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## CASE REPORT

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# Iatrogenic Injury to the Iliolumbar Artery during Bone Marrow Biopsy Successfully Treated with Direct Embolisation through the Biopsy Needle: a Case Report

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### INTRODUCTION

Bone marrow biopsy (BMB) is a standard bedside procedure used to evaluate haematological disorders and oncological diseases. Although rare, complications of this procedure are well documented. In 2003, Bain<sup>1</sup> reported 26 adverse events in a total of 54,890 BMB procedures giving a complication rate of around 0.05%. Haemorrhage, reported in 14 patients, was the most frequent and serious adverse event, necessitating blood transfusion in six patients and causing death in one. There is no standard guideline for management of vascular injury following BMB. We report a case of inadvertent arterial injury during BMB that was successfully managed by embolisation through the biopsy needle.

### CASE REPORT

An 84-year-old woman underwent BMB during workup for neutropenia. Her coagulation parameters were normal. A Jamshidi needle (11 gauge) was advanced from the back towards the right posterior iliac fossa. Active arterial spurting was encountered on withdrawal

of the stylet. The stylet was swiftly replaced. The patient was transferred to the angiography suite and placed in the left decubitus position with the needle still in place. The stylet of the Jamshidi needle was replaced with a haemostatic Y-adaptor. Contrast injection through the Jamshidi needle demonstrated an iliolumbar artery pseudoaneurysm with active extravasation (Figure 1). No venous injury was evident. Staged embolisation was performed with gelatin sponge particles first injected through the Jamshidi needle under fluoroscopic guidance until near stagnation of antegrade flow was evident. A 4F Cobra catheter was then fed through the Jamshidi needle and brought to just proximal to the pseudoaneurysm at the needle tip. Injection of N-butyl-2-cyanoacrylate (NBCA)/Lipiodol mixture in a 1:3 ratio through the Cobra catheter was performed until the pseudoaneurysm and its adjacent branches were full. The initial administration of gelatin sponge helped to minimise distal migration of NBCA by slowing blood flow. Additional NBCA/Lipiodol mixture was injected as the Jamshidi needle was withdrawn (Figure 2a and b).

