Unexpected outcome (positive or negative) including adverse drug reactions

Minimal access is not maximal safety: pelviureteric necrosis following percutaneous chemical lumbar sympathectomy

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Summary

Lumbar sympathectomy remains popular in the treatment of a variety of painful and circulatory conditions of the lower extremities. Although percutaneous chemical lumbar sympathectomy (PCLS) under radiographic guidance is minimally invasive and has decreased the need for open surgical sympathectomy, inadvertent damage to neighbouring structures is a matter for concern. We report the case of a 38-year-old man with thromboangiitis obliterans who had PCLS under radiographic guidance for relief of ischaemic rest pain that was complicated by necrotic disruption of the left pelviureteric region. The kidney was salvaged with an ureterocalycostomy and he remains well 4 years later. Such complications point to imprecise and unpredictable spread of the injected chemical too far beyond the needle tip. It is possible that such complications are often under reported and, therefore, not taken into consideration during informed consent. Precise neurolysis with laser and radiofrequency may be a safer alternative.

BACKGROUND

Sympathectomy has remained a popular procedure to improve peripheral blood flow ever since Jaboulay's report in 1899.¹ Surgical sympathectomy has been largely replaced by minimally invasive percutaneous chemical ablation and is recommended in the management of symptomatic unreconstructable peripheral arterial occlusive disease by over 80% of vascular surgeons interviewed in the UK and Ireland.²

Although Mandl³ in 1924 was the first to suggest percutaneous injection of neurolytic agents for permanent ablation of sympathetic ganglia after successful studies in animals, it was Haxton⁴ in 1949 who first reported results of such percutaneous chemical injections to the lumbar sympathetic chain in patients with occlusive arterial disease. However, injections guided by plain radiography alone were often imprecise and off target leading to poor outcomes and serious complications from inadvertent effects on adjacent structures. Precise placement of the needle tip to enable direct injection of the sympathetic chain became imperative, with prior injection of radiocontrast to confirm the tissue plane becoming routine.⁵

Nevertheless, rare but serious complications, particularly from inadvertent effects on the ureter, continue to be reported.^{6–13} It has also been suggested that such complications are often under reported and, therefore, not taken into consideration during informed consent.⁷ We report a case of pelviureteric disruption following PCLS for unreconstructable peripheral arterial occlusive disease despite correct placement of the needle.

CASE PRESENTATION

A 38-year-old Sri Lankan male farmer, a heavy smoker of 20 pack per year, presented with left lower extremity ischaemic rest pain following progressively worsening claudication in the previous 6 months. His pedal pulses were absent despite good femoral and popliteal pulses, suggesting tibio-pedal occlusive disease. The absence of hypertension, diabetes mellitus and hyperlipidaemia with distal occlusive disease in a young man addicted to tobacco was in keeping with a diagnosis of thromboangiitis obliterans. Absence of named outflow vessels in the foot on angiography precluded bypass surgery. Thus, we opted for PCLS to relieve pain and give time for tobacco cessation to take effect.

PCLS was performed under fluoroscopic guidance. Site for needle placement at the third lumbar vertebral level was identified on anteroposterior, lateral and oblique radiographic projections, and a 15 cm, 22 gauge needle was advanced to the anterolateral aspect of the vertebral body. A 1 ml non-ionic radio contrast was injected and its spread over the anterior aspect of the vertebral body and outlining the sympathetic chain confirmed that the needle tip was in the correct prevertebral tissue plane. Thereafter, 3 ml each of absolute alcohol and 0.5% bupivacain was mixed and injected.

Post-procedure course was complicated with progressively worsening left loin pain and swelling. An ultrasound scan revealed a large mixed echogenic lesion at the lower pole of the left kidney compatible with blood and extravasated urine. Double J stenting of the left ureter and pelvis was attempted but failed to contain the urinary leak and

Figure 1 Contrast CT—nephro-urogram demonstrating a large left perinephric urinoma.

