

Case Report

Anomalous superficial ulnar artery based flap

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ABSTRACT

Upper limb shows a large number of arterial variations. This case report describes the presence of additional superficial ulnar artery which was used to raise a pedicle flap to cover an arm defect thus avoided using the main vessel of the forearm - radial or ulnar artery. Vascular anomalies occurring in the arm and forearm tend to increase the likelihood of damaging the superficial anomalous arteries during surgery. Superficial ulnar or radial arteries have been described to originate from the upper third of the brachial artery; here we report the origin of the anomalous superficial ulnar artery originating from the brachial artery at the level of elbow with the concomitant presence of normal deep radial and ulnar arteries.

KEY WORDS

Anomalous artery based flap; arterial variations of the forearm; superficial ulnar artery based flap

INTRODUCTION

Arterial variations of upper limb are very common and different variations have been described in the literature, first mentioned by Von Haller in 18th century. As such these variations are of not much importance in normal individuals, but we here mention a rare case of such a variation in which the presence of an anomalous superficial ulnar artery in addition to the normal radial and ulnar arteries was used to our advantage to harvest a pedicle flap to cover an elbow defect thus avoiding the morbidity and cosmetic deformity associated with the radial artery forearm flap. We in this case report want to suggest that such vascular

anomalies can be of advantage if we are prepared to think out of the box!

CASE REPORT

A 60 year old right handed male presented with the complaints of swelling in the left lower arm over the medial aspect for the past 6 months and progressively increasing in size. Examination revealed a 7 cm × 5 cm swelling with central ulceration on the anteromedial aspect of the left lower arm [Figure 1a]. The elbow movements were normal, no distal neurovascular deficit. Magnetic resonance imaging revealed a well-defined lobulated lesion measuring 5 × 4 × 4.2 seen involving the subcutaneous tissue of the medial aspect of the lower arm. Fat planes with brachial artery, brachial venae comitantes and medial nerve preserved. A biopsy confirmed high grade liposarcoma with myxoid change. The patient was treated with pre-operative external beam radiotherapy to the left elbow, using Cobalt 60, 50 Gy/25#/37 days. Later he was planned for surgical excision of the lesion and cover with pedicled radial artery forearm flap/ulnar artery perforator flap.

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OPERATIVE FINDINGS

Following wide excision, there was an 8 cm × 9 cm defect exposing the biceps tendon, brachial artery, median and ulnar nerve, all the structures were uninjured. [Figure 1b].

Under tourniquet control. An access incision made over the middle of the forearm for the planned pedicled radial artery flap/ulnar artery perforator flap, on incising the skin, there was an anomalous superficial branch arising from the brachial artery at the level of elbow running up to the distal third forearm [Figure 1c],

1. Multiple perforators were visualised arising from this vessel and going into the dermis.
2. From the same incision radial and ulnar vessels were visualised.
3. In view of visible perforators and uninjured vessels up to the brachial artery and venae comitantes, decision was taken to base an islanded flap on this anomalous vessel with skin paddle dimension of 10 cm × 8 cm [Figure 1d].
4. No significant perforators from ulnar artery were seen during the further dissection.
5. As the vessel was arising in arm from brachial artery the arc of rotation was less and flap could be raised from the muscular part of the forearm (c.f. radial artery forearm flap) with potentially less chance of donor site morbidity.
6. Both major vessels of forearm were spared [Figure 1e].
7. Flap bleed was excellent [Figure 1f].

Patient had an uneventful post-operative recovery with 100% graft take [Figure 1g].

DISCUSSION

Various studies have provided a classification of the arterial variations in the upper limb, as well as a model of arterial development based on the study of large anatomical and embryological samples.

Arterial variations in the upper limb have been the subject of much controversy since Von Haller mentioned their existence for the first time in the 18th century.

The classic theory of Singer,^[1] stated that the adult pattern develops from a main axial trunk, which extends from the axilla to the fingers and represents the brachial and interosseus artery. The different arteries arise via sprouting angiogenesis: First the median artery, then the ulnar then the superficial brachial and finally, an anastomosis at elbow level between the brachial and superficial brachial arteries, which eventually become the initial part of the radial artery, whereas the proximal segment regresses to form the definitive adult pattern.

