Volume : 5 | Issue : 5 | May 2016 • ISSN No 2277 - 8179 | IF : 3.508 | IC Value : 69.48

Research Paper

Variation in The Origin of Radial Artery and Branching Pattern in Population of Bundelkhand Region and Clinical Implications

Medical Science

KEYWORDS : Radial Artery, Variations.

***Shashikant Verma** (Anatomy), Associate Professor, Department of Anatomy, Bundelkhand Medical College (BMC) Sagar (M.P.) 470001 *Corresponding Author

Arpan Dubey (Anatomy), Assistant Professor, Department of Anatomy, Bundelkhand Medical College (BMC) Sagar (M.P.) 470001

ABSTRACT

The aim of this research is to study the variation in the origin of radial artery and branching pattern in population of bundelkhand region.

Material and Methods: This study consists of 50 human upper limbs obtained from adult cadavers, out of them 25 right upper limbs and 25 left upper limb. All cadavers were male. All the cadavers limb were preserved and fixed by formalin in the department of anatomy, NSCB Medical College, Jabalpur M.P. and Bundelkhand Medical College, Sagar (M.P) Radial artery identified and traced from its origin to the anatomical snuff box.

Results: The incidence of normal and variant origin of radial artery summarizes in table no.1. The radial artery is one of the terminal branch of brachial artery in cubital fossa, below level of intercondylar line of humerus. Normal Origin of Radial artery observed in 20 cases on right side and in remaining 5 cases variation in origin was observed in present work. On the left side normal origin observed in 18 cases. The variation in origin was observed in 7 cases

Conclusion: The study concluded that radial artery is most commonly originated from brachial artery in cubital fossa and least commonly from axillary artery.

Introduction:

Radial artery is the smaller of the two terminal branches of brachial artery. It begins 1cm above elbow and runs laterally and downwards to gain the lateral aspect of forearm. Lower down it passes under the tendon of abductor pollicis longus and the extensor pollicis bravis muscle and goes to back of wrist. Throughout the course radial artery resting on the tendon of biceps, supinator and pronator teres. It appears in the front of forearm through the apex of cubital fossa. While in the fossa it gives branch the radial recurrent artery which ascends between the superficial and the deep branch of radial artery and anastomoses with radial collateral branch of profunda brachii in front of lateral condyle. The course of radial artery is divided in to three parts- in the forearm, at the wrist and in hand. The artery is accompanied by pair of venae comitantes along the entire extent. In the forearm, it extends downwards with lateral convexity from the origin to the front of styloid process at distal end of radius, where pulsation of radial artery is usually felt. Artery leaves the apex of cubital fossa, where it is overlapped partially by brachioradialis muscle. In rest of the course it runs sub-fascially and intervene between the tendons of brachio-radialis and flexor carpi radialis.

At the wrist the artery winds dorsally beneath the tendon of abductor policis longus and extensor policis bravis, crosses the anatomical snuff box and leaves the dorsal surface of wrist through a triangular gap between two heads of first dorsal interosseous muscle. In the hand artery appears in the palm, usually between oblique and transverse head of adductor policis muscle and anastomoses with the deep branch of ulnar artery to form deep palmar arch.

In fore arm brachioradialis overlap the artery in the upper part, rest of the artery covered only by the skin,superficial fascia &deep fascia. Posterialy it is related to number of structures together forms the bed for the radial artery. In order from above downwards, tendon of biceps, supinator,insertion of pronator teres, flexor digitorum superficialis, radial head of flexor pollicis longus, pronator quadratus & lower end of radius.

Laterally brachioradialis along its entire extent & superficial branch of radial artery in the middle 1/3. Medally pronator teres in upper1/3 & flexor carpi radialis in lower 2/3.

Branches:

1. Radial recurrent artery: It arises in cubital fossa & ascend superficial & deep branch of radial nerve & anaostomoses with radial collateral branch of profunda brachii artery infront of lateral condyle.
2. Many muscular branches which supply adjacent muscles.
3. Palmar carpal branch passes medially across the anterior surface of distal end of radius & anostomoses with corresponding carpal branch of ulnar artery to form palmar carpal arch.
4. Dorsal carpal branch passes medially across the posterior surface of the lower end of radius under cover of extensor tendons of wrist & form dorsal carpal arch, after joining dorsal carpal branch of ulnar artery.
5. Superficial palmar branch arises from radial artery before it curves laterally over the carpus. The artery descends through or over thenar muscles & may form superficial palmar arch after joining with ulnar artery.
6. First dorsal metacarpal artery arises just before the radial artery passes between two heads of first dorsal interosseous muscle. The artery divides to supply adjucent side of thumb & index finger.
7. Arteria princeps pollicis arises from the radial artery in the palm & run distally between the oblique head of adductor pollicis muscle along the first metacarpal bone , to which it provide nutrient branch , on reaching to proximal phalanx of thumb , artery divides into two branches to supply both side of thumb & form digital plexus of pulp.
8. Arteria radialis indices arise in palm & supply radial side of index finger.

