Original Article

PERCUTANEOUS CORONARY INTERVENTION OF OSTEAL LESIONS IN NEWLY ESTABLISHED TERTIARY CARE CARDIAC HOSPITAL

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ABSTRACT

Objective: To assess the outcome of percutanious Angioplasty in patients with osteal lesions in Coronary artery Diseases.

Methodology: This is a retrospective analysis of all coronary angiograms performed at the catheterization laboratory of Karachi Institute of Heart Diseases (KIHD), a tertiary referral center in Karachi, Pakistan, between the periods August 2006 to August 2008.

Results: Fifty patients were enrolled which included thirty-five men and fifteen women and all were >40 years of age. Each patient had a single target osteal lesion: twenty nine patients underwent PCI for ostial LAD lesion (among them twenty males & nine females), six had ostial LCX (five males and one female), and fifteen patients had osteal RCA stenosis (10-male patients and 5- female patients). After high-pressure balloon dilatation residual stenosis was reduced. Twelve patients were treated with bare metal stents (BMS) while thirty eight with drug eluting stents (DES). In all cases the procedure was successful without any pre and post procedural complications.

Conclusion: A key issue in the treatment of an osteal lesion is to assure that the stent is inserted proximal enough to fully cover the osteal junction. Improvements in technique, equipment, adjunctive drug therapy and better understanding of the procedure have remarkably changed the practice of interventional cardiology

KEY WORDS: Osteal stenosis, percutaneous transluminal coronary Angioplasty, coronary artery disease.

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INTRODUCTION

The term "ostium" is derived from the Latin os, referring to the mouth. A lesion located at the ostium of a vessel is referred to as an "ostial lesion.[1] Generally, lesions located within 3 mm of the origin of a vessel are considered osteal, but some authors consider lesions up to 5 mm from the origin as osteal.[2]

Besides atherosclerosis, coronary osteal lesions may occur uncommonly in various other disease states such as syphilis, Takayasu's

arteritis, fibromuscular dysplasia and postradiation fibrosis.[3,4] Female sex and family history of coronary artery disease and hypercholesterolemia are independent predictors of osteal right coronary artery lesion[5] Osteal left main coronary artery and right coronary artery lesions are strongly correlated.[6,7] Bilateral tight coronary osteal lesion is potentially lethal and can present as sudden cardiac death, myocardial infarction, angina or ischemic cardiomyopathy. There is also imminent risk of sudden death due to global ischemia or infarction.[8]

Coronary angioplasty of osteal lesions has a high initial angiographic and clinical success rate but restenosis remains a limitation. The beneficial action of stents has been attributed to maximizing the initial luminal gain and overcoming the elastic recoil. PTCA using a cutting balloon followed by stenting is technically feasible. Stenosis of the right coronary ostium is a high-risk lesion for stent restenosis.[9]. With improvement in hardware and increasing experience, isolated osteal disease of the LMCA (>3.5mm) can be managed by stenting alone or debulking and stenting.[10,11] A technique for correct positioning of a stent in an osteal stenosis by using a second wire passed through the last cell of a stent. The anchor wire technique, first described by Szabo will facilitate precise osteal stent placement and eliminate errors of positioning inside or outside the ostial narrowing.[12] DES implantation in de novo osteal LAD lesions appears safe and effective and is associated with a significant decrease in restenotic rates compared with historical experience with BMS. [13.] Stent insertion into sapheneous vein graft ostial lesions is associated with a high procedural success rate,[14] but Angioplasty of these lesions is further limited by the high restenosis rate. This may be as a result of the simultaneous presence of atherosclerosis, fibrosis, and calcification in the surrounding aortic wall, and the higher concentration of elastic and muscle fibers around the ostium, which causes recoil after balloon inflations.[15] Conventional balloon dilatation can successfully dilate the majority of coronary artery stenoses. In this study we have analyzed the data of PCI of osteal lesions.

METHODOLOGY

This is a retrospective analysis of all coronary angioplasties performed at the catheterization laboratory of Karachi Institute of Heart Diseases (KIHD), a tertiary referral center in Karachi, Pakistan, between the periods August 2006 to August 2008.

An inclusion criterion was Single de novo lesions and osteal lesions. While patients with LVEF <30%, Left main >50%, coexisting chronic heart failure, valvular heart diseases, chronic renal failure, contraindication to anticoagulation, difficult anatomy, poorly visible lesions, overlap, multiple stenoses within one artery, diffuse disease, left main disease, multivessel disease were excluded from study.

All osteal lesions were crossed by guide wire through respective guiding catheter then predilated with appropriate balloon at approximately 6 to 8 ATM pressure followed by deployment of suitable stent according to lesion size and length. Both types of stents, Bare Metal (BMS) and Drug eluting (DES) were selected but majority were DES (Endeavour). All DES were sirolimus type, because restenosis rate is less with DES stent as compared to BMS but due to financial constraints we also deployed bare metal stents. We used Endeavour because government provided us as well as it is one of good quality DES. Patients were evaluated for the occurrence of major adverse cardiac events comprising death, acute myocardial infarction, and need for repeat revascularization with either coronary artery bypass surgery or PCI. Patients were discharged after 48 hours of procedure.

