumors cannot be ruled out.¹ However, pathological findings can confirm the diagnosis after orchiectomy, resulting in unnecessary orchiectomies.

We report a case of STI associated with epididymitis that was successfully diagnosed using color Doppler US to avoid radical orchiectomy. To our knowledge, this is the first report of STI being diagnosed during puberty and managed using color Doppler US and contrast-enhanced MRI-guided conservative treatment.

2. Case presentation

A 14-year-old male patient experienced left scrotal pain when he woke up and had a fever the following day. He experienced difficulty walking because of left scrotal pain; therefore, he consulted a local urologist. He was referred to our hospital for suspected left testicular torsion on color Doppler US.

Physical examination revealed normal vital signs; however, the left testis and epididymis presented with swelling, pain, and tenderness (Fig. 1A). He had no relevant history of medical conditions or medication usage and no dysuria, and his urinalysis results were normal. Blood analysis showed elevated C-reactive protein level (CRP; 5.8 mg/dL) and a white blood cell (WBC) count (13,100/ μ L; 77.9% neutrophils). Color Doppler US of the left epididymis revealed swelling and increased blood flow (Fig. 1B). A wedge-shaped hypoechoic and heterogeneous echo lesion without blood flow was observed locally in his left testis; however, his left testis was also swollen (Fig. 1C). Based on the color Doppler US findings of his left scrotum, he was diagnosed with a left STI associated with the left epididymitis. After emergency hospitalization, fosfomycin (2.0 g/day) was administered intravenously to treat the left epididymitis. MRI for assessing the entire left testis on hospitalization day 2 revealed a mosaic of high-intensity and low-intensity signal areas on T2-weighted MRI in the left testis and no obvious testicular tumor in his left testis (Fig. 2).

Blood tests performed on hospitalization day 5 showed improvement in inflammatory findings, such as WBC count (11,000/ μ L; 69.1% neutrophils) and CRP levels (1.6 mg/dL). In addition, blood analysis results were negative for tumor markers such as α -fetoprotein, β -human chorionic gonadotropin, and soluble interleukin-2 receptor. He was

Abbreviations: CRP, C-reactive protein; MRI, magnetic resonance imaging; STI, segmental testicular infarction; US, ultrasound; WBC, white blood cell.

* Corresponding author. Department of Pediatric Urology, Nagoya City University Graduate School of Medical Sciences, 1, Kawasumi, Mizuho-cho, Mizuho-ku, Nagoya, 467-8601, Japan.

E-mail address: kmizuno@med.nagoya-cu.ac.jp (K. Mizuno).

<https://doi.org/10.1016/j.eucr.2023.102324>

Received 6 December 2022; Received in revised form 7 January 2023; Accepted 10 January 2023

Available online 11 January 2023

2214-4420/© 2023 The Authors. Published by Elsevier Inc. This is an open access article under the CC BY-NC-ND license (<http://creativecommons.org/licenses/by-nc-nd/4.0/>).

discharged from the hospital after recovery from his left epididymitis. MRI at 1 week and 3 months after the STI revealed no recurrence of STI (Fig. 3A–D). At the 2-year follow-up, the patient felt no pain in the left testis.

3. Discussion

STIs are rare, mostly idiopathic, and frequently diagnosed only after surgical and histological examinations.¹ Most reported cases underwent surgical exploration because testicular tumors could not be ruled out. Therefore, few cases of STIs are conservatively managed following diagnosis.² However, a pathological diagnosis is required to rule out the possibility of testicular tumors. Therefore, surgical exploration or radical orchiectomy is performed for STI because STI cannot be considered a differential diagnosis. Moreover, radical orchiectomy for STI should be considered overtreatment, although, in some cases, other definitive diagnoses may be performed using a histological examination of the orchiectomy specimen.³ With increasing clinical and radiological awareness, conservative management is being considered more frequently.^{1,2}