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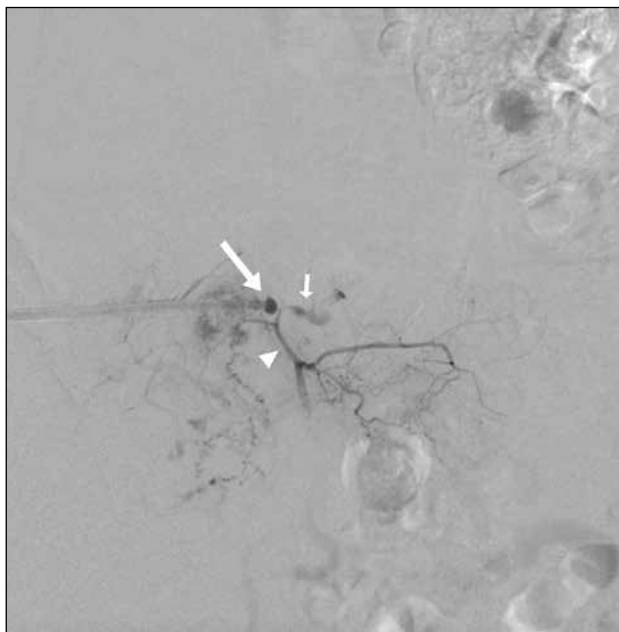
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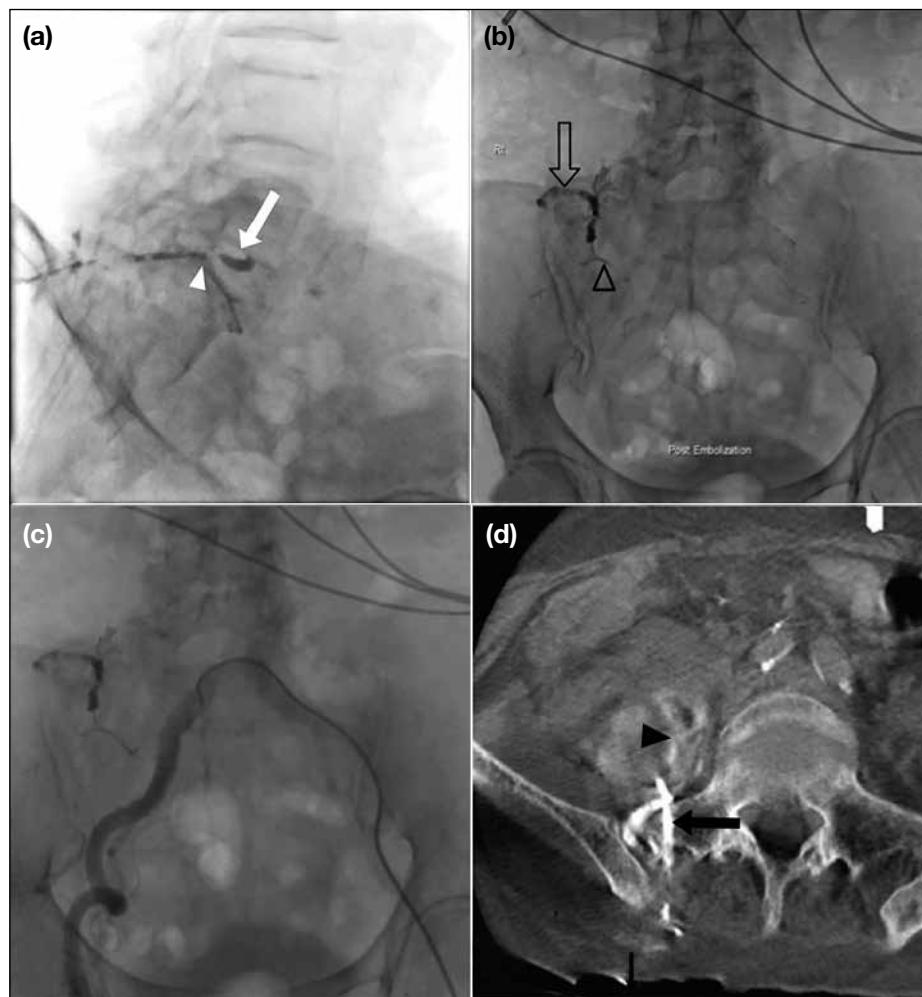
**Figure 1.** Angiogram via Jamshidi needle with the patient in the left lateral decubitus position showing a ruptured pseudoaneurysm anterior to the needle tip (long arrow). Contrast extravasation was seen anterior to the pseudoaneurysm (short arrow). The supplying iliolumbar artery was also opacified by retrograde flow of contrast (arrowhead).

The patient was then positioned supine. Right common iliac arteriogram performed with a 4F Cobra catheter via the left common femoral artery confirmed occlusion of the pseudoaneurysm and absence of contrast extravasation (Figure 2c). Cone-beam computed tomography (CT) demonstrated a large retroperitoneal haematoma. The Jamshidi needle path, outlined by glue cast (Figure 2d), was shown to have deviated superiorly and medially from the intended trajectory, traversing the sacral ala and injuring the iliolumbar artery. Despite the large haematoma, the patient's vital signs remained stable throughout. The patient recovered uneventfully and was discharged 3 days later.

