CASE REPORT

Large pectoral haematoma post-transradial catheterisation: an unusual but avoidable complication

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SUMMARY

Large pectoral haematoma is an extremely rare complication of transradial catheterisation. Branch or main vessel injury due to luminal passage of guidewires and catheters may lead to bleeding and haematoma formation at adjacent sites along the vessel track. We present a 53-year-old post-transradial catheterisation patient, who complained of chest pain due to right axillary artery branch perforation causing haematoma, which was emergently managed by embolisation with autologous coagulated blood.

BACKGROUND

Ever since its introduction, transradial catheterisation is gaining increasing popularity as an alternative to conventional transfemoral approach providing advantage of less vascular complications, and shorter hospital stays.^{1–3} But, with novel techniques comes novel complications. Here, we present a 53-year-old man who developed a large pectoral haematoma due to axillary artery branch perforation following transradial catheterisation, managed by endovascular embolisation.

Case presentation

A non-diabetic, non-hypertensive, obese (body mass index 33.9), 53-year-old man, with history of thrombolysed inferior wall myocardial infarction 5 months ago, presented with typical angina (Canadian Cardiovascular Society 2) on medical therapy. He had evidence of inferior wall ischaemia on exercise stress echocardiography and was admitted for diagnostic coronary angiogram.

After obtaining right radial access with a short (7 cm) 5 Fr sheath and injecting unfractionated heparin and vasodilator intra-arterially, a 0.035" J-tipped, polytetrafluoroethylene-coated, 150 cm guidewire was used to advance a 5 Fr radial diagnostic catheter (Optitorque TIG 100 cm, Terumo) under fluoroscopic guidance. Coronary angiography showed non-critical plaques in left anterior descending and left circumflex arteries. Right coronary artery (RCA) could not be selectively engaged and non-selective angiogram showed an anomalous origin from left sinus of Valsalva. A 250 cm hydrophilic polymer-coated angled guidewire (Radifocus, Terumo) was used to exchange Judkins right catheter (3.5 curve, Terumo) which also failed. Hydrophilic wire was again used to exchange and

try an oversized Judkins right catheter (4.0 curve). This pulled the wire into axillary artery and its tip inadvertently entered a small branch. Wire tip was repositioned into main artery and advanced to aortic root. With manipulation, Judkins right 4.0 catheter partially engaged RCA ostium showing subtotal occlusion in mid-RCA (see online supplementary video 1). Radial sheath was removed and a compression bandage was applied for haemostasis. The patient was symptom-free at the end of a seemingly uneventful procedure.

A few hours after the procedure, the patient complained of pain and swelling in the right side of chest. Examination revealed a huge haematoma over mammary area extending towards supraclavicular and axillary areas (figure 1) with sinus tachycardia and fall in blood pressure. Haemoglobin level fell from preprocedure value of 12.1 to 8.9 g/dL 8 hours postprocedure. Volume resuscitation was started and patient was taken to catheterisation laboratory with strong suspicion of branch axillary/subclavian artery perforation. Right femoral access was taken and a 6 Fr multipurpose guide (Medtronic) was used for right subclavian arteriogram. It revealed a perforated branch from axillary artery with brisk contrast extravasation (figure 2A, see online supplementary video 2). A 6 Fr compatible microcoiling catheter (Cook Medical) was taken over a floppy guidewire (Cougar XT, Medtronic) to the perforated segment. Due to the unavailability of appropriate sized microcoils, alternative embolisation material had to be used. Five millilitre of patient's own blood was uniformly coagulated ex vivo by stirring, and 1 mL of this soft clot suspended in saline was injected via microcatheter into the perforated branch, with catheter tip well inside the branch preventing any retrograde leakage (figure 2B,C). Immediately, the perforation sealed and repeat angiogram at 30 min showed complete disappearance of contrast extravasation into soft tissue (figure 2D, see online supplementary video 3). A single unit of cross-matched blood was transfused overnight.

Subsequent ultrasonography and CT of chest revealed a huge haematoma within right prepectoral region (21.6×12.2×5.4 cm) (figure 3). Although superficial ecchymosis developed over right pectoral and axillary areas after 36 hours (figure 1), there was no further fall in haemoglobin

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Figure 1 Huge haematoma with ecchymosis over right pectoral region. Note the extent of swelling on right side compared with left.

level or increase in haematoma on ultrasonography over the next 4 days.

OUTCOME AND FOLLOW-UP

Patient was discharged on fifth postcatheterisation day. He was reviewed in outpatient follow-up at 3 weeks with faint and recovering ecchymosis and no residual symptoms. Percutaneous angioplasty of RCA is planned.

DISCUSSION

Radial catheterisation is rarely complicated by access-related vascular complications like bleeding, haematoma, pseudoaneurysm, arteriovenous fistula and thromboembolism, compared with femoral approach.^{1 2} Vascular complication risk with

Figure 3 CT of chest with bone window at upper thoracic level showing extravasation of contrast in prepectoral soft tissue (open arrow) causing large area of high-density attenuation consistent with haematoma.

transradial approach is 0.3%, primarily involving the radial artery, and the risk of significant bleeding requiring transfusion is extremely rare, less than 0.1%.³ Nevertheless, vascular complications can occur at any site of vessel along the track of the wires or catheters.^{1 2} To the best of our knowledge, there has been only one previously reported case in literature of such a large prepectoral haematoma due to radial catheterisation,⁴ other unusual regions being mediastinal and cervical haematomas.^{5–9}

Hydrophilic wires are used for their enhanced 'lubricity'—a measure of reduction in friction by hydrophilic coating. Tortuous vascular segments are more easily manoeuvred, but an angled tip hydrophilic wire can glide into small side branches without appreciable resistance, heightening the risk of subintimal dissection and perforation. Due to this, hydrophilic wires are usually not the first choice among guidewires. Their use requires more operator control, and their distal tip must always be within field of view during manipulation.

