

Case report

Hyperbaric oxygen treatment for unilateral testicular torsion in a child

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Abstract

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Torsion of the testis is a urological emergency most commonly occurring in adolescent boys. Hyperbaric oxygen treatment (HBOT) has been shown to alleviate reperfusion injury in experimental ischaemia of the testis. We report a 13-year-old boy who had prolonged right testicular ischaemia. Despite surgery, the colour of the testis remained poor. He underwent a post-operative course of 10 HBOT over 8 days, with restoration of blood flow on colour Doppler and reduction of oedema. At four-month followup, the testis appeared normal on ultrasonography. To the best of our knowledge, this is the first published case of torsion of the testis treated with HBOT.

Key words

Genitourinary tract, children, hyperbaric oxygenation therapy, reperfusion injury, case report

Introduction

Torsion of the testis and spermatic cord is a urological emergency most commonly occurring in adolescent boys.¹ In 5–6% of patients torsion is secondary to trauma.² Torsion interrupts the blood supply leading to ischaemic damage to the testis. In addition, re-establishing blood flow via surgical intervention (de-torsion) may result in a reperfusion injury. Oxidative stress and inflammation associated with reperfusion contributes to germ cell injury.³ Therefore, additional treatments other than re-establishing the blood supply are needed to prevent the development of germ cell injury in these patients.⁴

Hyperbaric oxygen treatment (HBOT) has been shown to alleviate reperfusion injury in a number of organs including the testis.^{3,5} To the best of our knowledge, the use of HBOT has not been reported for testicular torsion. Herein, we report a patient who had prolonged testicular ischaemia from torsion, only partially relieved by surgery and successfully treated with the addition of HBOT.

Case Report

A 13-year-old boy presented to another emergency department complaining of severe scrotal pain and swelling, which was first noticed at 0700 h. Treatment with an antibiotic and an anti-inflammatory drug was started on the basis of the diagnosis of orchitis. Later the same day (1630 h), he was admitted to our hospital's emergency department because of worsening pain. Urological assessment revealed a history of an accident while riding his bicycle the day before. On examination, scrotal oedema and mild hyperaemia were observed. His right testicle was

very painful to palpation and there was no pain relief with testicular elevation (negative Phren's sign), indicating testicular torsion. The left testis was normal in size and not painful to palpation. Scrotal colour Doppler ultrasonography (CDU) showed a right testis measuring 31 x 21 x 17 mm and left 31.2 x 18.8 x 17.7 mm. No right epididymal or testicular arterial blood flow could be detected on CDU.

Emergency surgery was performed at 1830 h (11–12 h after the onset of symptoms). At surgery, a 360° torsion of the right testicle was found, and the testis was completely purple in colour. Despite testicular de-torsion and warm serum application for 45 minutes, the colour of the testis did not improve. However, some bleeding was observed in a small incision made in the right testis. The surgery was completed with bilateral testicular fixation. Considering the prolonged duration of ischaemia and complete arterial obstruction, the boy was referred for HBOT following informed parental consent.

The first HBOT commenced about 5 h post-operatively (about 18 h from the onset of symptoms). HBOT was carried out at 243 kPa for 90 minutes, interspersed with two 5-minute air breaks. Two further HBOT were given 15 and 26 hours post-operatively followed by daily sessions to a total of 10 sessions, without incident.

CDU on the fifth post-operative day showed normal right epididymal and testicular arterial blood flow. The right testis was significantly increased in size compared to the left. The boy was discharged without any complaints after eight days. At a four-month follow up, Doppler ultrasonography showed the right testis size to be 21.6 x 17.7 x 15.9 mm and the left 31.4 x 18.7 x 17.8 mm.

Discussion

Early diagnosis and surgical treatment is important to achieve the best outcome in the treatment of testicular torsion. Testicular necrosis develops if testicular torsion is not corrected within 4 to 6 hours in case of complete arterial occlusion.^{6,7} Testicular atrophy together with subfertility develops in two-thirds of patients in the long term.⁶ The two most important factors determining outcome after testicular torsion are the duration and the degree of testicular torsion. The success rate is 100% if the patient is treated within 6 hours after the onset of symptoms, 70% if treated between 6 and 12 hours and only 20% if treated between 12 and 24 hours.⁸ Beyond 10 h of torsion, most patients will have significant atrophy, unless a spontaneous reduction had occurred or the torsion was limited to 180°–360°. With a torsion of > 360° that lasts more than 24 hours, all patients will have complete or severe atrophy.⁹ In our case, the patient had a 360° torsion and this was not corrected for approximately 12 hours after the onset of symptoms. Therefore, he has a high risk for testicular necrosis or atrophy.

HBO is a safe treatment modality, widely used for various indications. HBOT given during ischaemia or reperfusion reduces germ cell injury in an animal model of testicular torsion.⁵ Its beneficial effects are related to reduced neutrophil recruitment, inhibition of inflammatory cytokine secretion, antioxidant enzyme activation and blockade of lipid peroxidation in rats.³ Testis weight and daily sperm production at one month improved only in the HBO-treated rats in this study.³ To the best of our knowledge, the use of HBOT for testicular torsion in a child has not been reported previously. Considering the prolonged duration of ischaemia and complete arterial obstruction in our patient, we wished to use HBOT to prevent reperfusion injury. Long-term follow up would be needed to know whether testicular atrophy and hypofertility were prevented in this case.

In conclusion, we successfully used HBOT in a boy with prolonged testicular torsion and ischaemia. However, we cannot endorse routine use of HBOT for such patients until results from clinical trials are forthcoming.

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