CASE REPORT

Axillary artery pseudoaneurysm resulting in brachial plexus injury in a patient taking new oral anticoagulants

Mohammed Monem,¹ Mohamad Khalid Iskandarani,² Kishan Gokaraju¹

¹Trauma & Orthopaedic Department, East and North Hertfordshire NHS Trust, Stevenage, Hertfordshire, UK
²The Royal London Hospital, Barts Health NHS Trust, London, UK

Correspondence to
 Mohammed Monem,
 monem@doctors.org.uk

Accepted 4 August 2016

SUMMARY

We discuss the case of an independent 80-year-old Caucasian woman, being treated with new oral anticoagulants for a previous deep vein thrombosis, who had fallen on her right shoulder. She made a delayed presentation to the emergency department with a wrist drop in her right dominant hand. She had right arm bruising with good distal pulses but had a global neurological deficit in the hand. Plain radiographs of the shoulder, humerus, elbow, forearm and wrist demonstrated no fractures. MRI showed a significant right axillary lesion distorting the surrounding soft tissues, including the brachial plexus, and CT with contrast confirmed this to be a large axillary pseudoaneurysm. This was treated with an endovascular stent resulting in slightly improved motor function, but the significant residual deficit required subsequent rehabilitation to improve right upper limb function.

BACKGROUND

This report discusses the uncommon condition of a brachial plexus injury secondary to a traumatic pseudoaneurysm. However, it is the first documented case of a patient who has presented with traumatic pseudoaneurysm while on new oral anticoagulants (NOACs). The case emphasises the importance of assessing for the effects of the increased bleeding potential in the presence of NOAC.

CASE PRESENTATION

An independent 80-year-old Caucasian woman presented to our emergency department 2 days following a fall on her right dominant arm complaining of ongoing right shoulder pain. Radiographs of the shoulder showed no obvious fracture so she was sent home with advice and analgesia. Five days later she re-presented in the emergency department reporting of bruising in the right arm and an increasing inability to use the arm.

Medical history revealed osteoporosis and a recent deep vein thrombosis being treated with Rivaroxaban—a direct factor ten (Xa) inhibitor. She was otherwise fit and well but had taken a sleeping tablet that caused her to feel dizzy resulting in the initial fall. On examination, she had extensive swelling and ecchymosis throughout the arm. She had reduced but present sensation from C5 to C8. She had zero of five power on the Medical Research Council (MRC) scale in C5 and

C6 myotomes with two of five in C7. She was haemodynamically stable and afebrile.

INVESTIGATIONS

Plain radiographs of the right shoulder, humerus, elbow, forearm and wrist did not demonstrate any acute bony injury or dislocation of joints.

MRI of the cervical spine demonstrated cervical spine degenerative changes, specifically multilevel foraminal narrowing and spinal canal narrowing at C3/4 and C5/6 but no cord signal changes or nerve root compression.

MRI of the right shoulder and brachial plexus with contrast agent (Gadolinium) revealed extensive subcutaneous and muscular oedema surrounding the shoulder girdle but no acute bony injury. A large mass was identified measuring 6.5×6.0×4.5 cm located within the right axilla, directly posterior to the axillary artery and among the cords of the brachial plexus. It comprised of a ring of soft tissue with a central cavity.

CT scan with contrast confirmed the lesion to be a pseudoaneurysm showing enhancement on arterial phase and, on ultrasound scan, this exhibited a turbulent, pulsatile flow. The neck measured ~1 cm in length and was 0.5 cm wide. The pseudoaneurysm itself measured 6 cm in the craniocaudal axis, 5 cm transaxially and 4.5 cm anteroposteriorly, surrounded by a haematoma. The brachial artery distally was patent along the rest of its course. There was compression of the basilic vein locally with reconstitution more distally and a patent cephalic vein.

The CT images were reconstructed to demonstrate the pseudoaneurysm; this is demonstrated in figures 1 and 2.

Arterial arteriography is an invasive investigation that can be used to make the diagnosis if non-invasive imaging is not diagnostic. Figure 3 demonstrates a pseudoaneurysm with the contrast agent flowing into the pseudoaneurysm.

All imaging was reported by a consultant musculoskeletal radiologist.

DIFFERENTIAL DIAGNOSIS

Prior to investigations, differentials included nerve root compression within the cervical spine or a brachial plexus injury secondary to trauma.

TREATMENT

The pseudoaneurysm was treated with an endovascular insertion of a curved (Viabahn) stent to right

CrossMark

To cite: Monem M, Iskandarani MK, Gokaraju K. *BMJ Case Rep* Published online: [please include Day Month Year] doi:10.1136/bcr-2016-216976

Figure 1 Reconstructed image of the CT scan demonstrating the size of the axillary pseudoaneurysm in the right axilla.

Figure 2 Reconstructed image of the CT scan demonstrating a cephalad view of axilla with the pseudoaneurysm and axillary artery (blue arrows) highlighted.

Figure 3 Arterial arteriogram demonstrating contrast leak into the surrounding axillary pseudoaneurysm before stenting.

Figure 4 Arteriogram demonstrating the treatment of the pseudoaneurysm with an arterial stent in situ. There is no sign of contrast leaking into the pseudoaneurysm after stenting.

axillary artery (figure 4) with image guidance by the local vascular service.

The NOAC were stopped preoperatively.

OUTCOME AND FOLLOW-UP

The patient experienced minimal motor function improvement postoperatively and required referral for further specialist physiotherapy. Follow-up will be made by a local vascular team and a peripheral nerve injuries unit at a tertiary referral centre.