Figure 2 Intravenous contrast urogram—12 min phase demonstrating normal excreting right kidney, dilated left renal pelvicalyces with non-visualisation of the ureter, percutaneous drain tube in the urinoma and double J stent coiled up in the proximal ureter.

re-establish pelviureteric continuity. This was confirmed on contrast CT, which showed a 17×12×14 cm hypodense mass (Hounsfield Units-15) compressing the left kidney (figure 1). Subsequently 2 litres of uninfected urine was drained via percutaneous catheter and an intravenous urogram showed left hydrocalycosis without visualising the left ureter (figure 2). Furthermore, a Tc^{99m}DTPA diuretic scan revealed a pelviureteric obstruction with a differential function of 43%.

Figure 3 Antegrade contrast study showing an intact calico-ureteric drainage system with no leak.

TREATMENT

Continued perinephric urinary drainage of 700–1000 ml/day pointed to extensive pelviureteric disruption from injected alcohol and, thus, the need for surgical repair with a view to re-establishing pelviureteric continuity and antegrade urinary drainage. At surgery, the hilar region of the kidney was inflamed and adherent to the colon and was left undisturbed. Normal-looking upper ureter was identified and transected for frozen section confirmation of healthy structure. Thereafter, a wedge of kidney tissue was excised from the lower pole to open up a lower calyx, which was then anastomosed to the healthy upper end of ureter. The lower calico-ureteroplasty was protected with a temporary nephrostomy and a repositioned J stent.

OUTCOME AND FOLLOW-UP

He had an uneventful recovery and an antegrade contrast study showed an intact calico-ureteric drainage system with no leak (figure 3). He has been followed up with ultrasound and Tc^{99m}DTPA studies and the left kidney remains functionally preserved 4 years later.

DISCUSSION

This report highlights a serious complication of PCLS despite correct placement of the needle.

This is the second of such reports in the indexed literature.⁷ It has been suggested that such complications are often under reported and, therefore, not taken in to consideration during informed consent.⁷

It is unlikely that the injection was made directly into the pelvi-ureteric system, because most of the ureter was spared and also the location of the needle tip was confirmed by preliminary contrast injection. It is clear that damage to neighbouring structures is possible despite the needle tip being in the correct plane because of unperceived and unpredictable spread of the injected solution beyond the point of injection and even across tissue planes if they had been breached in the process of needle positioning. The severity of pelvi-ureteric injury could also vary with the sclerosant type, volume, concentration and contact time, and could manifest as late strictures to early necrotic disruption with extravasation of urine as observed in this patient.

It may be possible to overcome such a complication by the use of ablative methods whose field of effect is more localised and predictable.¹⁴ Laser and radiofrequency heat are two such methods. Heat spread is limited to less than 1 mm from the needle tip minimising the potential for wide-spread damage to adjacent structures. This is evidenced during repeat procedures after laser and radiofrequency sympathectomy where the potential space in which the sympathetic chain lies remains unobliterated in contrast to the fibrous obliteration observed after chemical and surgical sympathectomy. Dominkus *et al* have reported encouraging results using radiofrequency lumbar sympathectomy in peripheral vascular disease¹⁴ and comparison with chemical injection has shown similar effectiveness.¹⁵

Timely management of this injury was crucial to salvage the kidney. When the urinary leak was diagnosed it was thought to be due to a minor ureteric defect; thus, the attempt to treat it with a J stent. The extent of the damage was clearly underappreciated at the time and the J stent neither entered the renal pelvis nor drained the extravasated urine. This delay in drainage allowing continuous perinephric accumulation of urine mixed with injected alcohol resulted in marked inflammation and fibrosis in the surrounding area. Hence, it is advisable to drain the pelvis percutaneously and explore injuries early to enable safe debridement and direct anastomotic repair.¹⁶ When intervention is delayed, as in this patient, any attempt to mobilise the pelviureteric region could damage adjacent viscera and blood vessels; hence, calicoureteroplasty,¹⁶ as in our patient. Success rates of 70–90% have been reported for this procedure, while a failed procedure leads to loss of the kidney.¹⁷

Finally, we need to consider risk versus benefit from PCLS for unreconstructable peripheral arterial occlusive disease. Rare but serious complications may be acceptable if the benefits are substantial. However, a systematic review of the scientific literature on the subject failed to show ben-

efit.¹⁸ In the light of this evidence it may be argued that lumbar sympathectomy should not be considered as a treatment option for complications of unreconstructable peripheral arterial occlusive disease.