In our case, conservative management without urgent surgical exploration was possible because STI was suspected and diagnosed using color Doppler US. The patient was practically diagnosed with epididymitis at our hospital, although he was referred for suspected testicular torsion. Color Doppler US conducted at our hospital detected the impaired blood flow in his left testis, although the blood flow of the left epididymis had increased. Hence, it was necessary to consider differential diagnoses other than testicular torsion as the cause of impaired blood flow in his left testis. Because a typical STI appears as a solitary solid wedge-shaped or round area in the testis with the grey-scale US, where no blood flow was observed with color Doppler US,¹ the patient had similar findings. Therefore, STI associated with the epididymis was successfully diagnosed using the color Doppler US.

Moreover, the reasons for deciding that urgent surgical exploration was unnecessary are as follows: First, testicular torsion was not suspected using the color Doppler US. Second, the findings of the hypoechoic area on the US in the left testis differed from those of the testicular abscess. Although the subsequent appearance of testicular or

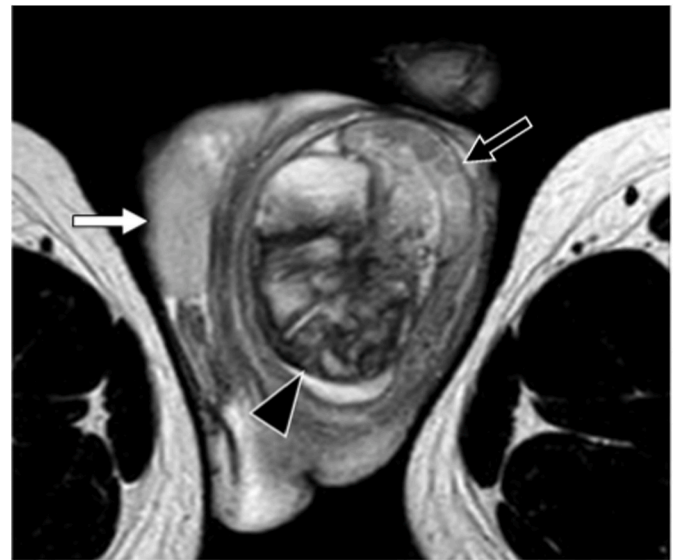


Fig. 2. MRI findings of the testes on hospitalization day 2. On T2-weighted MRI on the transverse plane, a mosaic of high-intensity and low-intensity signals (black arrowhead) is observed in the left testis. The low-intensity signal shows the finding of hemorrhage. The black arrow indicates the left swollen epididymis. The white arrow indicates that the left swollen testis compresses the right testis. MRI, magnetic resonance imaging.

epididymal abscesses may require urgent surgical exploration for drainage,⁴ it was not required in our case. Third, color Doppler US and MRI findings did not reveal any strong indications of a testicular tumor.² However, MRI is also excellent for establishing the diagnosis, occasionally showing a hemorrhagic signal and an enhanced halo delimiting the avascular area if the borders are not well defined, or the findings are inconclusive using the color Doppler US.¹ T2-weighted MRI shows various signal intensities in the lesions of STI.²

Most STIs are idiopathic. Regarding STI associated with epididymitis, testicular ischemia may result from vascular compression due to the swelling of the epididymis and inflammation of the spermatic cord.

