CASE REPORT

Bilateral lower limb ischaemia following acetabular reconstruction and arthroplasty

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Accepted 1 May 2018

SUMMARY

The incidence of acetabular fractures has increased markedly in patients over 60 in the last quarter of a century, with open reduction and internal fixation being regarded to be the treatment of choice in most patients with displaced acetabular fractures. Lower limb ischaemia following acetabular fixation or arthroplasty is rare. However, such complications can be limb or life threatening, and therefore, it is important to recognise them as early as possible. We present the case of a 70-year-old man with no significant medical history who underwent acetabular fixation with simultaneous arthroplasty complicated with bilateral lower limb ischaemia. We highlight the importance of having a high degree of suspicion which allows early diagnosis and corrective measures to be implemented which can ultimately lead to excellent outcome.

BACKGROUND

The incidence of acetabular fractures has increased markedly in patients over 60 in the last quarter of a century.¹ In the elderly, low-energy injuries predominate with falls from a standing height accounting for about 50% of acetabular fractures.¹ For displaced acetabular fractures, open reduction and internal fixation (ORIF) is mostly regarded to be the treatment of choice with non-operative measures only used for patients with minimally displaced fractures or for those who are unable to successfully tolerate surgical intervention.² However, failure rates for acetabular ORIF, requiring reintervention with a total hip replacement (THR) have been reported to occur in over 25% of patients.²

Due to the high-failure rate associated with ORIF along with the potential benefit of early mobilisation in the elderly group of patients, the concept of simultaneous acetabular fixation and total hip arthroplasty has developed.²

Lower limb ischaemia following acetabular fixation or arthroplasty is rare.³ However, such complications can be limb or life threatening, and therefore, it is important to recognise them as early as possible.³ The incidence of vascular complications following arthroplasty is reported to be between 0.2% and 0.3% which include bleeding, thrombosis and rarely pseudoaneurysm.⁴ To the best of our knowledge, bilateral lower limb ischaemia following acetabular surgery or arthroplasty has never been described previously in the literature.

CASE PRESENTATION

We present a 70-year-old man who presented to the emergency department following a fall from standing height landing on to his left side. He presented with severe pain in his left hip and was in obvious discomfort with a noticeably shortened left leg.

He had no relevant background medical history or known risk factors of thromboembolism, such as diabetes mellitus, hypercholesterolaemia, hypertension, previous Myocardial Infarction (MI) or smoking history. On examination, he had significant tenderness around his left hip with minimal range of movement secondary to pain. It was a closed and isolated injury. His neurovascular examination was normal.

INVESTIGATIONS

Plain film radiographs and a CT scan (figures 1 and 2) demonstrated an anterior column posterior hemitransverse left acetabular fracture. The treatment options were all discussed with the patient. Based on the patient's premorbid condition and the poor results associated with non-operative treatment, conservative management was inappropriate. Operative options that included acetabular reconstruction with delayed THR, or acetabular reconstruction and a simultaneous THR, were both presented. Relative merits of both procedures were discussed with the patient, and a decision was made to proceed with 'fix and replace'.

TREATMENT

Simultaneous acetabular fixation and acute THR was performed in the same sitting. The first stage of surgery involved anterior column fixation through a stoppa approach using a contoured suprapectineal plate. The principle of using the above-mentioned plate requires fixation beyond the fracture in the anterior column which brings the plate in close proximity to the iliac vessels. The iliac vessels often have to be lifted away from the brim and iliac wing to make room applying the plate and screws. This has the effect of tenting the vessels and compresses the calibre of the vessel. The suprapectineal plate was applied and held with three cortical screws above and three cortical screws below the hip joint.

The patient was then repositioned in lateral decubitus, repped and draped. A standard Kocher-Langenbeck approach was used to expose the posterior column and fracture. A 9 hole 3.5mm recon plate was moulded to fit the

To cite: Tarazi N, Thomas A, Chowdhry M, et al. *BMJ Case Rep* Published Online First: [please include Day Month Year]. doi:10.1136/bcr-2017-223779

Figure 1 Axial cut from the CT left hip demonstrating a left acetabular fracture.

posterior column and held with three cortical screws above, and three cortical screws below the hip joint. We proceeded with a standard left THR using a trabecular metal acetabular revision system and a dual mobility cup for the acetabular component, along with a cemented collarless polished tapered stem (figures 3 and 4). The operation was completed with no intraoperative complications. However, immediately postoperatively he experienced intractable pain in both legs to an extent that he had to be reanaesthetised. On examination, his lower limbs were pale and cold with no palpable pulses in the left leg and only a femoral pulse on the right. It was clear that the findings were consistent with bilateral lower limb ischaemia. This was very unusual considering his operation was unilateral. An emergency CT angiogram was organised, which showed an acutely occluded left common iliac and right femoral arteries along with multiple thrombi in the aorta. The patient was then immediately taken back to theatre for bilateral common femoral embolectomy, left common iliac and external iliac angioplasty and stenting (figure 5). In addition, he had a prophylactic bilateral fasciotomy. Postoperatively, he had excellent Doppler signals on both feet.

