CASE REPORT

Post-traumatic pseudoaneurysm of brachial artery in multiple hereditary exostoses

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SUMMARY

Pseudoaneurysms adjacent to exostoses have been commonly reported in the femoral and popliteal arteries and only rarely in the upper extremity. We describe a case of an 18-year-old man with multiple hereditary exostoses who developed a brachial artery pseudoaneurysm after minor trauma to his right upper arm, adjacent to a known lesion. He was referred to a vascular surgeon who removed the pseudoaneurysm and repaired the artery with a saphenous vein graft. We encourage a high suspicion of vascular injury even after minor trauma when an osteochondroma is adjacent to a vascular structure.

BACKGROUND

Osteochondromas are the most common benign bone tumours.¹ Multiple hereditary exostoses (MHE) is an autosomal-dominant disease that has been reported to be associated with less than a 1% chance of malignant transformation.² Osteochondral exostoses, resulting from physeal dysplasia, typically form near the metaphyses of long bones and are covered with a thick, soft cartilage cap during childhood and adolescence. During skeletal maturity, this cap ossifies and may become a sharp projection.^{1,3} Although vascular compromise secondary to an osteochondroma is a rare complication, cumulative microtrauma or an acute traumatic event may lead to injury of adjacent structures or arterial perforation.⁴ Most published reports involve the femoral and popliteal arteries. The resultant pseudoaneurysm is caused by compression of the vascular structure by the exostosis⁵ or trauma to the artery.⁶

CASE PRESENTATION

An 18-year-old boy with a history of MHE sustained blunt trauma to his right upper arm, an area with known lesions, during a basketball game. The patient presented to the office 1 day after injury and was treated as having a localised contusion. X-rays were negative for fracture of the proximal humerus and the adjacent exostoses (figure 1). When the patient was seen 2 weeks later, the right axilla was still tender and had persistent ecchymosis and increased swelling. The patient remained neurovascularly intact with full radial and ulnar pulses and excellent range of motion of the right shoulder. No fremitus or signs of distal microemboli were present.

INVESTIGATIONS

MRI revealed a 5.7×4.5 cm pseudoaneurysm in the brachial artery (figure 2). The patient was referred to a vascular surgeon for further treatment. CT angiography (CTA) was obtained for preoperative planning (figure 3).

DIFFERENTIAL DIAGNOSIS

Chondrosarcoma.

TREATMENT

An open approach to the right arm was used to remove the protruding, sharp cartilage spoke adjacent to the pseudoaneurysm. A vascular surgeon excised the pseudoaneurysm without complication and an autologous reversed saphenous vein graft was interposed (figure 4).

OUTCOME AND FOLLOW-UP

The patient had an uneventful postoperative course with routine healing of the surgical site. He was monitored at standard 6-month intervals without complication. At 2-year postoperative follow-up, the patient had full range of motion of the right shoulder, a normal neurovascular examination with full radial and ulnar arterial pulses and complete use of the extremity.

DISCUSSION

Approximately 100 total cases of arterial pseudoaneurysms associated with osteochondromas have been reported in the literature, with lesions about the knee accounting for the vast majority.² Typically occurring in young adult males, the distal femur (86%) and popliteal artery (77%) are the most common sites of bony exostoses and associated vascular injury, respectively. Our case represents only the eighth documented report of a brachial artery pseudoaneurysm resulting from an adjacent humeral osteochondroma. All prior reports of this specific condition have been treated with open exostosis resection, pseudoaneurysm resection and direct arterial repair or interpositional vein grafting.^{1,3,4,7–9}

Gerrand reported a 6 cm diameter brachial artery pseudoaneurysm which developed adjacent to a proximal humeral osteochondroma in a 16-year-old boy after a weight training injury. This mass caused compressive brachial plexopathy and was treated with exostosis and pseudoaneurysm excision.⁷ Tobias and Chang described a 19-year-old boy with MHE who developed brachial artery

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Figure 1 Radiographs of right humerus in an 18-year-old boy with multiple hereditary exostosis.

pseudoaneurysm after a basketball injury, resulting in a median and ulnar nerve neuropathy. This patient had undergone humeral osteochondroma excision 13 years prior to presentation. At the time of surgical excision, the pseudoaneurysm was adherent to an osteophyte which had developed in the area of prior resection.³ Scotti reported a brachial artery pseudoaneurysm adjacent

to a humeral osteochondroma after a fall from a horse treated with resection and reversed saphenous vein graft interposition.⁸ Koenig *et al* discussed another presentation of a brachial pseudoaneurysm which developed adjacent to a sharp humeral osteochondroma after weight lifting. This patient was initially incorrectly diagnosed as having a biceps rupture.¹ Three other atraumatic cases have also been described.^{4,9}

All patients who sustain trauma to an area with a bony exostosis should be monitored vigilantly for vascular injury and the development of a pseudoaneurysm. Orthogonal radiographs should be obtained to characterise the lesion and assess for acute fracture. Doppler ultrasound offers a non-invasive first-line vascular imaging modality. Advanced imaging techniques including computed tomography or magnetic resonance angiography (CTA or MRA) are diagnostic and facilitate preoperative planning. MRA offers the advantage of no ionising radiation.

Figure 2 T1 axial MRI of a right arm demonstrating a brachial artery pseudoaneurysm.

Figure 3 Axial slice CT angiography of a right arm demonstrating a brachial artery pseudoaneurysm.

Figure 4 Intraoperative photograph of right arm osteochondroma excision, brachial artery pseudoaneurysm resection and reversed saphenous vein graft interposition.

This decision should be made in consultation with the operating vascular surgeon.

Symptomatic osteochondromas, typically about the knee, causing pain, bursitis or neurovascular symptoms are routinely removed in children and adolescents.^{1 8 10} However, controversy exists regarding the need for prophylactic excision of exostoses.^{10 11} Specific recommendations regarding prophylactic removal are limited due to the rarity of vascular complications associated with exostoses and anecdotal nature of all previous literature. Consideration should be given to lesions with sharp, pointed edges and closer proximity to neurovascular structures. Patients with exostoses should be monitored until skeletal maturity, when these benign exostoses typically cease growth. Vascular injury, usually occurring after trauma or vigorous exercise, may

be more common after skeletal maturity, when exostoses may lose the overlying protective cartilage cap.^{13 11}

Learning points

- In patients with painful swelling following trauma to an area with a bony exostosis, vigilance for adjacent vascular injury is necessary.
- Advanced imaging with MRA or CT angiography is diagnostic.
- Prompt referral to a vascular surgeon is paramount.

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