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CASE REPORT

True Idiopathic Radial Artery Aneurysm: A Case Report and Review of Current Literature

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Introduction: True non-traumatic radial artery aneurysms (RAAs) are extremely rare, and few cases have been described. The majority of RAAs are post-traumatic or iatrogenic pseudo-aneurysms following arterial cannulation. However, RAAs due to other causes have also been described. Here a rare case of true idiopathic distal RAA, which was managed by surgical resection and repair with interposition vein graft, is described.
Report: A 62 year old female with a known medical history of hypertension and hyperlipidaemia presented with left wrist swelling of one year duration, associated with a pulsatile lump that was increasing in size. Duplex ultrasound and computed tomography angiography revealed a distal RAA. She underwent open surgical resection and repair with interposition vein graft using the distal left cephalic vein. Histopathology of the specimen revealed an aneurysm with atherosclerosis. She recovered well post-operatively with no complications.
Discussion: True idiopathic RAAs are rare. Surgical treatment is almost always recommended in view of the risk of complications. A case of true idiopathic distal RAA is presented here, which was managed successfully by surgical resection and repair with interposition vein graft.

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INTRODUCTION

True non-traumatic radial artery aneurysms (RAAs) are rare and have only been described in a few case reports in the current literature. As with other blood vessels, the radial artery is defined as aneurysmal if there is focal dilatation of the artery that has a diameter more than 1.5 times the normal diameter of the artery; the normal diameter of the radial artery is about 2—3 mm. A true RAA is defined as dilatation of the artery containing all components of the arterial wall, usually occurring secondary to arterial wall weakening. The majority of RAAs are post-traumatic or iatrogenic pseudo-aneurysms following arterial cannulation.[1] However, RAAs due to other causes have also been described, such as connective tissue disorders[2,3] and vascular tumours.[4] RAAs occurring in the anatomical snuffbox are extremely rare with very few cases reported. A rare case of true idiopathic distal RAA is presented here, which was managed by surgical resection and repair with interposition vein graft.

Full written informed consent from the patient was obtained for publishing this article and images.

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CASE REPORT

A 62 year old female with a known medical history of hypertension and hyperlipidaemia presented with left wrist swelling of one year duration, associated with a pulsatile lump that was gradually increasing in size (Fig. 1). She was right handed and a retired accountant. She denied any previous trauma, injury, surgery, or instrumentation (including punctures or arterial cannulation) to the area and did not have any personal or family history of aneurysmal or connective tissue disease. On physical examination, there was a pulsatile lump over the left wrist in the area of the anatomical snuffbox proximal to the radial branch connecting with the arch. Both ulnar and radial pulses were strong with a normal modified Allen's test. There were no signs of other arterial aneurysms on examination and no pulsatile abdominal mass. Duplex ultrasound and computed tomography angiography revealed a fusiform aneurysm of the left distal radial artery measuring approximately 1.2 × 0.7 cm (Fig. 2). There was no evidence of aneurysm elsewhere in the upper extremity, trauma, previous fractures, or bone lesions on imaging.

Based on the size of the aneurysm, potential risk of embolisation and her symptoms, the patient decided to undergo definitive surgical treatment. Open surgical resection and repair with interposition vein graft using the distal left cephalic vein was performed. The aneurysm was dissected, proximal and distal control were obtained, and excision of the aneurysm was performed. In order to

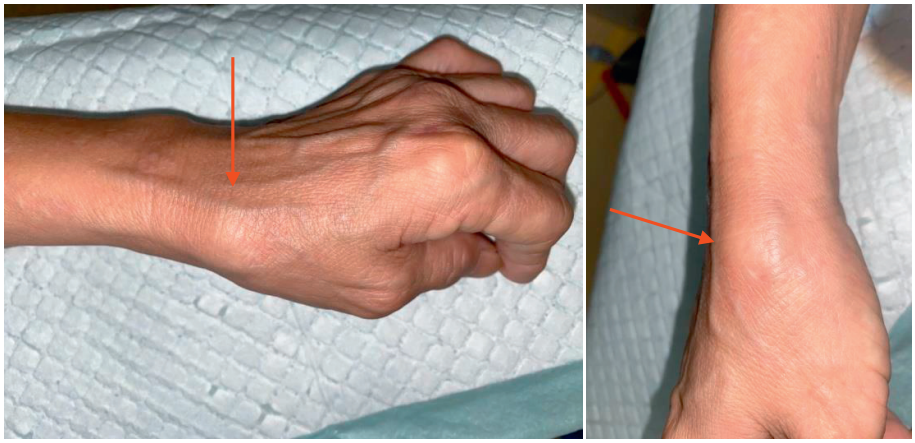

Figure 1. Pre-operative photographs of the patient's left hand showing a lump in the anatomical snuffbox (red arrows).

