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ACUTE MYOCARDIAL INFARCTION;

SHORT-TERM EFFECT OF SUCCESSFUL ASPIRATION IN PRIMARY STENTING ON PATIENTS WITH ACUTE MYOCARDIAL INFARCTION

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ABSTRACT… Objectives: To evaluate the effects of aspiration thrombectomy (AT) using an Aspiration Catheter (INVATEC SPA DIVER C.E. MAX, Italy) in patients with acute myocardial infarction (AMI). **Study Design:** Cross sectional and Case series study. **Setting:** Department of Cardiology, Liaquat University Hospital, Hyderabad. **Period:** January 2012 to December 2013. **Methodology and Results:** Measurement of left ventricular ejection fraction (LVEF) by echocardiography was obtained before (acute LVEF) percutaneous coronary intervention (PCI) and 1 week after (late LVEF) the procedure. Most of the patients with full restoration of ST segment elevation following PCI were higher in the aspiration Catheter control group (90 vs 68%, $P < 0.01$), (86 vs 62%, $P < 0.01$) and (90 vs 64%, $P < 0.01$) respectively. Minimal change in LVEF was observed in patients between the Aspiration Catheter group and control group at 1 week post procedure. **Conclusion:** Combination of AT using Aspiration Catheter (INVATEC SPA DIVER C.E. MAX) with primary stenting can better outcome, while left ventricle (LV) function had subtle change in AMI when compared to primary stenting after balloon predilation without thrombectomy.

Key words: Acute Myocardial Infarction, Aspiration Thrombectomy, Diver C.E. MAX.

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INTRODUCTION

There is well recognized procedure for the patients' treatment or diagnosis of ST-Elevation Myocardial Infarction (STEMI) i.e. Percutaneous coronary intervention (PCI).

Nevertheless, it often results in suboptimal restoration of epicardial blood flow and affects prognosis. The principal reason is the presence of thrombus in situ. Nowadays, thrombectomy devices are being commonly used in emergency PCI. In STEMI patients undergoing emergency PCI, the European Society of Cardiology guidelines on myocardial revascularization suggest aspiration thrombectomy (AT) as a Class IIa, with level of evidence-A.[1] AT is an efficacious adjuvant treatment for patients with STEMI.[2] Abnormal myocardial perfusion is common in acute myocardian infarction (AMI) patients following PCI despite restoration of blood flow.[3] Myocardial blush score is useful in assessing prognosis in high risk patients who achieved thrombolysis in myocardial infarction grade 3 (TIMI-3) flow after intervention.[4,5] The reestablishment of myocardial perfusion is specified by full resolution of ST-segment elevation more than 70% in resting electrocardiogram (ECG).[6,7] Adverse cardiac events in patients having defective microperfusion is worse as they have increased mortality rate, permanent myocardial damage.[8,9] AT during PCI in AMI (TAPAS) trial[10] showed amelioration of myocardial reperfusion from usual application of manual AT before employment of balloon or stent in the coronary artery. Follow-up of patients for 1 year from TAPAS trial showed a decrease in mortality with AT.[11] A meta-analysis of TAPAS

and many other trials ended with same results. Application of AT in AMI helps decrease mortality in contrast to PCI alone.[11,12,13] The present trial was planned to assess the safety and effectiveness of aspiration catheters (DIVER C.E. MAX) in primary PCI with stenting for AMI.

METHODOLOGY

This study consisted of the sample size of 136 patients whose revascularization treatment was done within 24 hours of Acute Myocardial Infarction for the period of one year i.e. from January 2012 to December 2013. Those patients who got anterior AMI first time and they reached in the hospital within 24 hours, were included in the study whereas. Patients were divided into 2 groups and two dissimilar interventions were given. The control group involved 62 consecutive patients managed by stent. The experimental group consisted of 74 consecutive patients treated by primary stenting after aspiration with DIVER C.E. MAX. The variables such, rate of ST segment resolution, acute left ventricular EF, late LVEF and rate of no-flow growth were compared in both groups like AT and Control groups.

Protocol

Standard treatment was continued following stent implantation. In the aspiration group, suction was performed both before and after stenting. According to the judgment of the operator, aspiration was also carried out in other vessels in which embolization have occurred. In cases where the aspiration catheter or stent could not be advanced by cut, dilatation was first performed using balloons with smaller diameter to prevent dislodgement of thrombi to the periphery followed by advancement of the device. In the control group, primary PCI was performed. In cases of slow flow phenomenon, intra-arterial nitrate was administered.