DISCUSSION

Trauma-related axillary artery lesions account for up to a fifth of upper limb vascular injuries. Post-traumatic axillary artery aneurysm with an affiliated brachial plexus injury has been reported but is even rarer in the absence of bony injury or

dislocation.¹ We present the first such case of a post-traumatic axillary artery pseudoaneurysm without fracture or dislocation in a patient who was being treated with NOAC for deep vein thrombosis.^{1–3}

Pseudoaneurysms are believed to occur in the axillary artery following trauma due to its relatively fixed position in the axilla. The arterial wall is usually traumatised from a sharp injury from fractured bone or from blunt or traction injuries seen in dislocations, resulting in abnormal dilation of the blood vessel. Direct communication between the blood flow in the lumen and aneurysm then exacerbates the aneurysm.^{4–5} The axillary artery is closely related to the cords of the brachial plexus—which are named according to their relation to the axillary artery—lateral, medial and posterior. These share the same fascial plane and thus a large pseudoaneurysm can explain the compressive effect on the brachial plexus cords.⁶

This case of axillary artery pseudoaneurysm in the absence of fractures or dislocation emphasises the importance of identifying increased risk of bleeding in such patients, including the use of anticoagulants. The use of NOACs is an important factor to consider in such presentations. These new anticoagulants are becoming more prevalent in everyday practise and their use in patients is providing new challenges in patients undergoing emergency surgery. In addition to this, they need to be considered in the injured patient, particularly in the elderly and those at high risk of falls.⁷

Prognostically, later presentation of a post-traumatic pseudoaneurysm and an acute brachial plexus injury affects outcome and rehabilitation potential. Treatment of an already established pseudoaneurysm with an endovascular stent prevents further

enlargement, but does not acutely reduce its diameter. This is a damage limitation strategy. The residual haematoma in situ may continue to have its space occupying and compressive effect on the plexus and hence impact on the rehabilitation potential and duration.⁸

Therefore it is imperative to consider the use of NOACs in the presence of trauma and this must be identified when obtaining a history. This offers a window for earlier intervention and improved outcome. In this patient known to be on NOACs, perhaps a closer follow-up after the fall may have been beneficial when no acute musculoskeletal injury was initially identified. In addition, appropriate counselling and advice on worsening of symptoms should be provided to ensure early return of patient to the emergency department. An acknowledgement of anticoagulant-related pathology, such as pseudoaneurysms, is required in trauma patients on NOACs, and a higher index of suspicion must be maintained.

Acknowledgements We would like to thank the Trauma & Orthopaedics, Vascular and Radiology departments in East and North Hertfordshire Trust.

Contributors All authors contributed to the complete body of work. MM and MKI planned and conducted the case report in parts. This included research of possible previous cases as well as the medical science pertaining to this case. They also edited the images together. MM and KG helped with acquisition of data, reporting and editorial direction. Both analysed the write-up and any further revisions pre-final submission.

Competing interests None declared.

Patient consent Obtained.

Provenance and peer review Not commissioned; externally peer reviewed.

REFERENCES

- 1 Adovasio R, Visintin E, Sgarbi G. Arterial injury of the axilla: an unusual case after blunt trauma of the shoulder. *J Trauma* 1996;41:754–6.
- 2 Chen L, Peng F, Wang T, et al. Traumatic pseudoaneurysm of axillary artery combined with brachial plexus injury. *PLoS ONE* 2014;9:e113099.
- 3 Syed A, Williams H. Injury. Shoulder disarticulation: a sequel of vascular injury secondary to a proximal humeral fracture. *Int J Care Injured* 2002;33:771–4.
- 4 Stenning M, Drew S, Birch R. Low-energy arterial injury at the shoulder with progressive or delayed nerve palsy. *J Bone Joint Surg Br* 2005;87:1102–6.
- 5 Graham J, Mattox K, Feliciano D, et al. Vascular injuries of the axilla. *Ann Surg* 1982;195:232–8.
- 6 Kapoor B, Haddad H, Saddekni S, et al. Diagnosis and management of pseudoaneurysms: an update. *Curr Probl Diagn Radiol* 2009;38:170–88.
- 7 Faraoni D, Levy J, Albaladejo P, et al. Updates in the perioperative and emergency management of non-vitamin K antagonist oral anticoagulants. *Crit Care* 2015;19:203.
- 8 Helm A, Watson J. Compression of the brachial plexus in a patient with false aneurysm of the axillary artery as a result of anterior shoulder dislocation. *J Shoulder Elbow Surg* 2002;11:278–9.

Learning points

- Post-traumatic pseudoaneurysms are rare in the absence of fractures and dislocations.
- In patients without fractures or dislocations following injury, anticoagulant-related pathology and risk of bleeding must be considered in patients on new oral anticoagulants (NOACs).
- In elderly patients undergoing low-energy trauma, the use of NOAC should be identified and appropriate advice, counselling and follow-up should be provided.

Copyright 2016 BMJ Publishing Group. All rights reserved. For permission to reuse any of this content visit <http://group.bmj.com/group/rights-licensing/permissions>.
BMJ Case Report Fellows may re-use this article for personal use and teaching without any further permission.

Become a Fellow of BMJ Case Reports today and you can:

- Submit as many cases as you like
- Enjoy fast sympathetic peer review and rapid publication of accepted articles
- Access all the published articles
- Re-use any of the published material for personal use and teaching without further permission

For information on Institutional Fellowships contact consortiasales@bmjgroup.com

Visit casereports.bmj.com for more articles like this and to become a Fellow