achieve a tension free repair, a segment of the left cephalic vein at the incision site was harvested, and the radial artery defect was repaired with interposition vein graft by an end to end anastomosis (Fig. 3). The radial pulse was strong. Post-operatively, she recovered well with no complications. She was discharged with analgesia, a short course of antibiotics and her usual medications for hypertension (losartan) and hyperlipidaemia (atorvastatin). Aspirin was not prescribed due to allergy. During the latest follow up visit (one month post-operatively) there were no complaints, the palpated radial pulse was strong with no neurovascular deficits, and Duplex ultrasound showed that the repair was patent. Histopathology of the specimen revealed an aneurysm with atherosclerosis (Fig. 4).

DISCUSSION

True RAAs are rare with a prevalence of 2.9% among all aneurysms affecting the upper extremities and have only been described in few case reports in the current literature (Table 1). The majority of RAAs are post-traumatic or

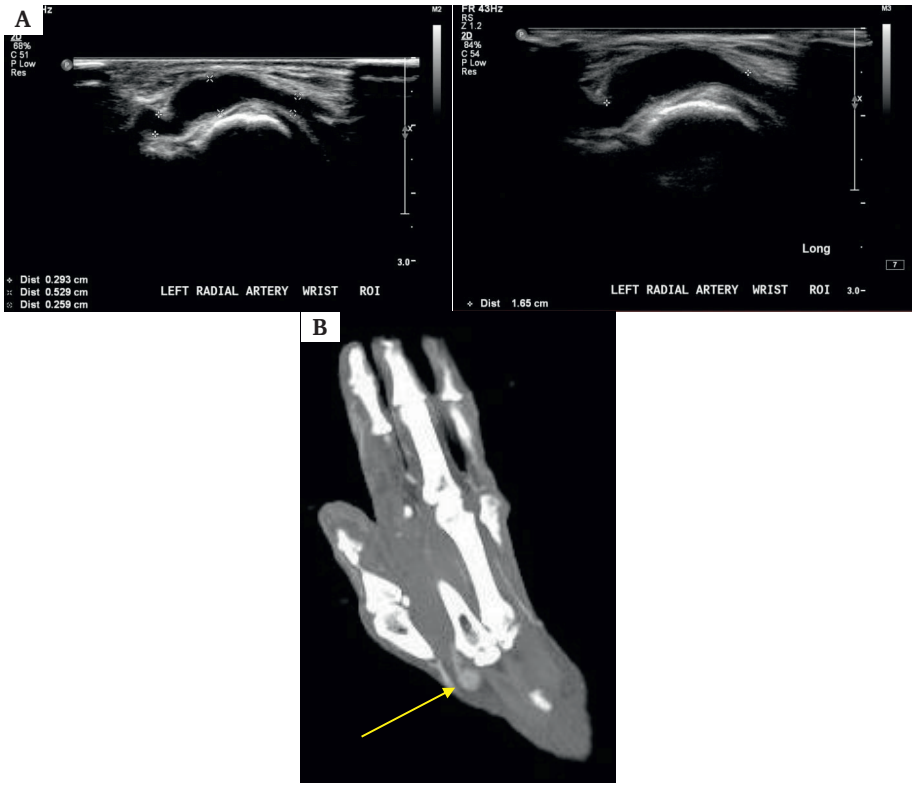

Figure 2. (A) Duplex ultrasound and (B) computed tomography angiogram showing the distal radial artery aneurysm in the area of the anatomical snuffbox.

