

Compressive Vascular Disorders of the Upper Limbs :

A Preliminary Report

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SUMMARY

This preliminary report relates to an on-going prospective study being undertaken at the Department of Vascular Surgery, Dow Medical College and Civil Hospital, Karachi. The Study is expected to yield valuable information regarding the incidence of occlusive vascular diseases of the upper limb relating to compressive disorders, the prevalence of thoracic outlet syndrome, the long term results of vascular decompression, role of adjunct cervico-dorsal sympathectomy, correlation of physical signs with angiography etc. In this preliminary report some relevant physical parameters are described, as found in the patients treated, with results of surgical treatment.

MATERIALS AND METHODS:

Only those patients were included in the study who had non-vasospastic upper limb vascular occlusive disorders. Therefore patients suffering from generalised vascular disease or arteriopathies were excluded. Most patients were referred by the Orthopaedic, Surgical and Neurological Departments. The remainder were referred by the local G.Ps. All patients were admitted routinely via the Outpatients Department except for one patient (R1) who presented with an arterial embolism. All patients underwent bilateral doppler examination of resting and post-exercise wrist and digital arteries. Patients exhibiting a positive doppler vascular sign (absence of resting radial or ulnar artery, reduction of or absence of wrist pulses after exercise or loss of digital pulsation) underwent angiography. The exercise of the arm consisted of rapid opening and closing of the corresponding hand 60 times per minute, associated with abduction (90 degrees) of the shoulder joint for two minutes. Weakness, prickling numbness,

pain, pallor, cyanosis, reduction of pulses, absence of pulse or digital arteries constituted a positive result. Comparison was made of the vascular status of both upper limbs, with each hand first lying by the side of the standing patient and with the palm facing the examiner and then with the shoulder at 110 degrees abduction and 20 degrees extension. Even if the pulse diminished with less than 110 degrees abduction, the observation having been noted, the arm was still raised to 110 degrees abduction and 20 degrees extension to eliminate observer-bias. All patients except one (AM) who was admitted with an arterial embolus, underwent nerve conduction studies to detect any conduction delays. All patients underwent routine blood examinations including platelet and blood sugar estimation. All patients with a positive vascular sign or symptom underwent arteriography which was performed via the femoral route and involved direct lead video angiography and selective cut film documentation of the vasculature in the supine

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and in 110 degrees abducted position, following the dye from proximal subclavian artery down to the fingers. Two patients additionally underwent upper limb venography. All patients reported in this preliminary report underwent surgery.

OBSERVATIONS/RESULTS OF THE STUDY:

In the overall group, most patients were young (mean = 38.7 years) 63.6% were males. 36.4% were females. Most (73%) led sedentary lives. Two (17%) were manual workers. (See Table -1)

Of the affected limbs, rest pain was present in 33.3% and exercise related pain in 100%

Diagnosis	Age Ravg	Sex	Number
Bilateral cervical ribs	14-55	2 F	4
		2 M	
		1 F	
Uni lateral cervical rib	20-50	3 M	4
Axillary vein compve-sion	30	F	1
Sublavian artery & vein thrombosis	22	M	1
Injury - ischemia left hand	37	M	1
			Total = 11 patients

TABLE - II

LIMB	VASCULAR SYMPTOMS						VASCULAR SIGNS			Exercise test
	Pain in hand		Coldness in hand		Cyanosis of hand		Supine Radial pulse (palp)	Supine Radial pulse (dopp)	Abduction Angle of occlusion	
	Rest	Ex	Rest	Ex	Rest	Ex				
R 1	+	+	+	+	+	+	-	+	45'	+
L 1	-	+	-	-	-	-	+	+	90'	+
R 2	-	+	-	+	-	+	-	+	80'	+
R 3	-	+	-	-	-	-	+	+	-	+
R 4	-	+	-	-	-	-	+	+	70'	+
L 4	-	+	-	-	-	-	+	+	110'	+
L 5	-	+	+	+	-	+	+	+	90'	+
R 6	-	+	-	-	-	-	+	+	100'	-
L 6	+	+	+	+	+	+	-	+	45'	+
R 7	+	+	+	+	+	+	-	-	0	+
R 8	-	+	-	-	-	-	-	+	-	+
L 9	+	+	+	+	+	+	-	+	30'	+
R 10	-	+	-	+	-	-	+	+	100'	+
L 10	+	+	+	+	-	-	+ weak	+	110'	+
L 11	-	+	-	+	-	-	-	+	0	+

Ex = on exercise, dopp = on doppler flow signal

Coldness was present in 40% at rest and in 60% on exercise. Cyanosis was present in 26.6% at rest and in 40% on exercise. In patients with cervical ribs causing thoracic outlet syndrome, the ribs were complete in 41.6% and incomplete in 58.4%). The angle of abduction at which the flow ceased on doppler, varied widely. In one

patient (R7) with the arm by the side there was no detectable flow heard in either the digital or the wrist arteries. This patient had a 100% occlusion of the second part of his subclavian artery with organised thrombosis and atheroma. In addition to decompression, he required a carotico-subclavian vascular prosthetic graft. In