Anatomical variations regarding origin, course & branching pattern, mode of termination are very common & have been previously reported by several investigators. Sound knowledge of radial artery is very essential for successful performance of different coronary intervention as it is superficially placed therefore easily accessible, ease of care for nursing staff. Radial artery having rich collateral circulation & low risk of thrombosis. These anatomical features makes radial artery ideal for using it as a root for coronary intervention. Radial artery had close proximity to cephalic vein which might produce dangerous complication during interavenous injection of medications.

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The study of variation of origin, course & branching pattern, mode of termination of radial artery has great importance to achieve best result & to avoid possible complications during diagnostic, therapeutic & operative investing.

The present study aims to study the anatomical variation of radial artery in human cadavers& its clinical implications.

Material & method:
Study performs in Department of Anatomy N.S.C.B. Medical College Jabalpur M.P. & Bundelkhand Medical College Sagar M.P. Fifty (50) upper limb of adult male cadavers (25 right & 25 left) were studied. Detached upper limb placed in supine position. The upper limb was carefully dissected from axillary region down to hand including arm, cubital fossa, fore arm, anatomical snuff box. Following parameters of radial artery were measured in both right & left upper limb. Its origin level measured in relation to interepicondylar line of humerus & other variations of its course, branching pattern & mode of termination were observed. Study was conducted between 2012-2016. All data were tabulated.

Result:
In most of the cases in right upper limb origin of radial artery take place as one of the two terminal branch of brachial artery in the cubital fossa below the level of intercondylar line of humerus.In the present work, in right upper limb, normal origin observed in 22 cases out of 25 cases & 03 cases shows abnormal high origin. Two of them originating from brachial artery & one originating from axillary artery.In one case on right side a very large radial recurrent branch observed as shown in figure 1. In one case arteria princeps pollicis branch was arising from superficial arch.

In most of the cases in left upper limb origin of radial artery take place as one of the two terminal branch of brachial artery in the cubital fossa below the level of intercondyar line of humerus.In present work, in left upper limb, normal origin observed in 24 cases out of 25 cases & one case show abnormal high origin from brachial artery. In one case on left side a very large radial recurrent branch observed. In one case on left upper limb radial recurrent branch were absent & replaced by several branches arising from radial artery. In one case radial recurrent branch were arising from brachial artery. Another variant seen in one case on left side, the arteria radialis indices arising from superficial palmar arch.

During present study very large number of anostomosis between branches of radial artery & branches of ulnar artery were observed.

Table 1.Incidence of normal & variant origin of radial artery (%)

Origin of radial artery	Right (25)	Left (25)
Normal	22(88%)	24(96%)
Abnormal	03(12%)	01(96%)

Table 2.Incidence of normal & variant origin of radial artery branches (%)

Branches	Right(25) Normal	Abnormal	Left(25) **Normal**	**Abnormal**
Right recurrent artery	25(100%)	00(0%)	23(92%)	02(08%)
Muscular branches	---	---	---	---
Palmar carpal branch	25(100%)	00(0%)	25(100%)	00(0%)
Dorsal carpal branch	25(100%)	00(0%)	25(100%)	00(0%)
Superficial palmar branch	25(100%)	00(0%)	25(100%)	00(0%)
First dorsal metacarpal artery	25(100%)	00(0%)	25(100%)	00(0%)
Arteria princips pollicis	24(96%)	01(04%)	25(100%)	00(0%)
Arteria radialis indicis	25(100%)	00(0%)	24(96%)	01(04%)

Muscular branches (---) are not taken into consideration.

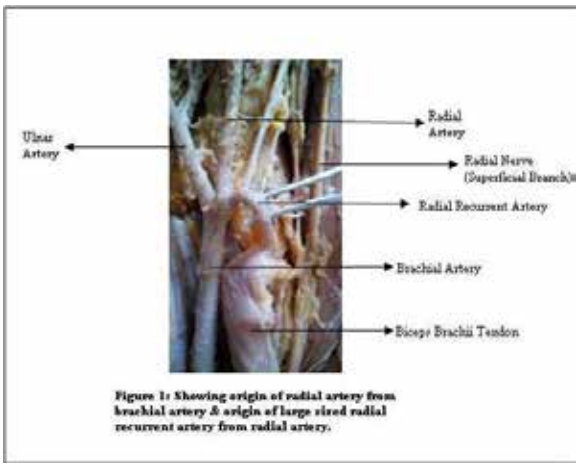

Figure 1: Showing origin of radial artery from brachial artery & origin of large sized radial recurrent artery from radial artery.

Discussion:
The variation in the origin of radial artery & the variation in origin of its various branches were observed during present study. Variation of radial artery may interfere with therapeutic, diagnostic & surgical procedures. The radial artery is superficially placed in most of the cases which were observed during present study, During present study very large number of anostomosis between branches of radial artery & branches of ulnar artery were also observed. These observations during present study confirm that radial artery has great cinical significance. It is used as a graft for coronary bypass & in transradial approach during coronary intervention. Acceptance of transradial approach & graft for coronary bypass became more popular now a days.Radial artery is ligated safely if needed to control bleeding.

Conclusion:
Knowledge of radial artery its course, position, branching pattern, mode of termination & its variants has great importance in different clinical field & basic medical studies. Anatomical variations of radial artery prove that in medical practice each individual must be considered as particular entity.

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