Gluteal necrosis following pelvic fracture and bilateral internal iliac embolization: Reconstruction using a transposition flap based on the lumbar artery perforators

Onur Gilleard*, John Stammers, Farida Ali

Department of Plastic and Reconstructive Surgery, St Georges Hospital, Blackshaw Road, Tooting, London SW17 0QT, United Kingdom

A R T I C L E  I N F O

Article history:
Received 8 May 2011
Received in revised form 15 October 2011
Accepted 7 November 2011
Available online 18 November 2011

Keywords:
Gluteal necrosis
Lumbar artery
Transposition flap
Embolization
Internal iliac artery

A B S T R A C T

INTRODUCTION: The use of bilateral internal iliac artery embolization to control hemorrhage associated with pelvic fractures is a life saving intervention. Gluteal necrosis is a rare but potentially fatal complication of this procedure. Following debridement, reconstruction can present a considerable challenge due to the compromised vascularity of local tissue.

PRESENTATION OF CASE: A 17 year old girl suffered an open book pelvic fracture following a road traffic accident. In order to stop profuse bleeding, bilateral internal iliac artery embolization was performed. This procedure was complicated by the development of right sided gluteal necrosis. Following extensive debridement, a transposition flap based on the lumbar artery perforators was performed to cover the soft tissue defect.

DISCUSSION: Gluteal necrosis occurs in approximately 3% of cases following internal iliac artery embolization. Following complete excision of the devitalised tissue reconstructive surgery is necessary. Local flaps are suboptimal options when the integument supplied by branches of the internal iliac arteries has been compromised following embolization. Furthermore, the use of a free flap is restricted by the lack of a readily accessible undamaged recipient vessel. In the present case a transposition flap based on the lumbar artery perforators facilitated robust reconstruction of the buttock region.

CONCLUSION: To avoid sepsis, it is imperative that gluteal necrosis following internal iliac artery embolization is recognized and promptly debrided. A transposition flap based on the lumbar artery perforators is a good option for subsequent soft tissue coverage, which avoids use of tissue supplied by the branches of the internal iliac arteries.

1. Introduction

Transcatheeter bilateral internal iliac artery embolization is a life saving intervention which is being used with increasing frequency in trauma centres to control hemorrhage associated with pelvic fractures.¹ Gluteal necrosis is a potentially fatal complication of this procedure which can initially be mistaken for a contusion, occurring at the time of injury, or a pressure ulcer. Early recognition and surgical debridement is imperative for patient survival. After debridement has been undertaken, subsequent soft tissue reconstruction can present a considerable challenge due to the compromised vascularity of local tissue and the absence of a readily accessible patent recipient vessel for micro-vascular anastomosis.

In this paper we describe a case of gluteal necrosis following bilateral internal iliac embolization and the use of a transposition flap, based on the perforators originating from the lumbar arteries, to facilitate reconstruction.

2. Presentation of case

A 17 year old girl sustained multiple injuries following a road traffic accident. Closed diaphragm femoral and radial fractures, a left sided pneumothorax and an open book pelvic fracture were diagnosed in the emergency department. Intra-peritoneal air was revealed on computed tomography (CT). The patient was taken to the operating theatre and the limb fractures underwent anatomical reduction and internal fixation. An external fixation device was used to stabilize the pelvis. A laparotomy was undertaken during which a splenic laceration, large bowel perforation and a large pelvic haematoma were identified. Splenectomy and segmental bowel resection was performed. The haematoma was evacuated and the pelvis packed. On return to the intensive therapy unit the patient remained hemodynamically unstable and a further CT scan suggested continued extra-peritoneal bleeding. Bilateral embolization of the proximal branches of the internal iliac arteries, using Gelfoam pudding, was subsequently undertaken (Fig. 1).
following day bruising was noticed over the right buttlock. Three days later open reduction and internal fixation of the pelvis using a cruciate plate and interlocking screws was performed. By this time the bruising over the buttlock had developed into an eschar measuring 5 cm × 7 cm and extensive underlying necrosis of both the gluteus maximus and medius muscles were found during debridement. The devitalised tissue was completely excised leaving a 17 cm × 15 cm wound to which a VAC dressing was applied. A bowel management system was introduced, which avoided the need to fashion a stoma. Three further debridement procedures were performed over 2 weeks before the wound was deemed ready for definitive soft tissue cover. In order to avoid using tissue supplied by branches of the internal iliac artery, a transposition flap incorporating perforators arising from the lumbar arteries was used (Figs. 2–4). No additional skin grafting was required. A size 10 Redivac suction drain was inserted under the inferior portion of the flap to reduce the risk of haematoma and help close the dead-space. This was removed after 10 days when the serous fluid drained was less than 30 ml in 24 h. Four months after the operation the patient was walking unaided and the flap and donor site were completely healed (Fig. 5).

3. Discussion

When pelvic trauma results in extra-peritoneal hemorrhage it is desirable to only embolize the individual bleeding arteries, using gel foam torpedoes. This reduces the likelihood of developing ischemic complications. However, such meticulous super-selective embolization is difficult to perform when rapid control of profuse bleeding is required. In such instances the entire branch system of an internal iliac artery may have to be embolized using Gelfoam pudding. This method of scatter embolization produces immediate blockade of all the first and second generation branches of the internal iliac artery, preventing retrograde hemorrhage via primary collaterals. In the most extreme circumstances, bilateral internal iliac occlusion is necessary.