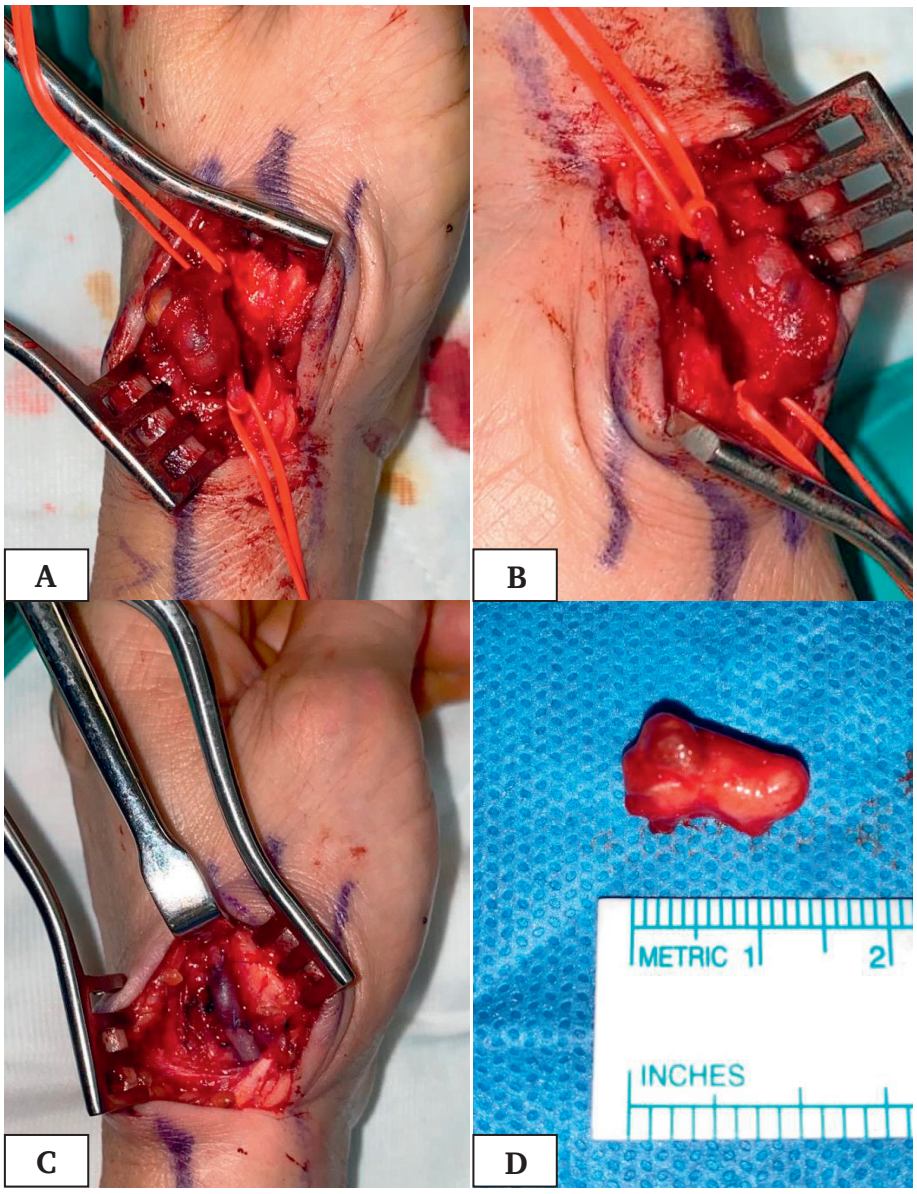

Figure 3. Intra-operative photographs showing (A,B) the radial artery aneurysm identified with proximal and distal control achieved, (C) completed repair with cephalic vein interposition graft with end to end anastomosis, and (D) the resected radial artery aneurysm.

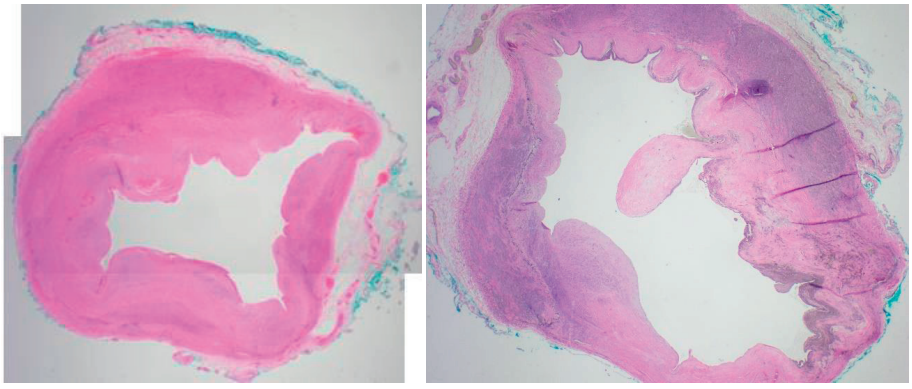

Figure 4. Histopathology images of the excised radial artery aneurysm with H&E (left) and EVG (right) stains. Sections of the vessel show fibrotic and focally thinned out wall with loss of internal elastic lamina. There is also intimal thickening and atherosclerotic changes.