Figure 2 Three-dimensional volume rendered reconstruction views of the pelvis also demonstrating the fracture.

Figure 3 Postoperative radiographs—Anteroposterior (AP) view.

OUTCOME AND FOLLOW-UP

At 1-year postoperatively, he is mobilising pain free without assistance and his wounds fully healed. His lower limbs are warm and well perfused with bilateral palpable peripheral pulses and normal sensation. He is able to perform all his Activities of daily living (ADLs). His Oxford Hip Score was 47/48.

DISCUSSION

Several mechanisms of vascular injury during arthroplasty leading to vessel occlusion have been proposed, and can be classified into direct and indirect injuries. Direct injuries can occur due to trauma from an osteotome, retractor, screws or powered reamer. In addition, direct injury to vessels by cement has been reported due to intrapelvic wall penetration with thermal injury leading to occlusion by thrombosis. Indirect damage can occur secondary to stretching or forceful manipulation that causes vascular tear or compression.⁵ In fact, the most commonly affected vessels are the external iliac artery and the common femoral artery.⁵

There are multiple presentations that have been noted in patients who develop lower limb ischaemia following surgery.^{1 6}

Figure 4 Postoperative radiographs—lateral view.

Figure 5 Intraoperative angiogram postgraft insertion—left femoral artery.

The most common presentation is similar to our case, where symptoms and signs of ischaemia appear acutely, either intraoperatively or immediately postoperatively. Delayed ischaemia is much rarer but has been described to occur in unlikely events such as the migration of acetabular components.^{3,7} Patients with pre-existing vascular occlusive disease are at higher risk of developing such complications.⁸

Multiple cases of lower limb ischaemia in the setting of arthroplasty have been described, but to the best of our knowledge, bilateral lower limb ischaemia following arthroplasty has never been described previously. There is only one case in the literature of a contralateral limb ischaemia after a THR and this occurred in a patient with femorofemoral crossover grafts.⁹ In that case, limb ischaemia was attributed to kinking of the crossover graft that led to thrombus formation.

In our case study, the patient had bilateral ischaemia suggesting a more central vascular lesion, that embolised to the iliac and femoral arteries during surgery. While direct occlusion or manipulation of the left sided iliac vessels could explain embolisation of an atherosclerotic plaque on this side, it cannot explain the embolisation that occurred into the right leg. Indirect disturbance of the arterial tree proximal to the aortic bifurcation could explain contralateral limb embolisation.

The CT angiogram that the patient received postoperatively did confirm atherosclerosis of the abdominal aorta. Despite having no previous diagnosis of peripheral vascular disease, a thorough preoperative assessment of this patient's vascular status may have avoided this undesirable complication. Alternatively, 'paradoxical embolisation' as a phenomenon has been described

in the literature before. Here, a fat embolisation results in occlusion of arterial vessels, despite the patient having normal pulmonary function and no patent foramen ovale or other cardiac shunt.¹⁰ This could be a potential explanation for the bilateral nature of this patient's condition.

Learning points

This case represents the first case of bilateral lower limb ischaemia to be described in the literature. Ultimately, the precise cause of this patient's ischaemia is unlikely to be elucidated; however, this case does provide some important learning points for future cases:

- ▶ Lower limb ischaemia following acetabular surgery is an important complication and can present over a variety of time courses and with a variety of patterns, including bilaterally.
- ▶ Atherosclerosis can cause clinically significant complications even in patients who do not have a formal diagnosis of arterial disease.
- ▶ It is important to be thorough in the exclusion of risk factors for complications prior to surgery in order to identify subtle suggestions that the patient is at risk.
- ▶ Awareness and a high degree of suspicion allows early diagnosis and corrective measures to be implemented which can ultimately lead to excellent outcome.

Contributors NT, AT, MC and AC contributed to conception, design and planning of article. NT, AT and MC contributed to acquisition of data, interpretation of data. NT, AT, MC and AC contributed to write-up, revision and final approval of the article. All authors read and approved the final manuscript.

Funding The authors have not declared a specific grant for this research from any funding agency in the public, commercial or not-for-profit sectors.

Competing interests None declared.

Patient consent Obtained.

Provenance and peer review Not commissioned; externally peer reviewed.

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