

INTRODUCTION

Microcalcification in the large arteries are commonly seen in chronic kidney disease (CKD) patients. Microcalcification will deposit on the tunica intima and media. Tunica intima microcalcification may lead to ischaemia-related occlusion. Tunica media microcalcification (Monckeberg's sclerosis) may lead to vessel stiffness.

Success or failure of the fistula is related to patient's factor such as multiple co-morbid and the care of the fistula and also to surgeon's factor such as the selection of vessels and the techniques.

Aim of the study is to assess the relationship between the formation of microcalcification in the tunica intima and tunica media of the artery with maturation of the arteriovenous fistula (AVF).

METHOD

An observational prospective cohort study was conducted from 1st January 2016 - 31st December 2016 in Universiti Sains Malaysia Hospital. 138 participants were included in this study. Participants with the age of 18 years old and above with CKD stage IV-V and ultrasonographical vein diameter of > 2 mm and arterial diameter of > 2 mm were included in the study.

Preoperative clinical assessment and surgery was performed by a single surgeon. Specimen of 3-5mm diameter, circular shaped arterial wall was obtained from the arteriotomy site. Arterial wall was stained with Von Kossa staining which is specific to calcification and was assessed by a single pathologist who was blinded to the clinical data. AVF maturation is assessed by the same operating surgeon at 6 weeks based on the National Kidney Foundation criteria.

Statistical analysis was performed using Pearson chi-square. $P < 0.05$ was considered statistically significant.

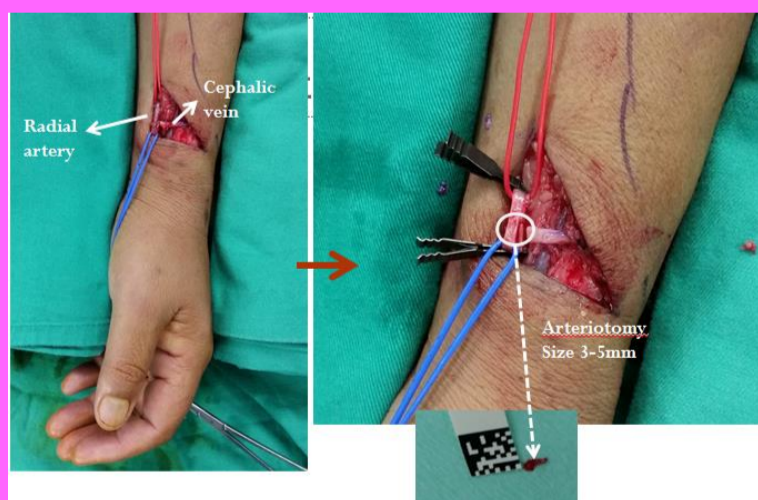


Fig.1 Arteriovenous fistula creation with arterial wall sample

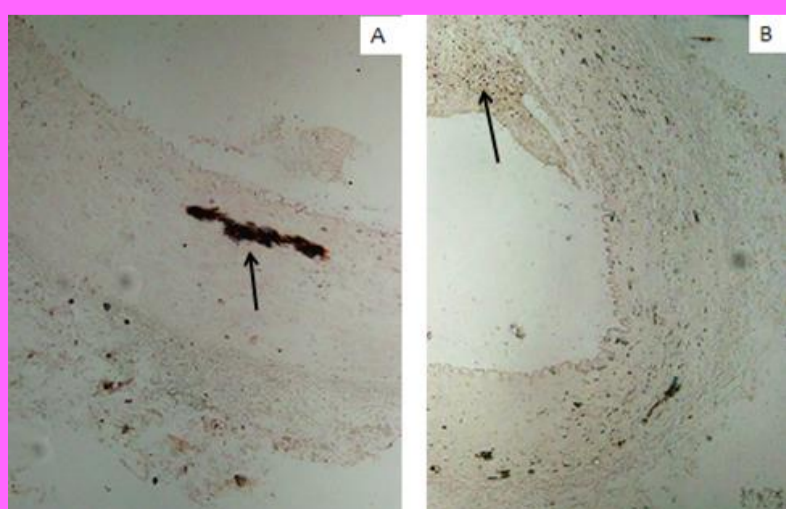


Fig.2 Arterial wall stained with Von Kossa staining. Arrow indicating calcification in the arterial wall

RESULTS

Of the total 138 participants, 110 participants (79.7%) have matured arteriovenous fistula in 6 weeks. 30.4% of AVF had microcalcification in the tunica intima while 12.3% of AVF had microcalcification in the tunica media. Microcalcification in the tunica media of the artery which was thought to contribute to AVF failure was not statistically significant with the P -value of 0.115. Despite having microcalcification in the tunica intima, 83.3% of the arteriovenous fistula matured.

Demographic data	
Mean age	57.09 ± 11.71
Gender	
Male	74 (53.6%)
Female	64 (46.4%)
Medical illness	
Diabetes mellitus	99 (71.7%)
Hypertension	132 (95.7%)
Coronary heart disease	29 (21%)
Others	29 (21%)
Chronic kidney disease	
Stage 4	26 (18.8%)
Stage 5	112 (81.2%)
Type of AVF creation	
Radiocephalic fistula	72 (52.2%)
Ulnobasilic fistula	9 (6.5%)
Brachiocephalic fistula	37 (26.8%)
Brachiobasilic fistula	10 (7.2%)
Loop arteriovenous fistula	10 (7.2%)

	Arteriovenous fistula maturation			P -value
	Matured AVF N(%)	Failed AVF N(%)	Chi-square (df)	
Tunica intima calcification				
Present	35 (83.3)	7 (16.7)	0.49 (1)	0.484
Absent	75 (78.1)	21 (21.9)		
Tunica media calcification				
Present	16 (94.5)	1 (5.9)	2.48 (1)	0.115
Absent	94 (77.7)	27 (22.3)		

DISCUSSION

Microcalcification in the tunica intima and media is not statistically significant in affecting maturation of the fistula. Participants which had failed AVF were associated with more than two long term co-morbid. Besides that, those with radiocephalic fistula created with or without microcalcification in the tunica intima or media, are prone to fistula failure.

Surgical skill, careful patient selection, and preoperative evaluation of vascular anatomy contribute to success of AVF maturation.

Limitations of this study were:

1. Vascular samples obtained might be too small to be representative of entire artery.
2. A non-randomised study.
3. Population is heterogenous with different fistula site creation and multiple co-morbid.

CONCLUSION

Microcalcification in the tunica intima and media of the artery does not affect the maturation of the AVF.

References:

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3. Leopold, J.A., *Vascular calcification: Mechanisms of vascular smooth muscle cell calcification*. Trends in cardiovascular medicine, 2015. **25**(4): p. 267-274.