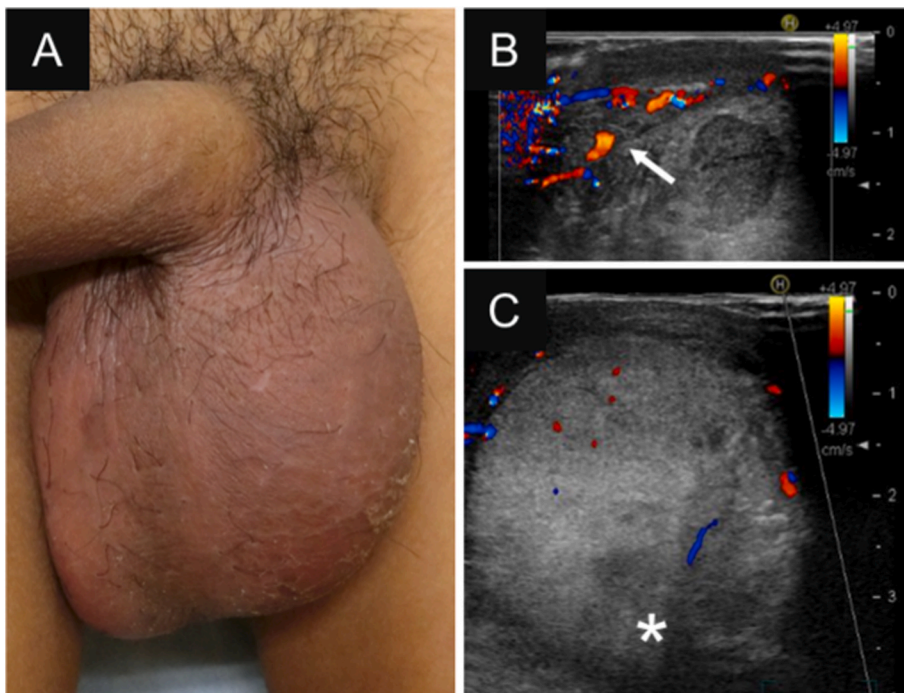


Fig. 1. The scrotum (A) and color Doppler US findings (B, C) at the time of referral to our hospital. (A) The left scrotum presents with swelling, pain, and tenderness. (B) The left epididymis is swollen, and the blood flow increases (arrow). (C) The left testis is swollen, and a wedge-shaped hypoechoic and heterogeneous echo lesion without blood flow is observed locally in the left testis (asterisk). US, ultrasound. (For interpretation of the references to color in this figure legend, the reader is referred to the Web version of this article.)