Learning points

- ▶ PCLS, despite x-ray guidance and correct positioning of the needle, is not without serious risk.
- ▶ This may be because of unpredictable spread of injected sclerosant solution across tissue planes.
- ▶ Alternative techniques with precise localised ablative effect, such as laser and radiofrequency, need to be explored.
- ▶ There is no evidence that lumbar sympathectomy is beneficial in the management of unreconstructable peripheral arterial occlusive disease.

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Competing interests None.

Patient consent Obtained.

REFERENCES

1. **McClintic CF.** History of periarterial sympathectomy. *J Am Med Assoc* 1929; **92**:1470.
2. **Nesargikar PN, Ajit MK, Evers PS, et al.** Lumbar chemical sympathectomy in peripheral vascular disease: does it still have a role? *Int J Surg* 2009; **7**:145–9.
3. **Mandl F.** *Paravertebral block*. New York: Grune & Stratton, 1947.
4. **Haxton HA.** Chemical sympathectomy. *Br Med J* 1949; **1**:1026–8.
5. **Tay VK, Fitridge R, Tie ML.** Computed tomography fluoroscopy-guided chemical lumbar sympathectomy: simple, safe and effective. *Australas Radiol* 2002; **46**:163–6.
6. **Dirim A, Kumsar S.** Iatrogenic ureteral injury due to lumbar sympathetic block. *Scand J Urol Nephrol* 2008; **42**:395–6.
7. **Antao B, Rowlands TE, Singh NP, et al.** Pelviureteric junction disruption as a complication of chemical lumbar sympathectomy. *Cardiovasc Surg* 2003; **11**:42–4.
8. **Cutts S, Williams HT, Lee J, et al.** Ureteric injury as a complication of chemical sympathectomy. *Eur J Vasc Endovasc Surg* 2000; **19**:212–13.
9. **Daschner H, Allgayer B.** [Ureteral obstruction following CT-guided lumbar sympathetic exclusion]. *Rofa* 1994; **161**:85–7.
10. **Trigaux JP, Decoene B, Van Beers B.** Focal necrosis of the ureter following CT-guided chemical sympathectomy. *Cardiovasc Intervent Radiol* 1992; **15**:180–2.
11. **Fraser I, Windle R, Smart JG, et al.** Ureteric injury following chemical sympathectomy. *Br J Surg* 1984; **71**:349.
12. **Ryttov N, Boe S, Nielsen H, et al.** Necrosis of ureter as a complication to chemical lumbar sympathectomy. Report of a case. *Acta Chir Scand* 1981; **147**:79–80.
13. **Ambasta SS.** A rare ureteral injury secondary to lumbar sympathetic ganglion block with phenol. *Br J Urol* 1975; **47**:276.
14. **Dominkus M, Bauer R, Kepplinger B, et al.** [Percutaneous radio-frequency sympathetic block in peripheral circulatory disorders]. *Vasa Suppl* 1990; **30**:152–6.
15. **Manjunath PS, Jayalakshmi TS, Dureja GP, et al.** Management of lower limb complex regional pain syndrome type 1: an evaluation of percutaneous radiofrequency thermal lumbar sympathectomy versus phenol lumbar sympathetic neurolysis—a pilot study. *Anesth Analg* 2008; **106**:647–9.
16. **Tahmaz L, Kilciler M, Yagci S, et al.** [Missed ureteral injuries following surgical exploration with percutaneous nephrostomy and drainage treatment]. *Ulus Travma Derg* 2000; **6**:284–7.
17. **Haouas N, Youssef A, Sahraroui W, et al.** [Ureterocalicostomy: indications and results based on a series of 16 patients]. *Prog Urol* 2005; **15**:641–5.
18. **Ruiz-Aragon J, Márquez Calderón S.** Effectiveness of lumbar sympathectomy in the treatment of occlusive peripheral vascular disease in lower limbs: systematic review. *Med Clin (Barc)* 2010; **134**:477–82.

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