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Case Report

Angioplasty of a totally occluded brachial artery using kissing guide wire technique by transradial approach

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ABSTRACT

The subacute or chronic upper limb ischaemia is mostly non-atheromatous, especially in the young and is of multiple aetiology. Subclavian artery is affected the most and is treated by angioplasty. Brachial artery is least affected, therefore the least is the experience to treat it. At present, intervention of upper limb vessels distal to axillary artery is taken as duplication of intervention technique used for coronary or lower Limb. This case report describes a 28-year-young man who underwent successful angioplasty and stenting of a subacute totally occluded brachial artery of 2 weeks duration possibly of post-traumatic aetiology. Kissing guide wire technique via transradial approach was used in this case, the first experience in upper limb ischaemia management distal to axillary artery.

1. Background

Brachial artery occlusion is rare. It accounts for approximately 12% of symptomatic upper Limb ischaemia.[1] The hallmark of subacute or chronic brachial artery occlusion is extensive collateral formation around the elbow but that may not always save the limb from amputation. The treatment options available for brachial artery occlusion include anti coagulation, thrombolysis, endovascular techniques and surgery. As of now balloon angioplasty of upper limb vessels distal to axillary artery with or without using a stent is off-label.

2. Case report

A 28-year-old man presented with left upper limb claudication at rest for past 2 months associated with black discolouration of fingers for the last 3 weeks. There was no history of coronary artery disease or risk factors for it. Two years back he had traumatic fracture of both ulna and radius of left forearm. Close reduction was done under local anaesthesia. The limb was immobilised for three months using above elbow plaster of Paris (POP). On examination, the whole hand was hyperalgesic with gangrene of tip of medial three fingers [Fig. 1]. There were no palpable pulsations below the level of left

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Fig. 1 – Gangrene of tip of middle, ring and little fingers of left hand as on day 12 of onset of symptoms.

axillary artery, which was consistent with Doppler findings. Venous Doppler study was normal. He was not on any anticoagulation before his presentation to us. Otherwise general and systemic clinical examination was normal. The routine laboratory test reports were within normal limits except for mild elevated Anti-nuclear antibody (ANA), Erythrocyte sedimentation rate 23 mm by first hour, and a negative rheumatoid factor. The batteries of test done for hypercoagulable state were normal including platelet count, level of factor V Leiden, prothrombin time (PT), Protein C, Protein S, fibrinogen level, Antiphospholipid antibodies and serum homocysteine. Urinalysis was negative for significant proteinuria. Cryoglobulins, cold agglutinins, and serum protein electrophoresis reports were normal. Echocardiography was normal. Left upper limb angiogram from right femoral approach showed completely occluded left brachial artery with fair amount of collaterals round the elbow joint mostly from axillary artery [Fig. 2]. Because of subacuteness, we planned subcutaneous low molecular weight heparin for five days and a repeat arterial Doppler to get some arterial signals at the wrist for possible retrograde approach because the totally occluded part of artery length was approximately 8–10 cm. The reason for this non-aggressive approach was we were doubtful about a successful intervention from antegrade approach as it was 100% occlusion and claudication history of 2 weeks duration. After five days of enoxaparin the repeat arterial Doppler signalled monophasic arterial pulsation in both radial (2.2 mm) and ulnar artery (1.8 mm), of course of poor flow. At this stage surgery was a option but this patient did not opt for it. Radial artery was successfully cannulated with 5 Fr radial sheath from Cordis under direct supervision of arterial Doppler up to the finest approximation of puncture site. Right femoral access was also made. The transfemoral angiogram revealed total occlusion of brachial artery distal to axillary artery extending up to just above the elbow, a fair amount of collaterals around the elbow, very good sized ulnar artery with ostioproximal 60–70% stenosis and under filled distal radial artery with sheath in it. The distal reformation of brachial artery was seen with favourable cap in the distal part of the brachial artery just above the elbow joint. With adequate anticoagulation (Unfractionated heparin – two doses 5000 IU each) and optimum antiplatelet coverage, we proceeded. In step one we tried to cross the occlusion antegradely via transfemoral approach using 5 Fr multipurpose catheter and an exchange length straight tip Terumo wire (Terumo Medical Corporation, USA) but could not succeed though there was some progress. The Terumo was left exactly at that point of advancement to guide us in retrograde transradial approach. Check angiogram showed no extravasation of contrast indicating no collateral has been damaged. The transradial retrograde Terumo passed through the distal cap with minimum thrust, crossed the totally occluded brachial artery segment over a length of 7–8 cm and kissed the antegrade Terumo wire exactly in the true lumen in disease free axillary artery [Fig. 3, Video 1]. The distal tip of retrograde Terumo led into axillary then subclavian artery with some ingenious effort confirming its position in the true vessel lumen. The 5 French sheath in radial position was upgraded to 7 French at some risk of radial artery injury. A Fielder XT extra stiff coronary guide wire was exchanged for Terumo wire. The entire stenosis was successfully dilated using compliant 4 mm coronary balloon at 4–10 atm pressure, with very good antegrade flow. Relief of hyperalgesia of left hand was instantaneous to bare minimum perception. The residual stenosis of more than 50% was apparent [Video 2] with dissection noted in the proximal part of brachial artery [Fig. 4]. Then the lesion was stented from radial access successfully using 6 mm × 90 mm self-expandable nitinol stent (Bard Peripheral Vascular, Inc.1625 West 3rd Street Tempe, AZ 85281, USA) over the exchange length Terumo, keeping the distal end of stent just above the joint line of elbow. The final result was satisfactory with residual stenosis less than 30% [Fig. 5, Video 3]. Though there was some stenosis at the distal part of stent, further dilatation was avoided because of smaller sized distal vessel. The radial sheath was removed immediately after procedure but femoral sheath was removed after actual clotting time (ACT) achieved a value of 160 s. There was no pseudoaneurysm at the site of radial sheath. Subcutaneous Enoxaparin was given for 10 days. Cilostazol was started in a dose of 100 mg twice daily and continued during follow-up. He was discharged on 10th day of procedure with painless, well functioning left hand with bounding radial artery and ulnar arteries. The Doppler signal was triphasic at the end of one month follow-up without symptoms. Arterial Doppler showed normal signal in the entire upper limb with patent stent. We had not given steroid because of definite past history of traumatic aetiology.

Supplementary video related to this article can be found at http://dx.doi.org/10.1016/j.jicc.2014.04.001.

3. Discussion

Arterial occlusive disease of the upper extremity may represent either local or part of systemic disease. The age of presentation is inversely proportional to the number of aetiology. Upper limb artery stenosis distal to axillary is rare. Brachial artery occlusion accounts only 12% of chronic upper limb