CASE REPORT

Protrusio acetabuli: a rare cause of pulmonary embolus

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SUMMARY

Protrusio acetabuli is an uncommon complication of total hip arthroplasty, which results in intrapelvic implant migration after erosion of medial acetabular wall. We present a case of severe prosthetic migration with the formation of haematoma and impingement on iliac vessels leading to thrombosis and subsequent pulmonary embolus. This is the first reported case of protrusio acetabuli as a cause of pulmonary embolus.

BACKGROUND

Pulmonary emboli are a common cause of sudden death in hospital. They are treatable if detected in time and often preventable. Pulmonary emboli arise from thrombi that usually originate within the deep venous system of the lower limbs. The classic presentation is of sudden collapse or acute onset pleuritic chest pain and dyspnoea.¹ Their management involves intravenous thrombolysis or intra-arterial thrombectomy in submassive and massive cases and immediate anticoagulation in other less compromising emboli, identification of the source of thrombi or any remediable hypercoagulable states. It is important to identify any source of embolus as recurrence is common and may cause death. We feel this case highlights the importance of thorough clinical examination to identify any abdominal mass, which may cause compression of pelvic veins and to consider anatomically related anomalies that might have causation as in this case. The authors suggest that the presence of any pelvic mass in association with total hip replacement should prompt consideration of presence of protrusio acetabuli and associated vascular pathology. Their assessment should include pelvic X-ray to identify any pelvic abnormality. Protrusio acetabuli is identified on anteroposterior radiographs of the pelvis with an acetabular line which projects medial to the ilioischial spine. This phenomenon was first described by Otto in 1816.² There have been no previous reports of protrusio acetabuli resulting in venous thrombosis and pulmonary embolus.

CASE PRESENTATION

A 75-year-old independently mobile woman attended the accident and emergency department with a 2-day history of dyspnoea and central chest discomfort. Her medical history was unremarkable apart from bilateral total hip replacement in 1996 (figure 1). She underwent revision of right total hip replacement in 2008 and was noted to have a defect in acetabular floor, this was reconstructed with mesh and femoral head allograft. There was

no personal or family history of thromboembolic disease. She lived with her husband who had cognitive impairment and for whom she was the main carer.

On admission she had a tachycardia with heart rate 105 bpm and blood pressure of 110/60 mm Hg, she had a raised respiratory rate with oxygen saturations of 97% on room air. Her chest examination was otherwise unremarkable. There was no evidence of lower limb oedema. Abdominal examination revealed a non-tender mass in the right iliac fossa. She described having intermittent non-exertional central chest pain with no radiation. There were no other risk factors for ischaemic heart disease noted apart from age and she was a non-smoker. A provisional diagnosis of pulmonary embolus was made and was confirmed with CT pulmonary angiogram (CTPA) scan (figure 2). As she was haemodynamically stable she was managed by anticoagulation with low molecular weight heparin 1 mg/kg twice daily, supplemental oxygen, analgesia and her symptoms resolved.

In the absence of an identifiable risk factor, she was investigated for a cause for her pulmonary embolus and was noted to have a mass in her right pelvis on examination. She had hypercoagulability blood panel (antithrombin III, protein c and s deficiency, lupus antibodies and factor V Leiden) performed which was normal. A Doppler ultrasound of her extremities was performed to identify any deep vein thrombosis which was unremarkable. CT of the pelvis revealed the large mass in the right hemipelvis related distinctly to mesh from

Figure 1 Bilateral hip prosthesis 1996.

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Figure 2 CT pulmonary angiogram: pulmonary embolus in the right pulmonary artery.

acetabular revision, this pelvic mass was in contact with iliac vessels (**figure 3**). Ultrasound-guided aspiration revealed presence of haematoma, initial drainage was unsuccessful and culture revealed no microbial colonisation. She was started on oral factor Xa inhibitor anticoagulation for prevention of further thromboembolism, follow-up with repeat CT of the pelvis was scheduled (**figure 4**).

INVESTIGATIONS

- ▶ CTPA
- ▶ Ultrasound Doppler lower limbs
- ▶ CT of the abdomen/pelvis
- ▶ Ultrasound-guided drainage

OUTCOME AND FOLLOW-UP

She was reviewed by the orthopaedic surgery team and was noted to have a significant protrusio acetabuli of her right total

Figure 4 Axial contrast enhanced CT demonstrating medial displacement and compression of right external iliac vein secondary to marked protrusio acetabuli.

hip arthroplasty with a large acetabular floor defect (**figure 5**). The rationale for surgery and associated risks for definitive correction of her hip and pelvic abnormality were explained to the patient. The patient declined surgery due to associated risks and prolonged rehabilitation. She was discharged to follow-up and was pain free and ambulatory.

