CASE REPORT

Ultrasound guided percutaneous thrombin injection for the treatment of iatrogenic pseudoaneurysms

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Abstract

Iatrogenic aneurysms are usually postcatheterisation pseudoaneurysms of the femoral artery. Until recently, the treatment of choice was ultrasound guided compression repair. A case of pseudoaneurysm of the axillary artery, arising as a complication of pacemaker insertion in an 83 year old man is reported. Compression repair was not possible in this case, and so the aneurysm was occluded by percutaneous ultrasound guided thrombin injection directly into the aneurysm sac. Percutaneous ultrasound guided thrombin injection is a promising new minimally invasive technique for the treatment of iatrogenic pseudoaneurysms.
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Keywords: pseudoaneurysm; ultrasound guided thrombin injection

During pacemaker insertion in an 83 year old man with severe aortic stenosis, via a left subclavian venous approach, the left axillary artery was inadvertently punctured. The remainder of the procedure was uneventful but the patient developed postprocedural pain and swelling over the left anterior chest wall. On examination, a pulsatile haematoma was noted and an intravenous contrast enhanced computed tomogram confirmed the presence of a 6 cm pseudoaneurysm arising from the anterior aspect of the proximal left axillary artery.

Ultrasound guided compression proved impossible because of the close proximity of the clavicle to the pseudoaneurysm. Consequently, percutaneous injection of thrombin into the false aneurysm was arranged. The pseudoaneurysm was imaged by contrast injection into the left axillary artery, which clearly showed the location of the aneurysm and its relation to surrounding structures (fig 1A). The aneurysm was isolated from the left axillary artery by inflation of a 7 mm, 4 cm balloon (Boston Scientific, UK) across the aneurysm neck; then, under ultrasound guidance, 1000 iu of activated thrombin (Tisseel, Immuno AG, Vienna, Austria) was injected percutaneously directly into the sac of the pseudoaneurysm. This produced very rapid thrombosis of the pseudoaneurysm, which was confirmed both on contrast injection (fig 1B) and on ultrasound (fig 2). The patient was asymptomatic on subsequent follow up.

Discussion

Most iatrogenic aneurysms are postcatheterisation pseudoaneurysms of the femoral artery. Their incidence varies with the complexity of the procedure, the size of the puncture, and the anticoagulant status of the patient.[1 2] Poor compression is an important factor in the aetiology of pseudoaneurysms, and this was almost

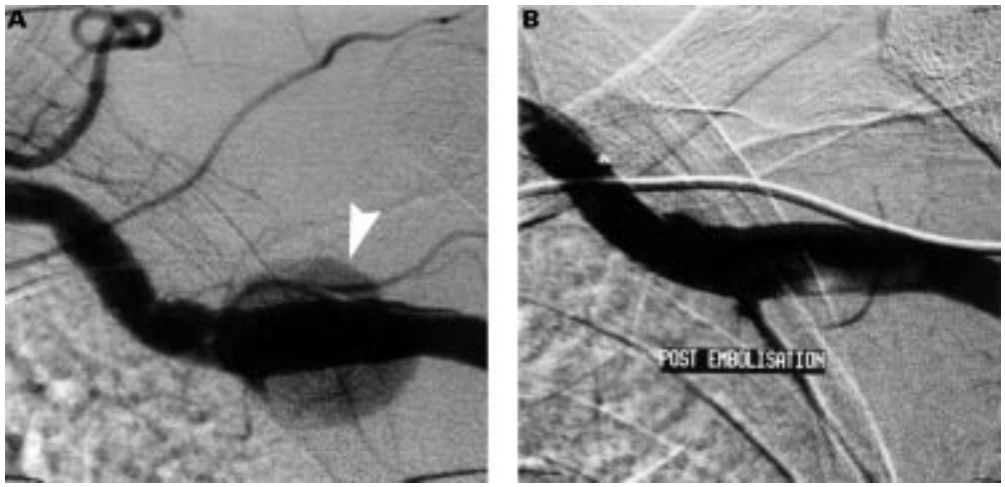

Figure 1 (A) Subtracted angiogram showing pseudoaneurysm (arrowhead) arising from the proximal left axillary artery. (B) Subtracted left axillary angiogram following percutaneous thrombin injection, showing occlusion of the aneurysm.