Gluteal necrosis occurs in approximately 3% of patients following internal iliac artery embolization performed in the trauma setting and is associated with mortality in up to 60% of cases. It is usually a consequence of the accumulation of embolic material within the superior gluteal artery and its Anastomosis with branches of the deep femoral artery. The diagnosis must be differentiated from that of a pressure ulcer or contusion, as early surgical

---

**Fig. 1.** Angiogram following Gelfoam pudding embolization of the right internal iliac artery (white arrow: showing no flow of contrast past proximal internal iliac artery; red arrow = laparotomy sponges used to pack pelvis).

**Fig. 2.** Right gluteal defect following multiple debridements. Lumbar artery perforators identified using a hand held Doppler (X) and the transposition flap outlined.

**Fig. 3.** Transposition flap based on the lumbar artery perforators raised.

**Fig. 4.** Immediate post-operative result.
debridement is necessary to prevent overwhelming sepsis and subsequent disseminated intravascular coagulation. Once complete excision of the devitalised tissue has been performed the resultant defect presents a considerable reconstructive challenge. Fasciocutaneous V-Y advancement flaps, the posterior thigh flap and the inferior gluteal artery perforator flap have all been used to cover large soft tissue defects in the buttck region, but are suboptimal options when the integument supplied by branches of the internal iliac arteries has been compromised following embolization. Furthermore, the use of a free flap is restricted by the lack of a readily accessible undamaged recipient vessel. The application of Gelfoam in place of metal coils theoretically allows re-canalization of the occluded arteries, however the time frame within which this occurs and the degree of final vessel patency is not yet clear. Consequently we recommend that early soft reconstruction should utilize tissue which is not supplied by branches of the internal iliac arteries.

The lumbar arteries originate directly from the posterior aspect of the aorta and travel in an anterior-bound fashion. Usually there are 4 sets of arteries each giving off 4–8 perforators to supply a triangular territory of skin bordered medially by the midline, inferiorly by the region just below the iliac crest and laterally by a diagonal plane that extends from the inferomedial insertion of trapezius to the iliac crest. In the present case ensuring that the lumbar artery perforators located adjacent to the erector spinae muscle were incorporated in the transposition flap, robust soft tissue coverage of the buttck region defect was achieved.

4. Conclusion

Gluteal necrosis following bilateral embolization of the internal iliac arteries is a rare complication associated with a high mortality rate. To increase the likelihood of survival it is imperative that the diagnosis is differentiated from that of a contusion or pressure ulcer and prompt debridement is undertaken. We have found that a transposition flap incorporating the lumbar artery perforators is a good option for subsequent early soft tissue coverage which avoids the use of tissue supplied by the branches of the internal iliac arteries, the vascularity of which may be compromised.

Conflict of interest statement

None.

Funding

None.

Ethical approval

Written informed consent was obtained from the patient for publication of this case report and accompanying images.

Author contributions

All three authors have contributed to the collection of data and writing of the manuscript.

References

1. Geeraedts Jr LM, Kaasjager HA, van Vugt AB, Frölke JP. Exanguination in trauma: a review of diagnostics and treatment options. Injury 2009; 40(1):11–20.
2. Takahira N, Shindo M, Tanaka K, Nishimaki H, Ohwada T, Itonm M. Gluteal muscle necrosis following transcatheter angiographic embolisation for retroperitoneal haemorrhage associated with pelvic fracture. Injury 2001; 32:27–32.
3. Velmahos GC, Chalwan S, Hanks SE, Murray JA, Berens TV, Asensio J, et al. Angiographic embolization of bilateral internal iliac arteries to control life-threatening hemorrhage after blunt trauma to the pelvis. Am Surg 2000; 66(6):658–62.
4. Dubose J, Inaba K, Barmapas G, Teixeira PC, Schnirrige B, Talving P, et al. Bilateral internal iliac artery ligation as a damage control approach in massive retroperitoneal bleeding after pelvic fracture. J Trauma 2010 [Epub ahead of print].
5. Suzuki T, Shindo M, Kataoka Y, Kobayashi I, Nishimaki H, Yamamoto S, et al. Clinical characteristics of pelvic fracture patients with gluteal necrosis resulting from transcatheter arterial embolization. Arch Orthop Surg 2005; 125:448–52.
6. Kato H, Otomo Y, Homma M, Inoue J, Hasegawa E, Henmi H, et al. Gluteal soft tissue necrosis after transcatheter angiographic embolization for pelvic fracture: a report of two cases. Eur J Trauma Emerg Surg 2007; 3:301–5.
7. Windhofer C, Michlis W, Papp C. Reconstruction in the buttck region using the local fasciocutaneous infragluteal flap. J Plast Reconstr Aesthet Surg 2010; 63(1):126–32.
8. Pu L. Reconstruction of a large gluteal soft tissue defect with a double opposing V-Y fasciocutaneous advancement flap. Plast Reconstr Surg 2007; 112(2):599–603.
9. Lubarsky M, Ray C, Funaki B. Embolization agents – which one should be used when? Part I. large-vessel embolization. Semin Intervent Radiol 2009; 26(4):352–7.
10. Offman SL, Geddes CR, Tang M, Morris SF. The vascular basis of perforator flaps based on the source arteries of the lateral lumbar region. Plast Reconstr Surg 2005; 115(6):1651–9.