

Short Report

High incidence of the median artery of the forearm in a sample of recent Southern African cadavers

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ABSTRACT

Observations of the presence of the median artery, providing substantial blood supply to the hand, were conducted on 96 dissected forearms of 15 adult African females and 49 adult males. The artery has a much higher incidence (27.1%) than previously reported by any author. There is no significant difference in its occurrence between sexes, nor between right and left limbs. The artery seems to occur more often bilaterally than unilaterally. The presence of the artery is not related to age. From a theoretical standpoint it is difficult to accept that a structure present in more than 1 in 4 of individuals should be considered an 'anomaly' or a 'variant'. A different approach to description of normal human anatomy is therefore necessary – that of presenting alternative anatomical patterns of equal standing rather than a single 'normal' pattern.

INTRODUCTION

Body size and shape show variations between different human populations. Little is known about such variability of internal anatomy. A recent compendium of anatomical variation (Bergman *et al.* 1988) testified to the heterogeneity of our knowledge in this regard. There is a need for quantitative surveys of particular variants. The median artery of the forearm is a case in point. It has been reported to occur in adults with frequencies ranging from 4.4 to 8.3% in various samples (Adachi, 1928; Misra, 1955; Hollinshead, 1969). The median artery provides the main blood supply to the hand in the embryo. After the 8th week of gestation ulnar and radial arteries develop and the median artery usually dwindles away to become a small vessel accompanying the median nerve, the *arteria comitans nervi mediani* (Singer, 1933).

The aim of this study is to report the frequency of the median artery of the forearm in a sample of adult native Africans who died between 1988 and 1989.

MATERIAL AND METHODS

Sixty-four cadavers (15 females, 49 males) were supplied from the hospitals in Johannesburg and its vicinity as 'unclaimed bodies' for student dissection at the University of the Witwatersrand. The ethnic

origin of many of them is uncertain. In the hospital records 58% were described only vaguely as 'South African Negro', whereas ethnicity of 15% was given as 'Zulu', 8% as 'Sotho', another 8% as 'Tswana', 7% as 'Xhosa' and single individuals as 'Tsonga', 'Swazi' and 'Ndebele'. Morphological characteristics of all individuals indicate that they would be officially classified as 'Black'. This would suggest that the entire sample falls into a 'Negroid' category as recently defined (Henneberg & van den Berg, 1990). In 34 cadavers both forearms were dissected; in the remainder only 1 upper limb was available for observation. In 2 female cadavers student dissection damaged the superficial palmar arch and some adjacent arteries so that it was uncertain whether the median artery participated in the blood supply to the hand. These 2 forearms were excluded from the numerical analysis. The total number of forearms studied was therefore 96 (47 left, 49 right).

The artery was recorded as present when it supplied structures in the hand other than the median nerve and its branches. A minimum diameter exceeding 1 mm was used as an additional guide. Such diameter was measured at the narrowest point of the embalmed artery anywhere between its origin and the proximal border of the flexor retinaculum. It has been our experience that arteries with a minimum diameter just above 1 mm joined the superficial palmar arch in a

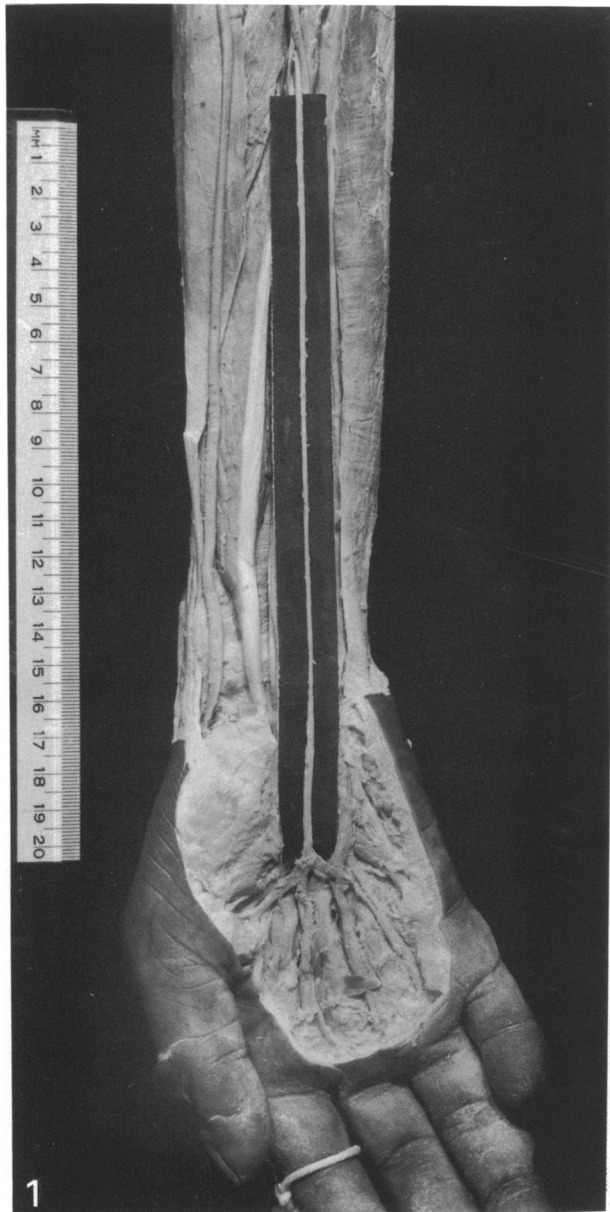


Fig. 1. A median artery of the minimum diameter accepted in this investigation. The minimum diameter occurred close to the flexor retinaculum. Note supply to the superficial palmar arch. Right forearm of a 69-year-old male.

