

Balloon Dilatation of Renal Artery Stenosis: First Case Report in Pakistan

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INTRODUCTION :

"Putting catheters to work in place of scalpel".
Tegtmeyer (1)

Surgical reconstruction of renal artery stenosis has been practiced since 1952 when Thompson(2) performed first spleno-renal shunt. Since then, thousand of cases has been reported with good results. However, the introduction of percutaneous renal artery dilatation has been a great breakthrough in the management of renal artery stenosis. We report the first case of renal artery dilatation using balloon catheter in Pakistan.

CASE HISTORY :

A 44 Years old Pakistani male patient was hospitalized for Abdominal Angiography. He was non Diabetic, Smoker, and had been hypertensive for last 25 years and at admission had poorly controlled hypertension despite taking Propranolol, Hydrallazine, Atenolol, Captopril and Moderetic. He had a strongly positive family history of hypertension. Abdominal Angiography done in 1984 elsewhere revealed disease of Abdominal Aorta at the bifurcation but Renal Arteries were not well visualized and presumed to be normal. Renal ultrasound done 3 months prior to this admission was reported normal. However, Renal Scan showed reduced up-take on right side. On admission his BP was 240/140 m.m. Hg. in. right arm, peripheral pulses were normal except pulses of right lower limb were not palpable. An abdominal bruit was present. Blood picture, Urine Examination and serum metabolic assay was normal. X-Ray chest and E.C.G. were unremarkable. A coronary

angiogram done as routine part of the panangiography showed severe disease of the left anterior descending and the right coronary arteries. L. V function was normal. Aortogram revealed normal arch and descending Aorta with severe obstruction of the right renal artery and severely diseased terminal aorta. There was a pressure gradient of approximately 100 mm Hg. across the lesion.

Balloon Dilatation of right renal Artery was performed with percutaneous femoral approach using the left femoral Artery. Selective Renal Angiogram was done showing critical 90% Stenosis (fig 1). Position of the dilating catheter was confirmed with hand Injections and pressure monitoring. Balloon Dilatation was done with a 4 mm ballon using initial pressure of approximately 5 bars and then 10 bars. This procedure was repeated twice (fig 2). Pressures were taken and as noted earlier, the pressure gradient of 100 mm Hg prior to dilatation was reduced to almost zero post dilatation. Renal Angiogram was repeated which showed a remarkable reduction of the Renal Artery Stenosis from 90% to about 30% (fig 3).

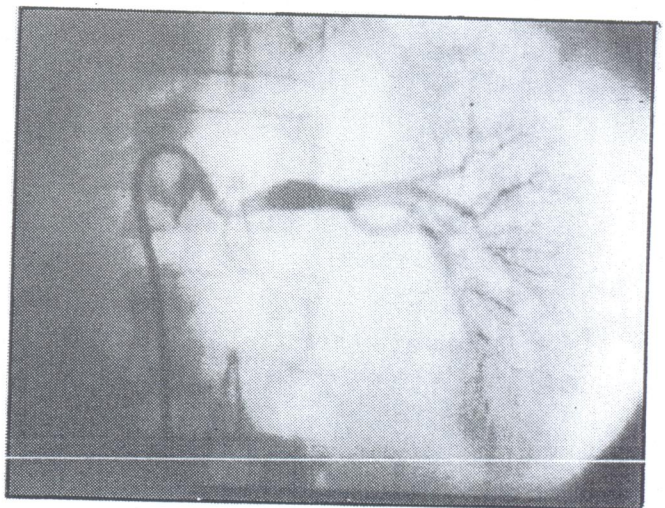


FIG. - 1.

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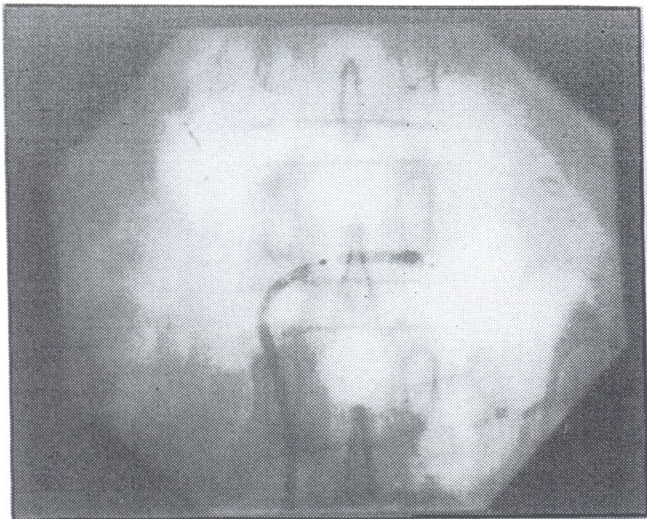


FIG. - 2.

