

Case Report

Location of urethral arteries by colour Doppler ultrasound

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Study design: A case report.

Setting: Regional Spinal Injuries Centre, Southport, UK.

Case report: A 56-year-old male with complete paraplegia at T-4 underwent visual internal urethrotomy of bulbous urethral stricture with a cold knife at 12 o'clock position. There was brisk arterial bleeding. Despite receiving antibiotics, this patient developed hypotension, tachycardia and tachypnoea. He was resuscitated and mechanical ventilation was instituted. After he recovered from this life-threatening episode of urinary tract-related sepsis, colour Doppler ultrasound imaging of bulbous urethra was performed to locate urethral arteries. In the bulbous urethra, single urethral artery was seen at 12 o'clock position.

Conclusion: Since the sites of urethral arteries vary among patients, it is advisable to assess individually the location of urethral arteries preoperatively and plan the site of incision accordingly. Persons with injury to cervical or upper dorsal spinal cord have decreased cardiac and respiratory reserve as well as alteration in immune function. Therefore, all possible measures should be taken to prevent acute blood loss and bacteraemia in this group of patients. *Spinal Cord* (2005) 43, 130–132. doi:10.1038/sj.sc.3101686; Published online 23 November 2004

Introduction

Endoscopic procedures of the urinary tract, which result in significant bleeding, predispose to systemic absorption of urine and irrigating fluid, which leads to bacteraemia. Apart from administering appropriate antibiotic(s) in adequate doses immediately prior to endoscopic procedures of the urinary tract, spinal cord clinicians should endeavour to minimise the chances of bleeding during endoscopic interventions in spinal cord injury patients, as patients with injury to cervical or upper dorsal spinal cord have decreased cardiac and respiratory reserve.

Case report

A 56-year-old male fell down from a ladder and sustained wedge-compression fractures of T-4, 5 and 6 vertebrae, multiple rib fractures, bilateral haemothoraces, and complete paraplegia at T-4 level in October 2002. This patient had indwelling urethral catheter drainage until February 2003, when he started performing self-catheterisation. A few weeks later, he noticed difficulty in inserting a size 12 Fr catheter. Flexible cystoscopy showed a short segment stricture in

the bulbous urethra. Visual internal urethrotomy was carried out under spinal anaesthesia. A dose of 120 mg of gentamicin was given intravenously just before endoscopy. Bulbous urethral stricture was incised with a cold knife at 12 o'clock position. There was brisk arterial bleeding. Cystoscopy was performed in order to coagulate the bleeding vessel. Although no obvious bleeder was seen, significant bleeding continued. Therefore, a 22 Fr three-way Foley catheter was inserted and continuous irrigation with 0.9% saline was started. The patient developed rigors on the operating table. Cefuroxime (1.5 g) was administered intravenously. Bleeding diminished gradually over a period of 4 h. After 14 h, this patient developed hypotension. Blood pressure was 62/27 mmHg. Temperature: 38.5°C. He was resuscitated with intravenous fluids and noradrenaline infusion. Gentamicin (240 mg once daily) and meropenem (1 g every 8 h) were prescribed. Chest X-ray showed diffuse shadowing throughout both lungs, consistent with interstitial pulmonary oedema. Blood samples were taken at the time of hypotension for aerobic and anaerobic cultures; but these showed no growth after 72 h of incubation. He became agitated and dyspnoeic. White cell count was $20.3 \times 10^9/l$; neutrophils: $19.59 \times 10^9/l$; Blood film: neutrophilia showing a shift to left; C-reactive protein: 91.6 mg/l (normal: 0–10 mg/l). Arterial blood gas: pH: 7.43; pCO_2 : 4.4 kPa; pO_2 : 10.1 kPa; actual bicarbonate:

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21.6 mmol/l; base excess: -2.0 mmol/l; standard bicarbonate: 22.7 mmol/l. While breathing 100% oxygen, arterial blood gas showed pH: 7.38; $p\text{CO}_2$: 4.8 kPa; $p\text{O}_2$: 14.2 kPa; actual bicarbonate: 20.8 mmol/l; base excess: -3.5 mmol/l; standard bicarbonate: 21.4 mmol/l. Endotracheal intubation was conducted and mechanical ventilation was instituted. He was extubated after 7 days and recovered fully from this life-threatening episode of urinary tract-related sepsis and endotoxaemia.

Immunological tests showed normal neutrophil oxidative function (by flow cytometry). The CD4 count was $0.500 \times 10^9/l$ (normal: 0.430 – $1.820 \times 10^9/l$). The CD8 count was very low at $0.039 \times 10^9/l$ (normal: 0.250 – $1.200 \times 10^9/l$). The CD4:CD8 ratio was high at 12.80 (normal: 1.45–1.65). A follow-up test showed that the CD4 count was $0.807 \times 10^9/l$. But the CD8 count was $0.134 \times 10^9/l$, which was below the normal range.

Subsequently, we performed colour Doppler ultrasound imaging of bulbous and penile urethra to locate urethral arteries. In the bulbous urethra, single urethral artery was seen at 12 o'clock position (Figure 1). In the penile urethra, single urethral artery was seen at 10 o'clock position (Figure 2).

Discussion

Our patient, who had complete paraplegia at T-4 level, was found to have a very low CD 8 count. Campagnolo *et al*¹ showed that individuals sustaining complete cervical spinal cord injury experience alteration in immune function while those with lesions at or below T-10 do not. Dysregulation of sympathetic outflow tracts may explain neurogenic immune dysfunction and consequently, heightened incidence of infections in individuals with tetraplegia or high paraplegia.

This patient developed arterial bleeding after visual internal urethrotomy at 12 o'clock position. Contrary to the common belief that the urethral arteries are consistently located at the 3 and 9 o'clock positions, colour Doppler

ultrasound showed presence of urethral artery at 12 o'clock position in the bulbous urethra. Chiou *et al*² performed colour Doppler ultrasound assessment of urethral artery location in 33 patients with urethral stricture.

Location of urethral artery	Percentage of cases
1–2 o'clock position	14
3–4 o'clock position	22
5–6 o'clock position	17
7–8 o'clock position	18
9–10 o'clock position	18
11–12 o'clock position	11

Since the number and site of urethral arteries in the bulbous urethra varied widely among individuals, it is advisable to assess individually the location of urethral arteries preoperatively and plan the site of incision accordingly. Had we performed colour Doppler ultrasound assessment of urethral artery location in bulbous urethra preoperatively, we would have found out that the urethral artery was located at 12 o'clock position and would have avoided incising the urethra at 12 o'clock position. The series of complications, which happened as a result of bleeding due to urethrotomy, might have been prevented.

In conclusion, patients with injury to cervical or upper dorsal spinal cord have decreased cardiac and respiratory reserve as well as alteration in immune function. Therefore, all possible measures should be taken to prevent acute blood loss and bacteraemia in this group of patients.

Acknowledgements

We thank Ms Katie Dedman, Product Manager, Janssen-Cilag, Saunderton, High Wycombe, Bucks, United Kingdom, for sponsoring the printing of colour illustrations.



Figure 1 Colour Doppler ultrasound of bulbous urethra shows single urethral artery located at 12 o'clock position (red dot)



Figure 2 Colour Doppler ultrasound of penile urethra shows single urethral artery located at 10 o'clock position (red dot)

References

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- 2 Chiou RK, Donovan JM, Anderson JC, Matamoros Jr A, Wobig RK, Taylor RJ. Color Doppler ultrasound assessment of urethral artery location: potential implication for technique of visual internal urethrotomy. *J Urol* 1998; **159**: 796–799.