Most of the previously reported cases were managed by supportive treatment and did not require any intervention.^{5–8} Tatli *et al* used a handmade covered stent for bailing out perforation in mammary artery.⁴ Arsanjani *et al* reported a large perforation in pericardiophrenic artery, causing haemorrhagic shock which was managed by coil embolisation.⁹ Our patient also developed haemodynamically significant blood loss; therefore, repeat catheterisation was done with intent to intervene the source of bleeding. Owing to the difficult access angle of the implicated branch vessel via femoral route, as well its small size, balloon occlusion or covered stent grafting were not a possibility. Micro-sized coils or other embolisation materials (Gelfoam, Alcohol, Glue, etc) were not available at the time, so a novel method of embolisation by autologous coagulated blood was successfully used. Its advantages are easy availability, cost-effectiveness and ability to preserve tissue viability due to later recanalisation. This rarely used method may best suite circumstances where small vessel size precludes coil embolisation, and particulate/sclerosing agents are not readily available for emergency use. It is based on the same premise behind usual embolisation materials—inflammation followed by coagulation.¹⁰ Open surgery is the last resort if vessel is not amenable to endovascular repair and/or significant bleeding persists.

Antiplatelet/anticoagulant usage may lead to significant haemorrhage even from difficult-to-recognise perforations in small branches from major vessels. In our patient, the haematoma was recognised only after the complaint of local 'chest pain' was made by patient few hours after the procedure. His background

Figure 2 (A) Selective axillary artery angiogram showing perforation and contrast extravasation (*). Autologous soft clot prepared ex vivo (B). Microcatheter advanced deep into perforated segment and autologous clot injection performed (C) which resulted in immediate sealing of the perforation (D).

medication included dual antiplatelet agents which increased the risk of bleeding.

Learning points

- ▶ A hydrophilic wire can inadvertently enter even the smallest arterial branches without much resistance, leading to dissection, perforation and haemorrhage. Angled wires have a higher tendency to enter small side branches, compared with standard J-tip wire. Where there is a wire, there may be a complication!
- ▶ Haemorrhagic vascular complications can be minimised by reinforcement of basic precautions—strict fluoroscopically guided wire manipulation and judicious use of hydrophilic wires. In our case, multiple catheter exchanges over a long length wire moved the tip proximally lacking operator control—advancement of catheter while the wire tip was angled towards a branch probably led to this perforation.
- ▶ Vigilance towards patients' haemodynamics and alertness to recognise alarming symptoms like swelling and pain are keys to timely recognition of a manageable complication.
- ▶ Endovascular embolisation is frequently helpful to avert a major surgery. Autologous clot embolisation is rarely done but may come in handy in emergent situations like small vessel perforation.

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REFERENCES

- 1 Agostoni P, Biondi-Zoccai GG, de Benedictis ML, *et al.* Radial versus femoral approach for percutaneous coronary diagnostic and interventional procedures; Systematic overview and meta-analysis of randomized trials. *J Am Coll Cardiol* 2004;44:349–56.
- 2 Jolly SS, Amlani S, Hamon M, *et al.* Radial versus femoral access for coronary angiography or intervention and the impact on major bleeding and ischemic events: a systematic review and meta-analysis of randomized trials. *Am Heart J* 2009;157:132–40.
- 3 Kanei Y, Kwan T, Nakra NC, *et al.* Transradial cardiac catheterization: a review of access site complications. *Catheter Cardiovasc Interv* 2011;78:840–6.
- 4 Tatli E, Gunduz Y, Buturak A. Hematoma of the breast: a rare complication of transradial angiography and its treatment with handmade stent graft. *J Invasive Cardiol* 2014;26:E24–6.
- 5 Jao YT, Chen Y, Fang CC, *et al.* Mediastinal and neck hematoma after cardiac catheterization. *Catheter Cardiovasc Interv* 2003;58:467–72.
- 6 Park KW, Chung JW, Chang SA, *et al.* Two cases of mediastinal hematoma after cardiac catheterization: A rare but real complication of the transradial approach. *Int J Cardiol* 2008;130:e89–e92.
- 7 Parikh P, Staniloae C, Coppola J. Pain in the neck: a rare complication of transradial cardiac catheterization. *J Invasive Cardiol* 2013;25:198–200.
- 8 Yang W, Qiao S, Liu R, *et al.* [Clinical features and outcome of eight patients with mediastinal and neck hematoma after transradial cardiac catheterization approach]. *Zhonghua Xin Xue Guan Bing Za Zhi* 2014;42:406–12.
- 9 Arsanjani R, Echeverri J, Movahed MR, Mohaved MR. Successful coil embolization of pericardiacophrenic artery perforation occurring during transradial cardiac catheterization via right radial artery. *J Invasive Cardiol* 2012;24:671–4.
- 10 Lubarsky M, Ray C, Funaki B. Embolization agents—which one should be used when? Part 1: large-vessel embolization. *Semin Interv Radiol* 2009;26:352–7.

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