

# Acute Epididymo-orchitis in Children Leading to Testicular Ischemia: A Case Report and Literature Review

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## Case Report

**Keywords:** Epididymo-orchitis, Testicular Ischemia, Child, Urologic disease

**Posted Date:** July 25th, 2023

**DOI:** <https://doi.org/10.21203/rs.3.rs-3157513/v1>

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**Additional Declarations:** No competing interests reported.

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# Abstract

**Background:** Epididymo-orchitis is a common pediatric urological emergency, which can typically be managed conservatively with antibiotics. However, if symptoms persist or worsen without an obvious cause, ultrasound evaluation is recommended and surgical exploration may be required.

**Case presentation:** We report a case of rapidly progressing epididymo-orchitis in a child, leading to testicular ischemia within one day. Intraoperatively we identified that high-tension tunica vaginalis caused compression of the swollen testis, leading to ischemia. After incision and decompression, partial blood flow was restored. However, at follow-up, the affected testicle was significantly reduced in size and hardened, with central ischemia.

**Conclusion:** In extremely rare cases, epididymo-orchitis can lead to ischemic necrosis of the testicle. This may be due to early spermatic cord compression, for example, by an enlarged thecal tunica vaginalis sac or epididymis. Early invasive treatment can provide better opportunities to preserve the testicles.

## Background

Epididymo-orchitis is a common cause of scrotal pain in clinical practice. The incidence of epididymitis is about 1.2/1000 boys per year and is more common in summer and winter[1]. It can occur at any age, but most commonly between 8 to 12 years[2]. Epididymo-orchitis can usually be cured with conservative treatment, including antibiotics and painkillers, and cases of testicular ischemic necrosis caused by epididymo-orchitis in children are rare. Here we report a special case of epididymo-orchitis in a child resulting in testicular ischemia within one day, and emergency surgery was performed.

## Case presentation

A 13-year-old boy presented to the emergency room with right lower abdominal pain started 38 hours ago. There was tenderness in the right lower abdomen, without rebound tenderness, and no abnormalities were found during the physical examination. The routine Blood test revealed a leukocyte count of  $15.6 \times 10^9/L$ , mainly about neutrophils. Abdominal ultrasound showed nothing about acute signification. The physician prescribed cefdinir for him and asked for further observation.

One hour after the beginning of abdominal pain, the child took an oral intake but vomited three hours later. The boy's body temperature rose to  $37.5^\circ C$  within 2h, and the pain transferred to the right groin. Subsequently, the temperature dropped to normal after 6h. So, the symptoms above were not taken seriously. But he was aware of discomfort in his right scrotum half a day later, which combined with redness and swelling without pressure pain. During the period leading up to his admission, the redness and swelling of the scrotum became progressively worse, and he developed pain. Out of unbearable pain, he came to ER. The child was administered Cefdinir orally 3 times while at home.

The patient had a history of COVID-19 infection one month previously. There was no history of surgery and no deformities. The patient had normal urine output since onset.

His body temperature was average. Severe swelling and pain in the right scrotum, along with indistinct testicular and epididymal borders. The pain increased in raising the scrotum combined with the loss of cremasteric reflex. The leukocyte count was  $10.7 \times 10^9/L$ .

Ultrasonography indicated a significant enlargement of the right testicle ( $4.0 \times 2.9$  cm) with rough and uneven echo. The Color Doppler flow imaging (CDFI) showed a significant decrease in intratesticular blood supply, with little blood signal at the edges only. The right epididymis and spermatic cord were markedly swollen. There was cloudy fluid in the right scrotum and a small collection of fluid around the left testicle. Therefore, an emergency exploration of the right testicle was conducted.

The tunica vaginalis was markedly thickened (3 mm) and contained a cloudy yellowish fluid (30 ml). The testicle and epididymis were visibly swollen. The testicle was soft, purple-black, with no adhesions around it. (Fig. 1) The spermatic cord was dilated, without varicocele and obvious torsion or post-torsion notching. Its color improved after incubation in warm water, so we performed only testicular fixation and placed a drainage tube.

After the operation, the scrotal swelling gradually went down. He had a low fever until the 3rd day after the operation. After removing the drainage tube, he was discharged on the third postoperative day with a week's supply of antibiotics. After two weeks, the scrotum begins to harden.