Table 1. Cases of true radial artery aneurysms published in English language to date.

No.	Authors	Age	Sex	Size of aneurysm (largest diameter, mm)	Aneurysm location	Aetiology	Diagnostic modality	Treatment	Outcome
1.	Thorrens et al. (1966)	60	M	30	Anatomical snuffbox	Idiopathic	Angiography	Surgical excision and primary end to side anastomosis	Post-operative arteriogram confirmed patency of anastomosis
2.	Malt et al. (1978)	56	M	20	Anatomical snuffbox	Idiopathic	Angiography	Surgical excision and primary anastomosis	Small Post-operative haematoma; lost to follow up
3.	Turner et al. (1988)	55	M	20	Cubital fossa — proximal radial artery just distal to posterior interosseous branch	Idiopathic	Angiography	Surgical excision and primary end to end anastomosis	Post-operative uneventful
4.	Singh et al. (1998)	45	M	Not stated	Proximal radial artery over proximal radial aspect of forearm	Neurofibromatosis I	US duplex, CT angiography	Surgical excision and radial artery ligation	Post-op uneventful, no complications at six months follow up
5.	Walton et al. (2002)	40	M	15	Anatomical snuffbox	Idiopathic	MR angiography	Observation alone	Not reported
6.	Luzzani et al. (2006)	63	F	11	Anatomical snuffbox	Idiopathic	US duplex, MR angiography	Surgical excision and radial artery ligation	Discharged two days post-op without complications
7.	Yaghoubian et al. (2006)	77	M	15	Just distal to anatomical snuffbox at base of thumb	Idiopathic	Angiography	Observation alone	No change in aneurysm size, no symptoms at 14 months follow up
8.	Behar et al. (2007)	62	M	19	Anatomical snuffbox at base of thumb	Repetitive occupational injury (tailor)	US duplex	Surgical excision and radial artery ligation	Post-op uneventful
9.	Filis et al. (2007)	45	M	30	Wrist	Idiopathic	Angiography	Surgical excision and primary anastomosis of radial artery to 2nd digital artery, 1st digital artery ligated	Discharged two days post-op, no complications at 12 months follow up
10.	Yukios et al. (2009)	74	F	9 (right), five (left)	Anatomical snuffbox	Marfan's syndrome	US duplex	Surgical excision and radial artery ligation (right), observation (left)	Discharged same day, no post-op complications
11.	Meira et al. (2011)	3	M	11	Proximal radial artery (2cm from radial artery origin)	Idiopathic	CT angiography	Surgical excision and radial artery ligation	No complications 30 days post-op
12.	Jedynak et al. (2012)	60	M	Not stated	Anatomical snuffbox	Idiopathic	US duplex, CT angiography	Surgical excision and radial artery ligation	No complications three months post-op
13.	Gabriel et al. (2013)	49	M	18.8	Wrist	Idiopathic	US duplex	Surgical excision and radial artery ligation	Post-op uneventful
14.	Igari et al. (2013)	72	F	15	Anatomical snuffbox	Idiopathic	Not stated	Surgical excision and radial artery ligation	No recurrence, ischaemia symptoms or post-op complications at 42 months post-op