manner indicating their substantial contribution to the blood supply. An artery of the minimum size accepted is shown in Figure 1. The diameter of an artery during life was most probably greater. The majority of the arteries were appreciably larger (Figs 2, 3). Differences in frequencies of the artery were tested by means of a χ^2 test with a conventional probability level of 0.05.

RESULTS

The artery was present in 26 of the dissected upper limbs. It had a frequency of 27.1% with the lower

Table 1. Frequency of median artery by sex

Sex	Forearms			
	With the artery		Without the artery	
	n	%	n	%
Female	3	15.0	17	85.0
Male	23	30.3	53	69.7
Total	26	27.1	70	72.9

Table 2. Number of individuals with both forearms dissected

	Median artery present		Median artery absent	Total
	Unilaterally	Bilaterally	Bilaterally	
n	2	9	23	34
%	5.9	26.5	67.6	100.0

limit of the 95% confidence limits being 18.2%, and the upper 36.0%. There was no significant difference (χ^2) in the frequency of the artery between male and female forearms (Table 1). Raw data suggested that the frequency in males was twice that of females, but this may have been due to the small number of female forearms.

Among 49 right forearms, 11 (22.4%) possessed a median artery whereas amongst 47 left forearms 15 (31.9%) possessed the artery. The difference between 2 sides is not significant (χ^{12}). Both frequencies fell within the 95% confidence limits for the frequency in the entire sample.

In those 34 cases in which both forearms of the same individual were dissected the median artery occurred more often bilaterally than unilaterally (Table 2). This finding appeared to be statistically significant when a sign test was applied, but sample size is too small to draw firm conclusions. It is worthy of note that the total frequency of individuals with a median artery, either unilateral or bilateral, amongst those with both forearms dissected exceeds 32%, once again falling within the confidence interval for the entire sample.

The age at death of individuals with the artery was 52.9 (s.d. 15.0) years. This did not differ significantly (t test) from the average age of those without the artery: 50.7 (s.d. 14.3) years.

In most cases the median artery arose in the cubital fossa or in its vicinity from the interosseous or the ulnar artery. In 2 cases the median artery was derived from the radial artery. In the first case (Fig. 2) the median artery in the left limb was the largest of the



Fig. 2. Front of the left forearm of a 36-year-old Tsonga male. Note the size of the median artery before and after it gives rise to a branch replacing the radial artery. White pins indicate epicondyles of the humerus.

vessels in the proximal half of the forearm. Midway it gave off a large branch which proceeded laterally. This branch ran superficially, parallel to the normal course of the radial artery, but was more medially placed. The radial artery was completely absent. A normal ulnar artery was present. In the distal half of the forearm the median artery was of the size commonly encountered when this variant vessel is present. In the right forearm of the same Tsonga male, a median artery of moderate size originated from the



Fig. 3. Front of the right forearm of a 35-year-old Tswana male. Note the artery passing under the flexor carpi radialis to join the median nerve (arrows).

radial artery in the cubital fossa. In this particular forearm both normal radial and ulnar arteries were present. In the second case (Fig. 3) the radial artery in the middle of the forearm gave off a sizeable branch that ran mediolaterally under the flexor carpi radialis to join the median nerve just above the proximal border of the flexor retinaculum. Unfortunately the left limb of the same cadaver was not dissected.

DISCUSSION

The frequency of the median artery in our sample is much higher than reported previously by any author. Even taking into account sampling effects and statistical errors, the lower boundary of the 95% confidence limits is around 18%, far greater than the 8.3% reported by Adachi (1928) and Misra (1955). On the other hand the frequency among individuals in whom both limbs were dissected was around 30%, in agreement with value of 36% for the upper limit of

the 95% confidence interval for the entire material. With such a high frequency – over a quarter of all individuals – the median artery can hardly be considered a ‘variant’. This is by no means an isolated instance. The lateral internal thoracic artery is another good example. Its frequency – 27.7%, as reported by Kropp (1951) – is closely comparable to the one found by us for the median artery.

The presence of additional arteries at such high frequencies poses a general question as to the validity of descriptions of ‘normal’ anatomy. Certainly a pattern occurring in a quarter of individuals is conceptually as important to note as that characteristic for a half. For this latter instance we refer to differences between sexes. Textbooks should routinely include descriptions of more common variants, not as anomalies but as normal alternatives. They may reach, at least in some populations, frequencies

substantial enough to be taken into account while planning surgical procedures.

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