RESULTS

Table-I gives details of total study population. Fifty patients were recruited: Thirty-five men and fifteen women and all were >40 years of age. Each patient had a single target osteal lesion: twenty nine patients underwent PCI for osteal LAD lesion (among them twenty males & nine females), six had ostial LCX (five males and one female), and fifteen patients had osteal RCA stenosis (10-male patients and 5- female

Table-I: Demographics of patients undergoing PCI for osteal stenosis (n=50)

		Male	*Female*
Distribution of patients	50	35	15
LAD	29	20	9
LCX	6	5	1
RCA	15	10	5

Table-II: Use of BMS Vs DES stents for osteal stenosis (n=50)

	BMS	*DES*
Total patients	12	38
LAD	6	23
LCX	2	4
RCA	4	11

patients). After high pressure balloon dilatation residual stenosis was reduced in all the cases. This facilitated stent deployment while post dilatation was done in few cases if required. Table-II shows twelve patients were treated with bare metal stents (BMS) while thirty eight with drug eluting stents (DES). In all cases the procedure was successful without any pre and post procedural complications. During 6 to 12 months follow up period we observed marked improvement of symptoms in majority of patients. Nine had myocardial infarction, 14 presented with arrthymias, 11 with unstable

Table-III: Follow up of patients (n=50)

time			*Gender*		*Total*
			M	F	
6 Month	Myocardial infraction	Count	1	2	3
		% within gender	2.9%	13.3%	6.0%
	Arrthymias	Count	2	3	5
		% within gender	5.7%	20.0%	10.0%
	Unstable angina	Count	2	3	5
		% within gender	5.7%	20.0%	10.0%
	Re-stenosis	Count	1	0	1
		% within gender	2.9%	0.0%	2.0%
	No disease identified	Count	29	7	36
		% within gender	82.9%	46.7%	72.0%
		Count	35	15	50
		% within gender	100.0%	100.0%	100.0%
12 Month	Myocardial infraction	Count	2	4	6
		% within gender	5.7%	26.7%	12.0%
	Arrthymias	Count	4	5	9
		% within gender	11.4%	33.3%	18.0%
	Unstable angina	Count	3	4	7
		% within gender	8.6%	26.7%	14.0%
	Re-stenosis	Count	3	2	5
		% within gender	8.6%	13.3%	10.0%
	No disease identified	Count	23	0	23
		% within gender	65.7%	0.0%	46.0%
		Count	35	15	50
		% within gender	100.0%	100.0%	100.0%

Marginal statistical association exist among male and females at 6 months (p-value: 0.07) while at 12 months significant difference exist among males and females (p-value<0.001) using Chi square test of significance

angina, six had re-stenosis .while no death has been reported so far.

DISCUSSION

Coronary osteal stenosis involving both the coronary ostia is a rare occurrence. The plaque formation can occur at unusual sites, including the ascending aorta and around the coronary ostia. This atheroma can interfere with aortic valve function.[16] Bilateral coronary osteal stenosis in young subjects without known conventional coronary risk factors may be due to fibro muscular dysphasia, syphilitic aortitis, post radiation and Takayasu's arteritis or without any recognizable etiological background.[17] Debulking before stenting located at the ostium of the LAD is safe and is associated with a high rate of technical success.[18] Mechanism of balloon angioplasty action involves three events: plaque fracture, compression, and stretch.[19] Balloon dilatation within a stenosis results in application of force in a random manner to the components of the stenosis. [20] Cutting balloon has been used for osteal lesions with or without stenting [21] but we can't use cutting balloon because of financial constraints.

In our cases dilatation with the conventional balloon enabled sufficient luminal gain to be obtained, facilitating stent insertion. This combination resulted in a good post procedural result with no immediate or late complications. The guiding catheter is optimally positioned outside the ostium but in sufficient proximity to opacify the adjacent aorta and thereby localizes the target ostium. However, the guiding catheter must be maintained at a sufficient distance from the ostium to avoid dislodging or damaging the stent. The choice of therapy in osteal stenosis of the coronary artery has conventionally been CABG or surgical patch aorto-coronary osteo-plasty. Eversince various balloons, stents, and other devices are introduced the success rate of PCI is over 95%, and the risks of serious complications has also decreased considerably.[22] As table 2 shows Drug -eluting stent implantation in osteal lesions achieved excellent results regarding re-stenosis and clinical outcomes compared with BMS implantation.[23] Osteal lesions, either in native vessels or grafts, can be particularly difficult to dilate with conventional balloon angioplasty. Stent insertion into sapheneous vein graft aorto-osteal lesions is associated with a high procedural success rate,[24] but restenosis remains a limitation for plaque excision as the preferred treatment because both balloon angioplasty and stenting presented a very high risk of jeopardizing the ostium of the left anterior descending artery, the mid left circumflex, or both.[25, 26] The beneficial action of stents has been attributed to maximizing the initial luminal gain and overcoming the elastic recoil. These mechanical advantages may be ideally suited for aorto-osteal lesions.[27]

CONCLUSIONS

A key issue in the treatment of an osteal lesion is to assure that the stent is inserted proximal enough to fully cover the osteal junction. Although Cutting balloon angioplasty followed by stent insertion is a feasible technique for the treatment of osteal lesions, the cutting balloon proved useful in dilating stenoses resistant to conventional balloon dilatation alone and so facilitating insertion of a Stent and perhaps improving long term outcome. But due to limited resources we did conventional balloon dilatation. Improvements in technique, equipment, adjunctive drug therapy and better understanding of the procedure have remarkably changed the practice of interventional cardiology.

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