## DISCUSSION

BMB is a commonly performed procedure for haematological conditions. Although BMB is generally considered safe, adverse events occasionally occur, particularly retroperitoneal haemorrhage.<sup>1</sup> Incidents of inadvertent needle puncture through to the anterior side of the sacrum or iliac bone causing injury to the iliac, iliolumbar, iliac circumflex, hypogastric, median sacral, or superior gluteal arteries have been reported, some leading to fatalities.<sup>2</sup> There is currently no standard

guideline on the management of retroperitoneal bleeding following BMB. Some recommend transarterial embolisation as first-line treatment.<sup>2,3</sup> Conservative and surgical management have also been described. Our group has previously reported a case of inadvertent internal iliac artery puncture during BMB that was successfully embolised with NBCA glue through the biopsy needle.<sup>4</sup> Tsai et al<sup>5</sup> described a case of Jamshidi needle-induced iliac artery injury managed by coil embolisation, also directly through the biopsy needle. In our case, packing the pseudoaneurysm sac with coils carried the risk of coil migration or even rupture of the pseudoaneurysm. For these reasons we opted to use a liquid embolic agent with the intention of filling the aneurysm. The major risk was inadvertent embolisation and tissue ischaemia. The iliolumbar artery arises from the posterior division of the internal iliac artery and further divides into an iliac branch that supplies the iliacus muscle and ilium, and a lumbar branch that supplies the psoas major and quadratus lumborum muscles. The lumbar branch also supplies a spinal branch to the cauda equina.<sup>6</sup> Spilling of embolic agent to the cauda equina could lead to paraesthesia and paralysis consequential to nerve damage. To minimise this risk, we performed a test run with a bolus of contrast medium prior to administration of NBCA glue to examine the flow dynamics. During injection of gelatin sponge particles and NBCA glue, we used the lumbar vertebral bodies as a landmark, and every effort was made to ensure that the embolic agent did not cross the lateral border of the vertebrae to reach the cauda equina. The use of gelatin sponge prior to NBCA glue also helped to slow arterial flow and reduce the risk of distal inadvertent spillage of NBCA glue. Potential advantages of this direct through-the-needle approach over the conventional transarterial route include more direct access to the bleeding site and consequent shorter time to haemostasis and less blood loss due to local tamponade by the needle. A potential drawback of this percutaneous approach is increased risk of extravascular deposition of NBCA glue that can induce foreign body reaction in the soft tissue.<sup>7</sup> A high index of suspicion for arterial injury during BMB and retention of the needle in its position are required for this embolisation technique. Of note, CT angiography was not performed prior to embolisation. Since spurting of blood was encountered on stylet withdrawal, arterial injury was thought to be likely, and the decision was made to bypass CT and transfer the patient directly to the angiography suite. The presence of arterial injury was subsequently confirmed by contrast injection through the Jamshidi needle. This approach had the advantages of



**Figure 2.** Fluoroscopic image capture (a) in left lateral decubitus position and anteroposterior pelvic radiography in supine position (b) following embolisation with 1:3 N-butyl-2-cyanoacrylate (NBCA)/Lipiodol mixture showing filling of the pseudoaneurysm (white arrowhead) and the extravasation site (white arrow) by NBCA cast. There was retrograde filling of the parent iliolumbar artery (open arrowhead). The sites of pseudoaneurysm and extravasation could not be precisely located on (b) because of overlapping NBCA cast. Note tract embolisation was performed upon needle withdrawal (open arrow). (c) Right common iliac unsubtracted angiography confirmed treatment success with absence of residual pseudoaneurysm or extravasation. (d) Cone-beam computed tomography image at S1 level showed the path of Jamshidi needle outlined by NBCA cast (black arrow). Inadvertent penetration through the sacral ala had resulted in injury to the iliolumbar artery. Retroperitoneal haematoma was present anterior to the needle path (black arrowhead).

expediting treatment and minimising patient movement from bed transferral that may have dislodged the needle and caused life-threatening haemorrhage.

## CONCLUSION

Retroperitoneal haemorrhage rarely occurs following BMB but is potentially fatal. If arterial injury is suspected during BMB, keeping the biopsy needle in place and urgent interventional radiological treatment can be lifesaving.

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