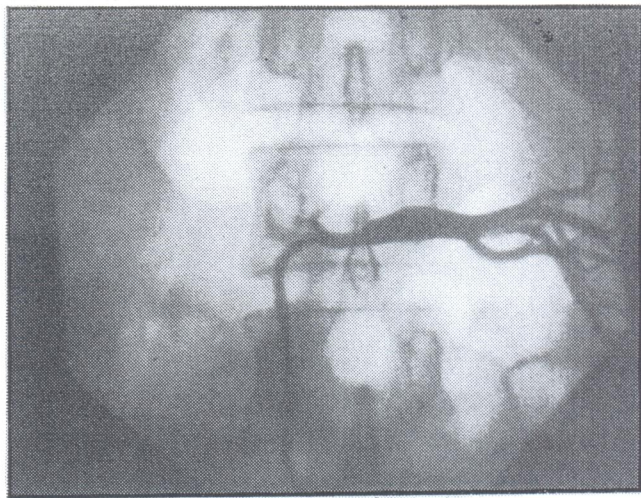


FIG. - 3.

DISCUSSION .

Prevalance of hypertension in general adult population around the world is, 10 - 15% (If BP > 140/90 mm Hg. is defined as hypertension) and 7 - 10% if cut off point is 160/95 mm Hg. (3). Renal Vascular Hypertension is the most common type of secondary hypertension and accounts for 3 - 6% of all hypertension (4).

Prevalance of hypertension in Pakistan varies from 23.6% (5) reported in sedentary shopkeepers to 2% in active army commandos (6). In one consecutive study of 60 hypertensive patient of less than 40 years, renal artery stenosis was found in 6 patient i.e. 10% (7). Features suggesting renovascular hypertension are detailed in Table. I.

TABLE I

Clinical Characteristics of 339 Patients with Essential Hypertension versus 175 Patient with Surgically Cured Renovascular Hypertension.

Clinical Characteristics	Essential Hypertension (N=339)	Renovascular Hypertension	
		Atherosclerosis (N=91)	Fibromuscular Dysplasia (N=84)
Age of onset, years	35	46*	33
Duration years	3.1	1.9*	2.0*
Sex, % female	40	34	81*
Family history of hypertension, %	67	58	41*
Physical			
Obese, %	38	17*	11*
Systolic BP, mmHg	169	181*	174
Diastolic BP, mmHg	109	108	108
Fundi grade 3 or 4, %	12	26*	10
Abdominal bruit, %	7	41*	57*
Laboratory			
Cardiomegaly (chest x-ray), %	26	26	8*
Serum creatinine > 1.5 mg/dl, %	11	15	2*
Serum potassium < 3.4 meq/liter, %	7	14	17*

*Indicates significant difference ($P < 0.05$) when compared with the group with essential hypertension.
Source: Adapted from Simon et al

Regarding Etiology of Renal Artery Stenosis, two pathological types are described. Table II compares and contrasts the clinical and angiographic features of the two types. Other rare causes of renal vascular hypertension are trauma, embolization and coarctation of Abdominal Aorta.

The clinical clues suggestive of renal vascular hypertension are development of sudden onset drug resistant malignant hypertension, with deteriorating renal function in a patient with renal bruit (a bruit with both systolic and diastolic component is more specific).

Rapid sequence IVP is abnormal in 83% of patient with reno-vascular hypertension (8). In bilateral renal artery stenosis, IVP and renal scanning are relatively insensitive and therefore some authors recommend digital subtraction angiography (9). Selective stimulated renal vein renin assays as a screening tests for patient with suspected renal artery stenosis is useful (9). A significant fall in blood pressure in response to the converting enzyme inhibitor Captopril may be also be useful as a screening test for bilateral renal artery stenosis (10). Renal Angiography should be done. in patient with equivocal result or in those undergoing Surgery or being evaluated for Angioplasty.

Prior to 1978 renal artery stenosis was treated either medically or surgically. In one large 7 to 14 years prospective study (11) of 214 patient, those treated surgically had a death rate of 16%

as compared to 40% if treated medically. They recommended surgery for all those with severe hypertension with significant renal artery stenosis. However, surgery is not free of complications and in one series (12) the overall surgical mortality was found to be 5.9%. In a recently published study (13), the operative mortality has been stated to be 2% with post operative complications of about 10%.

Dotter & Judkin in 1964 (15) were the first to report the percutaneous transluminal dilatation of femoral artery. The first ever per-cutaneous renal artery dilatation was done in 1971 by Zeitler (14) using teflon catheters. Gruntzing et al in 1978 reported the first percutaneous renal artery dilatation using balloon catheter (16).

All pathological types of haemodynamically significant renal artery stenoses (gradient > 20 mm Hg and for angiography lumen narrowing > 75%) can be dilated. It is effective even in renal artery hypass graft stenosis.

Since the first balloon dilatation of renal artery by Zeitler in 1971 (14), enough experience has been gained to perform renal angioplasty safely. In one large study consisting of 450 dilatation, major postprocedure complications have been 5 - 6% with zero mortality making angioplasty the safest treatment of choice in experienced hands (9).

TABLE II

Comparisons and Contrasts in the two main Types of renal artery stenosis.

Atherosclerosis

- Common in males.
- Age > 50 Years.
- Discrete Stenosis of Proximal third of artery.

Fibromuscular Dysplasia

- Common in females.
- Usual age 30 - 40 Years.
- Alternate areas of constriction and dilatation with "string of beads" appearance. Commonly affects middle and distal third of Renal artery but may extend to involve segmental arteries too.

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