A follow-up CT revealed no resolution of pelvic collection at 3 months and she reported recurrence of hip pain, her C reactive protein was elevated at 357 mg/dL and white cell count of 22.2. She was readmitted and treated with empirical intravenous antibiotics and underwent repeat ultrasound-guided percutaneous drainage of pelvic collection. There was no organism identified from aspirate culture. Again she reiterated her decision to have optimal medical therapy and avoid surgery. She had an inferior vena cava filter placed for prevention of recurrent pulmonary embolus. She has been under follow-up for the past

Figure 3 Coronal CT: mass effect on right common iliac vessels (note protrusio and iliopsoas collection).

Figure 5 Protrusio acetabuli 2012.

12 months with no recurrence of pulmonary embolus and is ambulatory with a mild trendelenberg gait.

DISCUSSION

Protrusio acetabuli prosthetica is an uncommon complication of total hip arthroplasty, the most common complications are loosening and infection.^{3–5} This may occur as a result of overly aggressive acetabular reaming which may lead to perforation of acetabulum and predispose to medial migration of prosthetic components, osteopenic states such as osteoporosis or rheumatoid arthritis also predispose to protrusio acetabuli. This may be classified as (A) first degree with medial migration of <5 mm, (B) second degree with medial migration of >5 mm and intact pelvic wall, (C) third degree occurs when there is >5 mm migration in conjunction with violation of pelvic wall.⁶ The migration of the femoral head towards the external iliac vessels has been reported to result in external iliac vascular pathology such as arteriovenous fistula of external iliac, and false aneurysm of external iliac artery.^{4 7 8} There have been no previous reports of protrusion acetabuli resulting in venous thrombosis and pulmonary embolus.

The management of protrusio acetabuli is complex and depends on multiple factors, the extent of hip migration, medical comorbidities and associated pathology. Surgical treatment requires reestablishment of the acetabular component in the anatomic position and construction of a medial buttress.^{6 9} The protruded prosthesis may have an associated mass as in our case and may displace vital structures such as the external iliac vessels and the femoral nerve. There have been reports of intrapelvic migration of acetabular component leading to vascular complications such as false aneurysm of external iliac artery, arteriovenous fistula of external iliac vessel, femoral artery ischaemia, these complications pose a significant challenge to the reconstructive surgeon.¹⁰ It is also important to discover any chronic infection associated with migrated prosthesis as this is reported in 50% of such cases. This may require a two-stage reconstruction for infected acetabular prosthetic protrusion with.¹¹ The reconstruction of acetabulum may require use of autogenous bone graft to reconstruct the medial bone defect.¹²

This case reports highlights the rare occurrence of pulmonary embolus associated with a mass and significant prosthetic displacement. This is a life-threatening complication and it is essential to identify the cause of thrombosis to allow optimal prevention of recurrence. The presence of any pelvic mass in association with total hip replacement should prompt consideration of presence of protrusio acetabuli and associated vascular pathology. CT can highlight any associated pelvic mass and thrombosis within vessels. The prevention of further deep vein thrombosis requires treatment of the prosthetic abnormality and removal of associated mass. It is imperative to use additional measures to prevent recurrence of deep vein thrombosis, this was achieved with anticoagulation with factor Xa inhibitor and

inferior vena cava filter in light of unresolved anatomical abnormality. The use of permanent vena cava filters may be beneficial in selected cases for prevention against long-term development of pulmonary embolus.¹³ This case also highlights the importance of considering previous major surgery such as total hip arthroplasty pathology as part of differential cause when trying to ascertain cause of any thrombosis or pulmonary embolus.

Learning points

- ▶ Intrapelvic migration of hip prosthesis may lead to vascular complications.
- ▶ Patients with multiple hip and acetabular surgeries should be assessed for presence of protrusio acetabuli which may predispose patient to risk of pulmonary embolus.
- ▶ Prevention of venous thrombosis with anticoagulation and inferior vena cava filter should be considered where anatomical abnormality cannot be resolved.

Competing interests None declared.

Patient consent Obtained.

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