

Upper limb arterial hemodynamics in high brachial artery bifurcation

by color Doppler ultrasound

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Introduction

The brachial artery (BA) begins as a continuation of the axillary artery at the lower border of the teres major muscle and terminates at the level of the neck of the radius in the cubital fossa by dividing into the radial and ulnar arteries. However, high brachial artery bifurcation (HiBAB) is a common anatomic variant, with a prevalence up to 20% and a challenging diagnosis by color Doppler ultrasound.

Aim

To compare the hemodynamic characteristics of the upper limb arterial axis based on the level of brachial bifurcation in patients in need of a vascular access for hemodialysis.

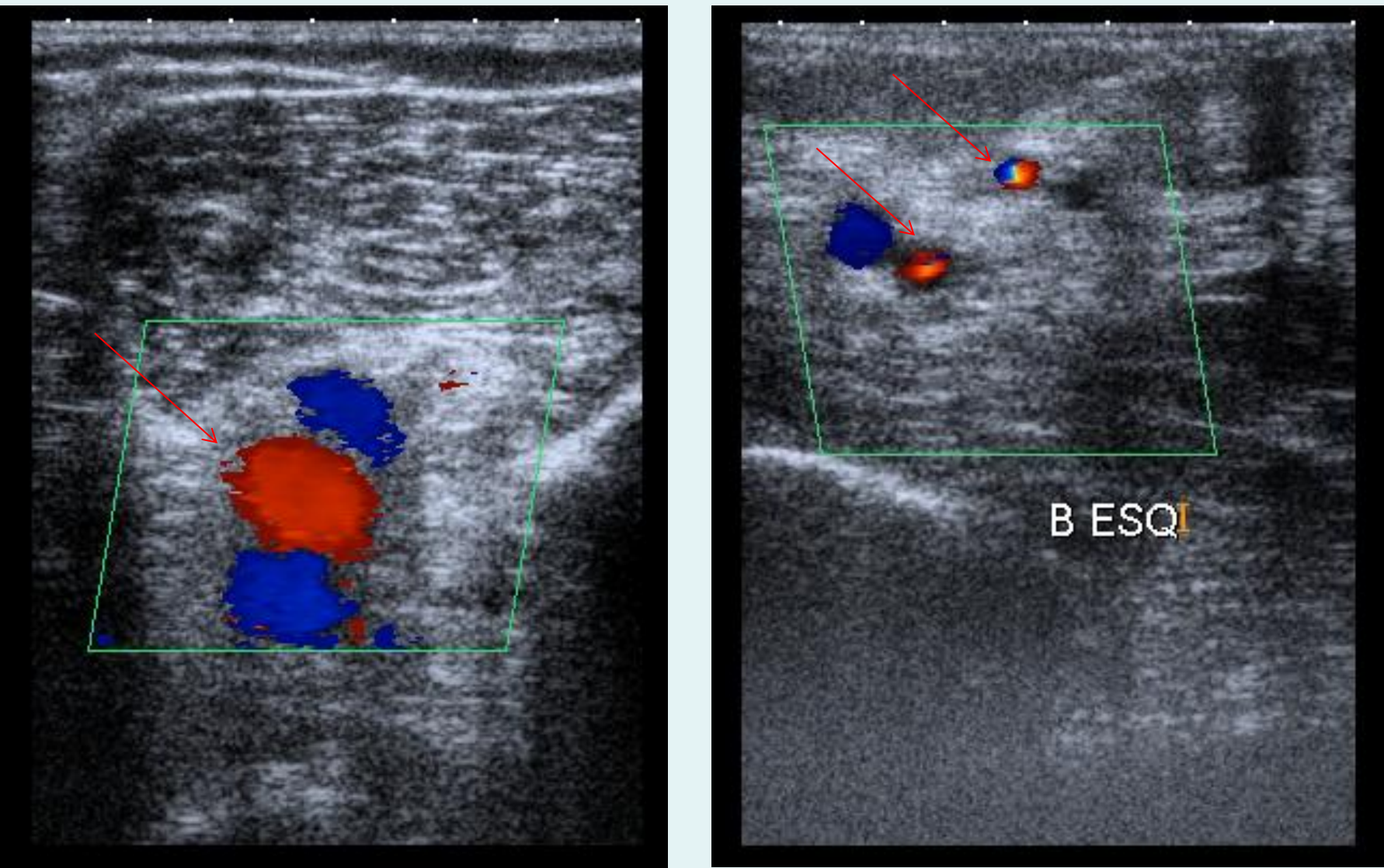


Figure 1. Normal BA bifurcation

Figure 2. High division of the BA, in the upper arm

Material and Methods

Cross sectional observational study with retrospective data collection. Patients proposed for first vascular access construction between February 2011 and January 2014 were included.