Two months later, the ultrasound revealed that the right testicle measured  $1.9 \times 1.1 \times 1.2$  cm, displaying a rough and uneven echotexture. CDFI showed a decrease in intratesticular blood supply, with blood flow signals detectable at the edge of the testicle. Physical examination indicated a hardened and reduced volume in the right testicle, while the left side showed no abnormalities. (Fig. 2)

## Discussion and Conclusions

Epididymo-orchitis leading to testicular ischemia is extremely rare, especially in pediatric patients. In the past fifteen years, less than ten cases have been reported in the literature (Table 1). The main causes of epididymitis in children are secondary infections such as pneumonia, enterovirus, and adenovirus[1].

Currently, there are several hypotheses regarding the pathological process of testicular ischemic caused by epididymo-orchitis, including spermatic cord inflammation, endothelial damage caused by bacterial toxins, and thrombus formation. But no consensus was achieved.

In this case, it was observed that the blood supply seemed to improve after the incision of the swollen tunica vaginalis. The possible physiological mechanisms are as follows. Initially, a severely swollen epididymis and spermatic cord can compress the blood vessels at the end of the spermatic cord[3]. This can lead to restriction of venous return[4]. As the condition worsens, the pressure inside the testicle

exceeds the arterial pressure, resulting in reduced arterial blood flow. This can eventually lead to ischemia or even necrosis of the testicle[5]. However, this process alone may not necessarily lead to complete testicular infarction. Most children with epididymo-orchitis have swelling of the epididymis, and only a few patients have a complete testicular infarction. Therefore, if other factors lead to more severe blockage of venous return, this process may be exacerbated, such as when venous thrombosis occurs simultaneously[6]. Blood flow to the testicle was improved significantly by cutting the tunica vaginalis. This may indicate that the process is reversible following timely surgical intervention and suggests that the formation of acute tunica vaginalis fluid might precede the development of venous thrombosis.

Preoperative ultrasonography showed a significant decrease in intratesticular blood supply, with only a little blood signal at the edges. This is similar to the findings of Chang et al.[7]. Their study included six patients with acute epididymo-orchitis resulting in ischemic testicular infarction. They found no blood flow signal in the testicle, but bead-like color Doppler signal changes in the albuginea near the epididymis. They called them juxta-epididymal string-of-bead (JSOB), which indicates the presence of incompletely closed blood vessels. We suspect this may be a common phenomenon related to our proposed pathological process. Due to the anatomical constraints within the testicle, there is a rapid increase in intravascular pressure. This happens faster than blood pressure rises at the surface of the albuginea. As a result, intratesticular arterial blood flow may be restricted. The blood vessels in the albuginea then act as a shunt, diverting some of the blood that cannot enter the testicle. Therefore, in the early stages of the disease, it may appear as internal testicular ischemia with rich blood flow in the peripheral testicular vessels.

This case is characterized by a shorter course of disease and a more acute onset than other case reports[8, 9]. Although intraoperative testicular blood flow improved after the obstruction was removed, the testicle was smaller and the area of necrosis was still present at follow-up. Perhaps in an emergency, we could consider doing an ultrasound-guided puncture. The testicle may have a better chance of recovery if the pressure is released earlier. This operation requires the collaboration of an experienced sonographer and a urologist.

In extremely rare cases, epididymo-orchitis can lead to ischemic necrosis of the testicle. This may be due to early spermatic cord compression, for example, by an enlarged thecal tunica vaginalis sac or epididymis. Early invasive treatment can provide better opportunities to preserve the testicles.

## Abbreviations

CDFI

The Color Doppler flow imaging

JSOB

juxta-epididymal string-of-bead

WBC

white blood cell

CRP  
C-reactive protein  
CDUS  
colored Doppler ultrasound

## Declarations

### Ethics approval and consent to participate

Not applicable.

### Consent for publication

Written informed consent was obtained from the patient and the legal guardian for publication of this Case Report and any accompanying images. A copy of the written consent is available for review by the Editor of this journal.

### Availability of data and materials

Not applicable

### Competing interests

All of the authors declare that they have no competing interests.

### Funding

Not applicable.

### Authors' contributions

Songqiao Fan: manuscript writing & literature review.

Weiping Zhang: Proof-reading & supervision

Meng He: Design, Proof-reading & supervision.

### Acknowledgements

Not applicable.

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## Tables

Table 1 is available in the Supplementary Files section.

## Figures



**Figure 1**

A Purple-black testicle; Swollen spermatic cord, no signs of torsion or incision marks post detorsion.)





**Figure 2**

The right scrotum and testis shrank and hardened significantly

## **Supplementary Files**

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- [Table1.docx](#)