Continued

Table 1-*continued*

No.	Authors	Age	Sex	Size of aneurysm (largest diameter, mm)	Aneurysm location	Aetiology	Diagnostic modality	Treatment	Outcome
15.	Santis et al. (2013)	48	F	Multiple small fusiform aneurysms	Multiple — most proximal located 3cm below brachial artery bifurcation	Neurofibromatosis I	CT angiography	Surgical excision and radial artery ligation	Discharged 10 days post-op, no complications at six months follow up
16.	Shaabi et al. (2014)	65	F	20	Anatomical snuffbox	Idiopathic	CT angiography	Surgical excision and radial artery ligation	Post-op uneventful
17.	DeŞer et al. (2017)	25	M	20	Wrist	Behçet's disease	US duplex	Surgical excision and radial artery ligation	Post-op uneventful
18.	Al-Zoubi et al. (2018)	61	M	30	Wrist	Idiopathic	US Doppler, CT angiography	Surgical excision and primary end to end anastomosis	Discharged same day, no post-op complications
19.	Erdogan et al. (2018)	52	M	14	Anatomical snuffbox	Idiopathic	CT angiography	Surgical excision with primary end to end anastomosis reconstruction	Discharged three days post-op, no lesion at three months on CT
20.	Ghaffarian et al. (2018)	25	M	6.3	Anatomical snuffbox	Idiopathic	US duplex, angiography	Surgical excision and repair with interposition great saphenous vein graft	No complications at 10 months post-op, duplex US shows patent vein graft with normal hand perfusion
21.	Maalouly et al. (2019)	73	F	15	Anatomical snuffbox	Idiopathic	CT angiography	Surgical excision and radial artery ligation	Discharged two days post-op, uneventful
22.	Umana et al. (2019)	83	M	20	Proximal radial artery just distal to elbow crease, 8cm distal to brachial artery bifurcation	Idiopathic	US duplex, CT angiography	Surgical excision and primary end to end anastomosis	Discharged 24h post-op, US duplex at six months post-op shows patent radial artery
23.	Wu et al. (2020)	65	M	Not stated	Wrist	Snake bite	Not done — diagnosed intra-op during emergency surgery	Surgical excision and radial artery ligation	Right forearm amputated
24.	Chee et al. (2020)	62	F	12	Anatomical snuffbox	Idiopathic	US duplex, CT angiography	Surgical excision and repair with interposition cephalic vein graft	Discharged one day post-op, no post-op complications

CT = computed tomography; US = ultrasound.

iatrogenic pseudo-aneurysms.[1] Previous reports of true RAA aetiologies include mycotic, arteriosclerotic, idiopathic, and underlying vasculopathy. Patients may present with localised swelling, a pulsatile lump, pain due to nerve compression or rupture, or ischaemic symptoms secondary to thrombosis or distal embolisation. The most common location for a distal RAA is at the level of the anatomical snuffbox. The diagnosis is often confirmed with duplex ultrasound and/or computed tomography angiography. The risk of embolisation or rupture is unknown, but risk of rupture is presumed to be higher the more proximal the location of the aneurysm,[5] the larger the aneurysm, or in the presence of thrombus within the aneurysm sac.

A MEDLINE search using the terms "radial artery" and "aneurysm" revealed 23 cases of true RAAs previously published in English language since the first case described by Thorrens in 1966, presented in Table 1.

There are currently no guidelines for the management and indications for surgical repair of RAAs; the existing literature has reported management with observation alone[6] *vs.* surgical excision. Surgical treatment is almost always recommended in view of the risks of rupture, embolisation, distal ischaemia as well as the low morbidity of repair, and in symptomatic RAAs.[7] The choice of surgical treatment depends on whether there is adequate perfusion to the hand if the aneurysm and involved artery are excluded from the circulation. To evaluate dominance, various tests exist with variable sensitivity and specificity, including Allen's test, modified Allen's test, digital plethysmography, digital Doppler waveforms and pressures, and duplex ultrasonography. Patient symptoms and the presence of thrombosis, distal emboli, or infections are also important factors to determine the mode of management. Options range from simple resection and ligation of the radial artery stump if the hand is adequately perfused, *vs.* reconstruction with a primary end to end anastomosis if there is no tension, or with graft interposition if the defect is lengthy. There is no clear consensus about whether to ligate or reconstruct the radial artery: some authors have proposed revascularisation whenever possible,[8] whereas others have argued for selective revascularisation depending on the collateral circulation.[9,10] Nonetheless, both methods have achieved good results with low morbidity, as evidenced by previously reported cases in Table 1 and in this patient. For this patient, the decision was made for surgical resection and reconstruction with an interposition vein graft given the patient was fairly young, the defect was deemed too long to achieve a tension free primary end to end anastomosis, and there was a suitable conduit available.

CONCLUSION

True idiopathic RAAs are rare. There are currently no guidelines with regards to the risk of embolisation and rupture, as well as management and indications for surgical repair, but surgical treatment is almost always recommended in view of the risk of complications and can be carried out with minimal morbidity. A rare case of true idiopathic distal RAA is presented, which was managed successfully by surgical resection and repair with interposition vein graft.

FUNDING

None.

CONFLICT OF INTEREST

None.

APPENDIX A. SUPPLEMENTARY DATA

Supplementary data related to this article can be found at https://doi.org/10.1016/j.ejvsvf.2020.11.003.

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