A communicating artery between axillary and radial artery - a case report

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Abstract

Variations in the branching pattern of axillary artery have been observed quite frequently. In a male cadaver aged around 45 years allotted for undergraduate dissection a communicating artery between axillary and radial artery was found on the right side during routine dissection. Such arterial variations are important for clinicians in angiographic examinations, removes ambiguity during diagnostic interventions and surgical procedures. Thereby it ensures competency and reduces complications in cardiac catheterization, pedicle flaps, arterial grafting etc.

**Key Words**: Communicating artery, Brachioradial artery, Superficial brachial artery.

Introduction

Axillary artery the continuation of subclavian artery begins at the outer border of 1st rib, ends usually at the inferior border of the teres major and continues further as the brachial artery which divides into radial and ulnar arteries at the level of the neck of the radius. Coronary artery bypass graft placement requires an autologous vessel as a conduit. Several options are available, including the saphenous vein, the internal mammary and inferior epigastric arteries, and with recent increasing frequency, the radial artery. The radial artery has many favourable features as a graft, including a caliber similar to that of the coronary arteries, adequate wall thickness and resistance to serve as a graft, sufficient length for complete revascularization, and a location that allows relative ease of harvesting. Hence knowledge of the anatomic variations of these arteries of the upper limb are useful for surgeons.

Case report

During routine dissection of a male cadaver aged around 45 years allotted to undergraduate students, a communicating artery between axillary and radial artery was found on the right side. The communicating artery arose from the III part of the axillary artery. Axillary artery after giving off the communicating artery, continued as brachial artery and divided into larger ulnar and a smaller radial artery from which radial recurrent artery was given off. After giving radial recurrent artery, radial artery passed deep to the tendon of biceps brachii and received the connection of the communicating artery from axillary artery. The communicating artery followed the course of the musculocutaneous nerve partly and then went down deep to the deep fascia of the arm along the lateral border of biceps brachii and then joined the radial artery. The length of the communicating artery i.e. from III part of axillary to its union with the radial artery was 38 cm. Diameter of the communicating artery was 1.64 mm. Diameter of axillary artery before giving off the communicating artery was 8.63 mm and after giving off the communicating artery the diameter of the axillary artery was 7.23 mm. The diameter of the radial artery before receiving the communicating artery was 2.77 mm and after receiving the communicating artery the diameter of radial artery was 2.78 mm. (Fig.1 & 2).

The arteries on the left side were as per anatomical description. There were no variations.

Discussion

**Morphological Significance**

A vessel connecting the axillary or brachial artery to one of the forearm arteries has been reported by Uzun et al. The anastomotic artery reported in their case
originated from the medial side of axillary artery or the initial portion of the brachial artery and connected the initial portion of the main radial artery on the radial side in the proximal forearm.

Relatively rare variation is the division of the axillary artery into two major stems that are continued down the arm. One of the stems is usually called the superficial brachial artery and the other the deep brachial artery. In Miller's series 30 of the 32 superficial branches were superficial radial arteries, one was superficial ulnar.

Origin of a communicating artery from the brachial artery has been described in the literature, and is called as brachioradial artery. In a study conducted by Niedenfuhr in 192 cadavers for arterial variations in the upper limb the authors have considered that the brachioradial artery was a radial artery with a high origin. They found brachioradial artery in 15 male cadavers and 24 female cadavers. At the elbow, brachioradial artery anastomosed with deep brachial artery in 14 cases. The origin of brachioradial artery was as follows: from axillary artery - 23%; from upper third of brachial artery - 34%; from middle third of brachial artery - 4%; from lower third of brachial artery - 3.9%. The radial recurrent artery originated from the brachioradial artery, from the deep brachial and from the anastomoses between those vessels, and could not be traced in three cases. In the present case the communicating artery was found arising from axillary artery and anastomosing with the radial artery and the radial recurrent artery was given off by the radial artery.

A case of bifurcation of axillary artery in its 3rd part into radial artery and brachioulnar artery has also been reported. Radial continued into the forearm, brachioulnar trunk gave branches of brachial artery in the arm and then continued as ulnar artery and hence was named brachioulnar.

**Clinical Significance**

Radial artery can be used as grafts instead of long saphenous vein for coronary bypass grafting. Many
authors have reported that the radial artery grafts have significantly better early graft patency and endothelial function than long saphenous vein grafts\(^7\). Also Percutaneous transradial coronary angiography has increased in popularity in the recent years. In routine clinical practice the variations of radial artery are the main reason for technical failure during transradial catheterisation. If these variations are well documented they do not represent a problem in transradial approach\(^6\).

In hand angiography, recognition of variations in brachial branching and injection sufficiently proximal to fill all vessels supplying the hand branches will prevent potential pitfalls\(^9\). Failure to recognize or appropriately manage these anomalies may result in a compromised surgical outcome\(^10\). Hence knowledge of different anatomic variations is necessary for the surgeons to decrease the failure rates and increase the success rates of the surgeries.

**Embryological Significance**

New theories of development state that arterial pattern of the upper limb develops from an initial capillary plexus by a proximal to distal differentiation of certain capillary vessels and regression of others. Arterial variations may be explained on the basis of this theory by modifications of the normal pattern of capillary maintenance and regression\(^5\).

The main arterial trunk grows outwards along the ventral axial line and terminates in a capillary plexus of the developing hand. Proximal part of the main trunk forms the axillary and brachial arteries. Close to the bend of the elbow the axis artery gives rise to the radial and ulnar arteries, the former initially arises somewhat proximal to the latter. Subsequently the radial artery is connected with the ulnar artery close to its origin and the proximal connection of the radial artery with the axis artery is withdrawn (Fig 3)\(^11\).

Superficial brachial artery is a consistent embryonic vessel that plays an important role in the normal arterial morphogenesis of the upper limb. Superficial brachial artery has two terminal branches, lateral one continues into the forearm as a part of definitive radial artery. This anastomoses with the trunk of the deep origin of the radial artery from the primitive axial artery\(^6\). In the present case this theory holds good.

The seventh cervical intersegmental artery forms the axis artery of the upper limb and persists in the adult to form the axillary, brachial and intersosseous arteries. A superficial brachial artery may or not coexist with the brachial artery. The trunks of deep origin predominate and the superficial arteries regress\(^12\). In the present case the proximal part of the radial artery is arising from the axillary artery and this part may be persisting.

**Conclusion**

Arterial variations are important for clinicians in angiographic examinations or surgical procedures. Such abnormal arteries can present a superficial pulse and accidental puncture of superficially placed arteries may occur while attempting venipuncture. Abnormal arteries are surgically vulnerable in both orthopaedic and plastic surgery operations. Report of such variations will enhance the anatomical knowledge and removes ambiguity during diagnostic interventions and surgical procedures. Thereby it ensures competency and reduces complications in cardiac catheterization, pedicle flaps, arterial grafting etc.

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**References**


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