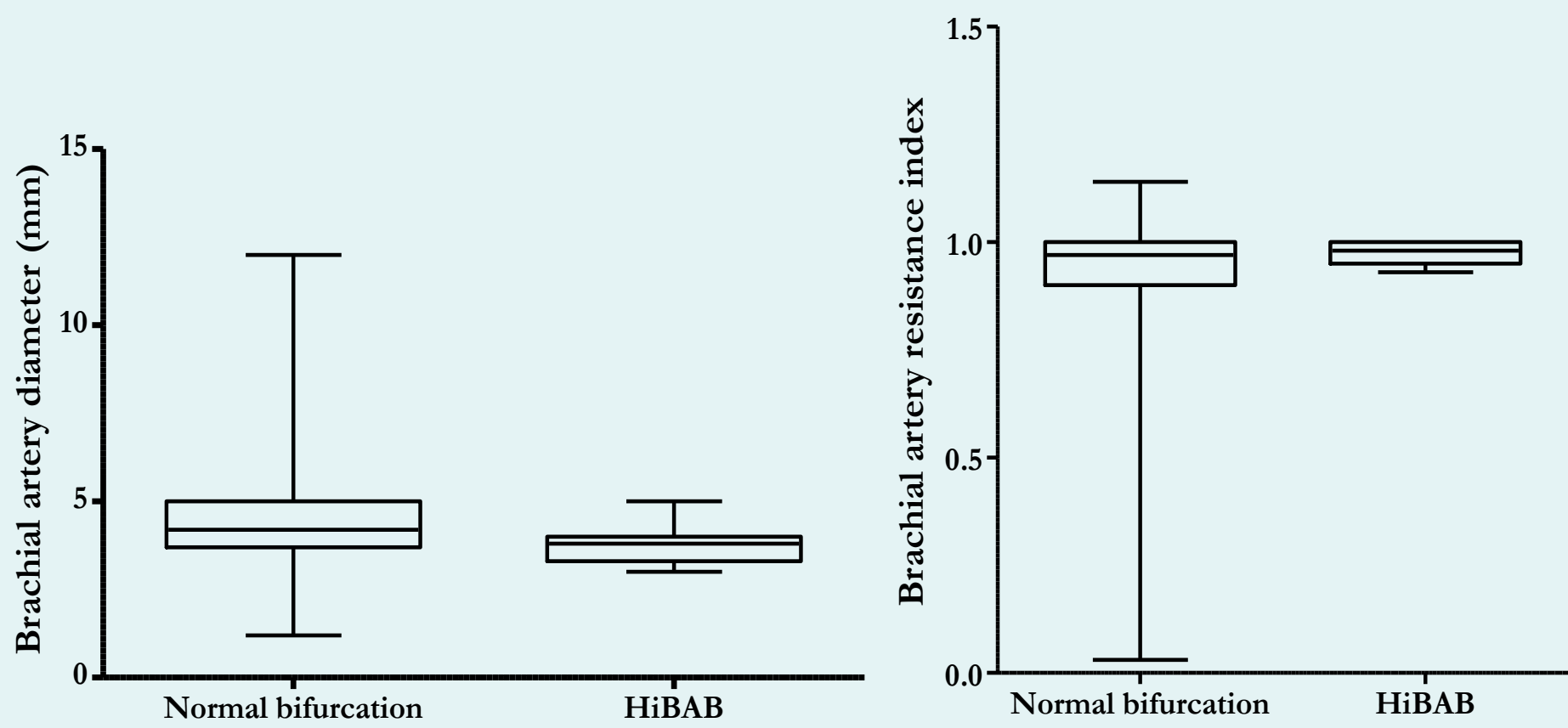
Results

	Normal BA bifurcation	HiBAB
Population	143	10
Gender	61 Female 82 Male	6 Female 4 Male
Median age	68 [11-92]	67 [40-86]

Prevalence of high brachial artery bifurcation was 6,53%.

Arterial hemodynamics					
		Normal BA bifurcation		HiBAB	
Brachial artery	Median diameter (mm)	4,385	1,22	3,771	0,64*
	Flow (L/min)	0,172	0,12	0,089	0,07
	Peak systolic velocity	80,365	27,3	75,614	31,4
	Resistance Index	0,940	0,68	0,973	0,58*
Radial artery	Median diameter (mm)	2,157	0,63	2,240	0,68
	Flow (L/min)	0,039	0,08	0,030	0,01
	Peak systolic velocity	57,268	28,88	43,638	14,92
	Resistance Index	0,948	0,11	0,900	0,08
Ulnar artery	Median diameter (mm)	1,84	0,62	1,86	0,36
	Flow (L/min)	0,117	0,77	0,099	0,19
	Peak systolic velocity	53,85	25,8	52,288	18,5
	Resistance Index	0,97	0,19	1,0	0,05
* $p<0,05$					

Radial and ulnar artery variables were not statistical significant.



Conclusions

The smaller diameter and higher resistance index of the brachial artery found in the high bifurcation patients may recommend an exhaustive search of this anatomical variant with color doppler ultrasound in preoperative mapping, since it might influence the proximal vascular access success.

The lack of differences in hemodynamic distal arteries characteristics suggests that the success of distal vascular access is not compromised.

Perspectives

We aim to extend our series and study the patency rate of the vascular accesses in this patients in order to determine the impact of this anatomical variant in the vascular access construction, reinforcing the importance of pre-operative color doppler ultrasound mapping.