The new findings by Rodriguez-Niedenfuhr *et al.*,^[2] suggest that the arterial pattern of the upper limb develops from an initial capillary plexus by a proximal to distal differentiation (in the forearm with a posterior — anterior polarity) due to the maintenance, enlargement and differentiation of certain capillary vessels and the regression of others. It is suggested that the persistence, enlargement and differentiation of capillaries forming the initial capillary plexus, which would normally remain in a capillary state or even regress, gives rise to arterial variations of the definitive arterial pattern, rather than sprouting of aberrant vessels.

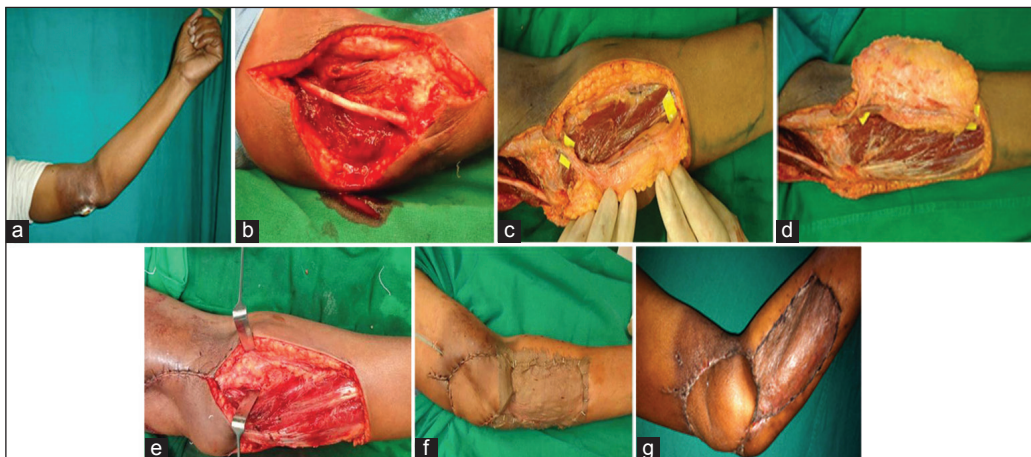


Figure 1: (a) pre-operative photo, (b) Defect, (c) access incision exposing the superficial ulnar artery, (d) flap incision committed for a superficial ulnar artery based flap, (e) normal deep radial and ulnar arteries, (f) final flap inset, (g) follow-up at 6 weeks

Incidence of arterial variations

1. Variations located exclusively in the arm:
Superficial brachial artery: Incidence 4.8%,^[2] which instead of coursing deep to the median nerve runs in front of it

2. Arterial variations located along the arm and forearm:

The brachioradial artery is the most frequent one with incidence of 14%.^[3,4]

It originated most frequently from the upper third of the brachial artery coursing superficial to the median nerve but deep to the brachial fascia and passed behind the bicipital aponeurosis and did not anastomose with the normal brachial artery. In the forearm they course deep to the fascia and reached their usual positions

3. Arterial variations located exclusively in the forearm
The median artery has been shown to present two different patterns, the antebrachial pattern ending in the forearm and the palmar one reaching the palm to supply the fingers.

The superficial radial artery is a radial artery coursing over the tendons defining the snuff box with incidence of 0.4%.^[5]

The absence of radial or ulnar artery has been rarely reported.

Vascular anomalies in the upper limb are of interest in raising flaps for reconstruction, one needs to be aware of such possible arterial variations in order to prevent complications and also to use such anomalous vessels for the reconstructive purposes thereby avoiding the sacrifice of major limb vessels.

CONCLUSION

Superficial ulnar artery is a rarely reported anomaly with incidence of 0.3%.^[6-8] The usefulness of the flap lies in it uncomplicated dissection, preservation of both major

vessels of forearm thus avoiding any vascular compromise to the extremity. Its advantage also lies in the fact that the donor site healing is uneventful and cosmetically acceptable when covered with a skin graft. The flap can also be used a free flap if needed. The superficial ulnar artery has been previously reported to as a trap while raising a radial forearm flap.^[9]

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