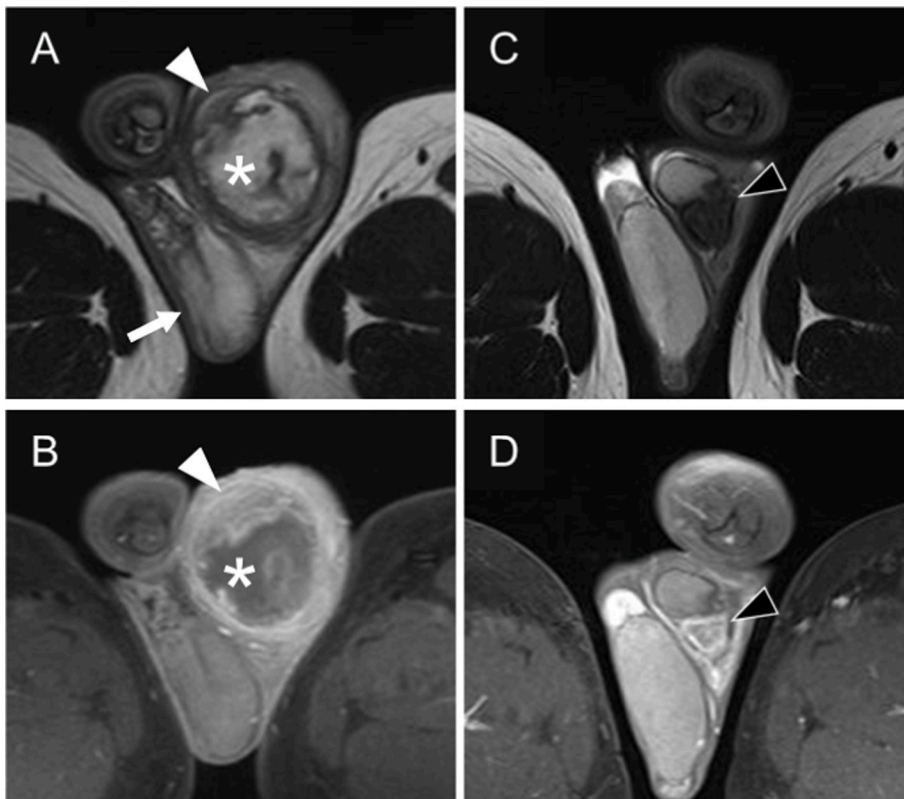


Fig. 3. MRI findings on the transverse plane at 1 week (A, B) and 3 months (C, D) after the STI. (A), (C) show T2-weighted MRI findings. (B), (D) show T1-weighted contrast-enhanced MRI findings. (A) The left testis (white arrowhead) is still swollen, and the infarcted lesion (asterisk) shows a high-intensity signal area. The white arrow indicates the right testis. (B) A non-enhanced area (asterisk) is surrounded by perilesional rim enhancement (white arrowhead) in the left testis. (C) The infarcted lesion shrank, and it changed from a high-intensity signal to a low-intensity signal (black arrowhead). (D) The infarcted lesion is rather enhanced strongly, and blood flow increases (black arrowhead). MRI, magnetic resonance imaging.

The subsequent edema causes lymphatic and venous compression followed by arterial occlusion and/or thrombosis.⁵ Anatomically, the testis is nourished by the testicular, anterior and posterior epididymal, and deferens arteries.² In this case because STI occupied most of the area other than the cranial and ventral sides, it was considered that blood flow was impaired in the extensive area nourished by arteries other than the anterior epididymal artery.

4. Conclusion

Reports of pubertal STIs are extremely rare, and STIs present with non-specific symptoms, such as pain and swelling; therefore, it is difficult to diagnose using physical examination alone. However, diagnosing STI conservatively and preserving testicular function without performing urgent radical orchiectomy using diagnostic imaging technology is possible. Therefore, it is critical to recognize STI as a differential diagnosis of acute scrotal diseases to preserve the testicular function as much as possible.

Consent

Informed consent for publication was provided by the patient's parent.

Funding

This research did not receive any specific grants from funding agencies in the public, commercial, or not-for-profit sectors.

Presentation

A summary of this case report was presented at the 31st Annual Meeting of the Japanese Society of Pediatric Urology (July 20, 2022, Tokyo, Japan), where it won the Best Presentation Award.

Declaration of competing interest

None.

Acknowledgments

None.

References

- Peradejordi Font MR, Vas D, Trias Puigureda I, Moreno Rojas JM, Ribal Caparrós MJ, Nicolau Molina C. The role of contrast enhanced ultrasound in the differential diagnosis of segmental testicular infarction. *Radiol Case Rep.* 2021;16:3815–3820. <https://doi.org/10.1016/j.radr.2021.09.021>.
- Fernández-Pérez GC, Tardáguila FM, Velasco M, et al. Radiologic findings of segmental testicular infarction. *AJR Am J Roentgenol.* 2005;184:1587–1593. <https://doi.org/10.2214/ajr.184.5.01841587>.
- Brimo F, Lachapelle J, Epstein JI. Testicular vasculitis: a series of 19 cases. *Urology.* 2011;77:1043–1048. <https://doi.org/10.1016/j.urology.2011.01.021>.
- Nishio H, Mizuno K, Kato T, et al. A rare case of epididymal abscess in an infant treated successfully with needle aspiration. *Urol Case Rep.* 2017;13:26–27. <https://doi.org/10.1016/j.eucr.2017.03.012>.
- Adorisio O, Ceriati E, Camassei FD, De Peppo F. Segmental haemorrhagic infarction of the testis in a paediatric patient: a rare aftermath of epididymitis. *BMJ Case Rep.* 2013, bcr2012007970. <https://doi.org/10.1136/bcr-2012-007970>, 2013.