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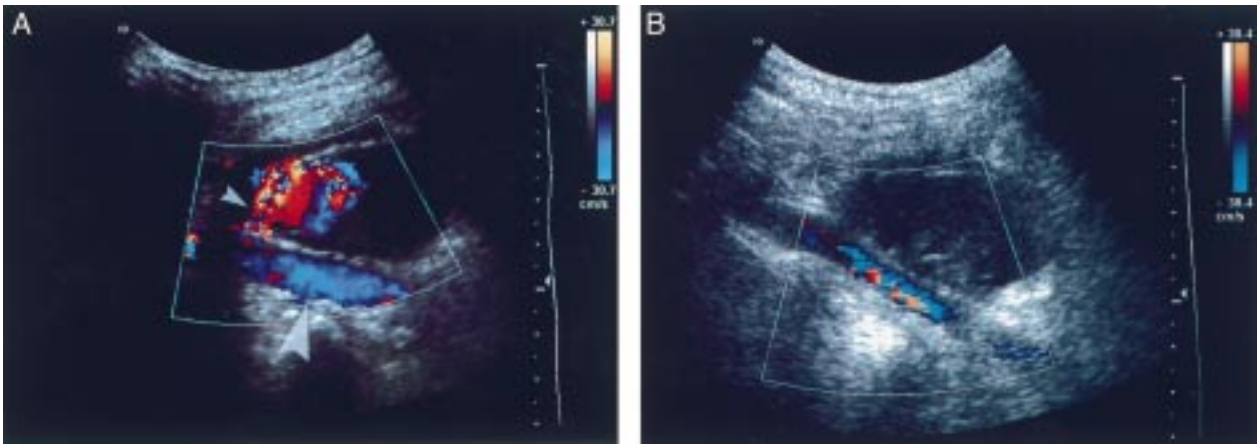

Figure 2 (A) Duplex ultrasound of the pseudoaneurysm before thrombin injection, showing flow from the left axillary artery (large arrowhead) into the pseudoaneurysm (small arrowhead). (B) Duplex ultrasound after percutaneous thrombin injection, confirming abolition of flow into the aneurysm sac.

certainly the cause in our patient, involving a site at which pseudoaneurysms are very rare. Treatment options include surgical repair, coil embolisation, stenting, and ultrasound guided compression. The latter is simple to perform, has a high success rate, and is the treatment of choice for femoral pseudoaneurysms.[3] However, the close proximity of the clavicle made the axillary pseudoaneurysm in our case unsuitable for compression.

Thrombin based tissue adhesives have been available for many years. Activated thrombin acts on fibrinogen to produce fibrin, which connects into long strands and forms thrombus once acted upon by factor XIII and calcium. There are a few reports of the percutaneous injection of thrombosis inducing agents in the treatment of pseudoaneurysm,[4–6] but none involves the axillary artery.

Percutaneous thrombin injection and ultrasound guidance has been shown to be effective in the treatment of pseudoaneurysms but techniques vary. Loose and Haslam advocate prolonged balloon insufflation (15 minutes) over the neck of the aneurysm following percutaneous thrombin injection to ensure no active thrombin or thrombus escapes into the native vessel.[4] Prolonged balloon occlusion carries its own potential risks and to prevent thrombosis caused by distal stasis the authors advocate intermittent flushing with heparinised saline through the balloon tip. Another disadvantage of the technique is the distal ischaemia produced during the 15 minute insufflation, which is likely to be painful (although not mentioned by the authors). Their technique is effective, however, and was successful in 12 of 13 cases with no complications.

In contrast Kang and colleagues used percutaneous thrombin injection under ultrasound guidance without balloon occlusion.[7] Obviating balloon occlusion reduces the complexity and procedural time and avoids the potential complications of a second arterial puncture. While there is a potential risk of distal embolus and failure of occlusion caused by continued flow in the false aneurysm, this has not been their experience (20 of 21 aneurysms were occluded without complication). This may be because in the majority of false aneurysms the neck, being produced by a needle, is small and prevents distal emboli. With a large neck the risks of distal thrombosis and embolism are likely to be increased, as in the case reported by Lennox and colleagues.[8] During this procedure, the neck of a brachial artery pseudoaneurysm was of similar diameter to the vessel, and following percutaneous thrombin injection there was thrombosis of both the pseudoaneurysm and brachial artery requiring surgical embolectomy. If balloon occlusion is not to be used it is therefore essential to assess the diameter of the neck before thrombin injection.

In our case we elected to use balloon occlusion to avoid the risk of thrombosis of the vertebral artery. However, as thrombin injection produced instantaneous thrombosis (as seen on real time ultrasound) we judged that prolonged insufflation, as recommended by Loose and Haslam,[4] was unnecessary.

In conclusion, ultrasound guided percutaneous thrombin injection is a rapid, cheap, and safe method for the treatment of iatrogenic pseudoaneurysms where the neck is narrow. We therefore recommend that it becomes the treatment of choice in such circumstances. We recommend balloon inflation across the aneurysm neck, especially where there is a branch vessel at risk or where the neck of the aneurysm is wide.

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