CLINICAL - ANGIOGRAPHIC CORRELATION

TABLE - III

Pt Code	Lesions	Vascular symptoms	Vascular signs	Angiographic findings			
				CR or band	Occl of S/C on critio abduct	Post Sten dil	Additional findings
R 1	CR + TE	+	+	+	+	+	TE mid brachial art
L 1	CR	+	+	+	+	-	Thyrotoxicosis + TB
R 2	CR	+	+	+	+	-	Total occl S/C III
R 3	Ax Vein	+	+	-	-	-	Extrinsic stenosis of Ax Art + Vein (tendon)
R 4	CR	+	+	+	+	+	—
L 4	CR	+	+	+	-	-	Insuffic abduction
L 5	CR	+	+	+	-	-	—
R 6	CR	+	+	+	+	+	—
L 6	CR	+	+	+	+	+	Thrombosis of S/C III
R 7	CR	+	+	+	+	+	Thrombosis S/C II,III
R 8	FB and haematoma compression	+	+	-	-	-	Bullet related thromb of S/C III + compress of Axillary vein
L 9	CR	+	+	+	+	+	Total occl Brach art
R10	CR	+	+	+	-	-	3 months after angio sympt + signs ↑↑↑
L 10	CR	+	+	+	-	-	Gradual ↑ of symptoms
L 11	Wrist inj Vascular insuffic	+	+	-	-	-	Forearm Radial, Ulnar thrombosis

TE = Thromboembolism, CR = Cervical rib, S/C = Subclavian Artery

RESULTS OF SURGERY

TABLE — IV

Pt	Lesion	Pre-op abd/ex test	Surgery	Result in 1 week			Result at 6 weeks		
				Sympt	Rest- ored pulse	Abd/ex test	Sympt	Rest- ored pulse	Abd/ex test
R 1	CR + embolus	+	Embolectomy + CR excision	—	+	—	—	+	—
L 1	CR	+	CR excision	—	+	—	—	+	—
R 2	CR	+	CR excision + graft	+	+	—	—	+	—
R 3	Ax Vein +artery compres	+	Pectoral tenotomy	—	+	—	—	+	—
R 4	CR	+	CR excision	—	+	—	—	+	—
L 4	CR	+	CR excision	—	+	—	—	+	—
L 5	CR	+	CR excision	—	+	—	—	+	—
R 6	CR	+	CR excision	—	+	—	—	+	—
L 6	CR+Ax embolus	+	CR excision + embolectomy	—	—	+	—	+	—
R 7	CR+ thromb S/Clav	+	CR excision + graft	+	—	+	—	+	—
R 8	FB + haem compress S/C art and vein	+	FB excision thrombectomy	—	+	—	—	+	—
L 9	CR	+	CR excision	—	+	—	—	+	—
R 10	CR	+	CR excision	—	+	—	—	+	—
L 10	CR	+	CR excision	—	+	—	—	+	—
L 11	Severed forearm vessels & thrombosis	+	Brachiradio ulner vein graft	+	+	+	—	+	—

CR=Cervical rib Ax=Axillary Abd/ex=Either abduction or exercise

another patient (R8), a bullet had caused local thrombosis and perivascular haematoma compression to both the third part of the subclavian artery and to the axillo-subclavian venous junction. In this patient the abduction test was irrelevant. (See Table II).

DISCUSSION

In relation to Thoracic Outlet Syndrome produced by a mechanical restriction of vesicular outflow, Gruss and many other authors (1,2,3,4, 5) reported that classical Adson's test was positive in 95% of their cases. We found, in our series, that unlike the protocol used by Adson, the angle of arm abduction required for obliteration of Radial pulse ranged from 45 degrees to 110 degrees. We are now suggesting that the discrepancy may have been caused by ethnic skeletal differences. Only a large enough series, with the continuation of this study, can confirm this for us.

In our series the incidence of post-stenotic aneurysmal dilatation in 12 cervical rib lesions was 6 (50%). Since these dilatations were considered minor, no remedial vascular reconstruction was performed. These cases will remain on our long term follow-up programme and it remains to be seen, whether, with removal of constriction, these will spontaneously reduce in size (6,7) in due course of time.

It has been suggested that severe aneurysmal lesions or thrombosed lesions should be bypassed with ligature or excision of the diseased segment to prevent subsequent embolisation (1, 8, 9,). In our short series, upto this point only two graft reconstructions of the Subclavian artery with appropriate ligature, were found necessary and performed.

In this series, adjunct cervico-dorsal sympathectomy was not performed in any patient with Thoracic outlet syndrome as has been suggested by Haimovici (10). Our result of decompression without sympathectomy yielded resolution of symptoms in 15 out of 15 lesions (100%) at our six-week follow-up, restoration of Radial pulse beyond the pre-operative critical angle of abduction-occlusion in 100% at six weeks.

Our study is based in showing 100% of the patients in our series as suffering from vascular symptoms either at rest or at exercise. We wish to point out that in this pilot study, our patients were preselected by the referees. Heyman et al (11) reported a 0.5 - 1% rate of incidental pick-up at routine chest x-rays, of cervical ribs. Of these, they showed, 10% proceeding to the symptomatic lesions. Of the symptomatic lesions, 80% developed neurological features while only 20% developed vascular disorders. As our study expands and includes a respectable number of purely neurological and purely asymptomatic cervical rib cases, the true incidence and behaviour pattern of Thoracic Outlet Syndrome in Pakistan, will emerge.

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