High frequency of the median artery of the forearm in South African newborns and infants

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In a sample of 60 neonates and infants from black communities in the Johannesburg area, the median artery of the forearm was found in 50% of individuals (11.7% in one forearm only, 38.3% in both forearms). The frequency per forearm was 44.2%, much higher than that found in any previous study, even among adults from the same community (27.1% per forearm). The artery occurs bilaterally significantly more often than it does in one antimere only. There are no differences in its frequency between sexes or between antimeres. The artery provides an additional route of blood supply to the forearm that should be kept in mind by hand surgeons. It can also be harvested for vascular grafts.

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Practitioners tend to regard anatomical structure of the human body as rigidly determined. It seems natural to refer to a standard text in order to learn about a particular anatomical arrangement in a particular patient. Human anatomy is variable from individual to individual and seems to undergo changes between generations.[1] Knowledge of variations in the anatomy of organs, muscles, nerves, vessels etc. is useful for diagnosis and in surgical procedures.[2]

We recently reported[3,4] a 27% frequency of the median artery of the forearm among adult South Africans. Acting as a third route of blood supply to the hand, this vessel may be of importance in cases of hand and wrist injuries requiring surgical repair of arteries. Since it lies in a relatively superficial position in the distal forearm, the artery may also be harvested for vascular grafts.

The large median artery supplying blood to structures in the forearm and the hand was reported by other authors to have an incidence ranging from 2.2%[5] or 4.4%[6] to 8.3%[7,8] and 20%.[9] The very high frequency of the median artery found by us needs to be confirmed by further study of individuals from the same population. This paper reports on the frequency of the median artery in a group of South African neonates and infants.

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Material and methods

Sixty infants who were either stillborn or died during the first year of life at Baragwanath Hospital in Soweto between 1969 and 1990 were examined. All were unwanted by their mothers. There were 27 boys and 33 girls. Fronts of both forearms of each individual were dissected and the presence of the artery determined by naked-eye inspection. The artery was considered present when its diameter throughout the entire length of the forearm was similar to that of the anterior interosseous artery or larger, and it participated in the blood supply to the hand, either by joining the superficial palmar arch (Fig. 1) or by independently leading into arteries to the fingers.

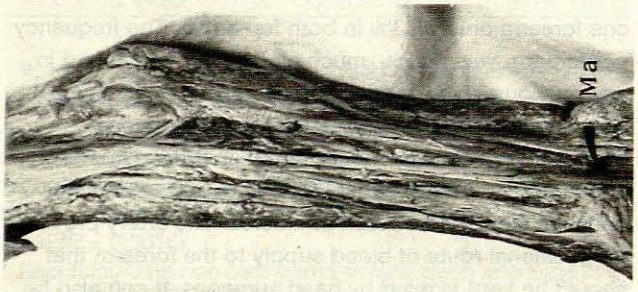

Fig. 1. The median artery in the left forearm of a 1-year-old Zulu boy.

Results

The median artery was present in 44.2% of forearms. Given the sample size of 120 forearms, the limits of the 95% confidence interval of this figure are 35.3% (lower) and 53.1% (upper). The artery is more often present bilaterally than unilaterally (Table I). This finding is statistically significant when a sign test is applied ($\chi^2 = 8.5$). It should be noted that exactly 50% of the entire sample had the median artery in at least one forearm. The limits of the 95% confidence interval for this figure are 37.3% (lower) and 62.7% (upper). They thus overlap with those for the percentage of forearms with the artery. Among 7 individuals with the artery unilaterally present, only 2 had it solely in the left forearm whereas 5 had the artery solely in the right forearm. These numbers are too small for any statistically valid conclusion to be drawn.

Table I. Incidence of median artery by individual

	Median artery present		Median artery absent
	Unilaterally	Bilaterally	Bilaterally
No.	7	23	30
%	11.7	38.3	50.0

There is no significant sexual dimorphism in the presence of the artery (Table II).

Table II. Incidence of the median artery per forearm by sex

	Forearms			
	With artery		Without artery	
	No.	%	No.	%
Girls	30	45.5	36	54.5
Boys	23	42.6	31	57.4
Total	53	44.2	67	55.8

Discussion

Our previous studies[3,4] failed to find bilateral differences and sexual dimorphism in the presence of the median artery in adults from the same area as the neonates and infants studied here. We have also previously indicated the tendency of the artery to occur bilaterally. This study statistically supports our previous suggestion. The fact that the median artery occurs more often in both antimeres of the same individual than in one only suggests that this occurrence may be due in part to heritable factors. This suggestion is based on the premise that both antimeres contain the same genetic material but may be differentially influenced by randomly acting environmental factors. If the presence of the artery were due to non-genetic factors acting locally during intra-uterine life, the artery would be present randomly in only one or the other limb. Its regular presence in both antimeres indicates at least that there is a factor common to both limbs.

The frequency of the median artery in our sample is much higher than in any other sample hitherto reported, even when the lower limit of the confidence interval is taken into account. In a previous paper[4] we reported a frequency of 27.2% ($N = 158$) in the forearms of adults (black and white alike) from the same area, i.e. the vicinity of Johannesburg. The difference between the frequency of the artery in the present sample and in that sample is statistically significant (2 x 2 contingency table, $\chi^2 = 8.67$). Neonate-adult differences in the occurrence of the median artery require further study. The differences may be a result of disappearance of the artery during childhood in some individuals, neonatal mortality of individuals with the artery, or differences between generations.[10]

The high frequency of the artery found repeatedly in three South African samples indicates that its presence may be expected in numerous patients. This fact needs to be considered by practitioners. In addition to its significance in hand surgery and the possibility of harvesting it for grafts, there have been cases in which the artery was responsible for symptoms of carpal tunnel syndrome and jackhammer syndrome.[11-14]

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