Statistics

All the data were entered and analyzed in SPSS version 22.0. Frequencies and percentages were expressed as n (%) for categorical variables. Mean $\pm$ Standard Deviation was calculated for numerical parameters and statistical test i.e. student t-test was used on $\leq$0.05 significant level of P value. All the data was calculated on 95% confidence interval.

RESULTS

A total of 136 patients were selected and they successfully treated by stents; complete resolution of ST elevation was seen in 90% of patients in aspiration group compared to 64% in control group ($P < 0.01$). The baseline data of the patients are presented in Table-I.

The parameters like sex, age, coronary risk factors, the culprit coronary artery, and door to balloon time or initial TIMI grade and ejection fraction were insignificant difference (P value = > 0.05).

Table-II reveals last TIMI grade such as 90% rate of achieving TIMI 3 in study groups while 68% was found in the control group. It was also seen that both groups had no statistically significant difference of acute LVEF or late LVEF. Regarding blush 3 score, 90% higher rate of blush score of MI was significantly seen in patient than control (64%) groups. The rate of no-flow was only 2% in the aspiration group in contrast to 40% in the control group ($P < 0.01$).

DISCUSSION

Platelets rich thrombi are usually seen in patients with STEMI.[14,15,16] Platelets have an essential role in distal embolism and microvascular dysfunction.[17,18] Recently, the Diver C.E.MAX aspiration catheter was brought in clinical practice. In STEMI patients subjected to emergency PCI, Diver C.E. catheter has demonstrated its safety and effectiveness.[19,20] As has been demonstrated in Polish-Italian-Hungarian Randomized ThrombEctomy (PIHRATE) trial,.[21] Whether thrombectomy can influence LVEF should be confirmed by new studies and long-term clinical follow-up in patients with STEMI. When considerable thrombus is present, AT may not be efficacious as rheolytic thrombectomy and might result in deficient thrombus removal, no-reflow, and/or distal emboli.[22]

Characteristics	Driver CE (n = 74)	Control group (n = 62)	P Value
Age (years)	63±11	56±13	
Male(%)	68	62	<0.45
Female (%)	32	38	<0.45
Diabetes mellitus (%)	11.5	9.6	<0.64
Hypertension (%)	21.3	18.9	<0.75
Renal dysfunction (%)	1.8	1.3	<0.90
Anterior AMI*(%)	40	51	<0.20
Door to balloon (min)	274±137	300± ±202	-
Killip class I-II (%)	78	80	<0.75
Initial TIMI±0-1(%)	86	90	<0.49
Initial EF±(%)	50±12	48±15	

Table-I. Baseline clinical and procedural characteristics of the study patients
Data are presented as mean±standard error of the mean (S E M) or number of patients in percentage (%). *AMI-Acute myocardial infection; ±TIMI – Thrombolysis in myocardial infection; ±EF – Ejection fraction

Parameter	Driver CE (n = 74)	Control (n = 62)	P Value
Complete restoration of ST fragment elevation (%)	90	64	<0.01
Final TIMI*3(%)	98	68	<0.01
Final MBG±3(%)	86	62	<0.01
No-filow (%)	2	40	<0.01
Late EF±(%)	51±11	49±12	<0.20
Time of intervention (min)	81±43	72±34	

Table-II. Parameter of study patients in each group
*TIMI –Thrombolysis in myocardial infarction; ±MBG – Myocardial blush grade; ± EF – Ejection fraction. Data are presented as mean±standard error of the mean (S E M) or number of patients in percentage (%)

No flow was present in two and 40 of the study and control group respectively No-reflow results in sustained myocardial ischemia after brief obstruction and reperfusion of an epicardial artery during PCI after AMI and affects prognosis.[9] Many interventional cardiologists encountered one or more drawback from AT such as left main thrombus emerging from target vessel, left main dissection, other vessel dissection and stroke.[23] Some clinical trials has proved the importance of AT in preventing angiographic no-reflow but additional studies are needed. Utilization of manual AT catheters is faster, cheaper than and as efficacious as other thrombectomy devices.[24,25] In a recent study, AT was found to decrease major adverse cardiac events, MI and target vessel revascularization except mortality in comparison to standard PCI and no advantages were seen in mechanical thrombectomy.[26] In the absence of anatomical contraindication, AT should commonly be used during STEMI PCI.[27]

DISCUSSION

Platelets rich thrombi are usually seen in patients with STEMI.[14,15,16] Platelets have an essential role in distal embolism and microvascular dysfunction.[17,18] Recently, the Diver C.E.MAX aspiration catheter was brought in clinical practice. In STEMI patients subjected to emergency PCI, Diver C.E. catheter has demonstrated its safety and effectiveness.[19,20] As has been demonstrated in Polish-Italian-Hungarian Randomized Thrombectomy (PIHRATE) trial,.[21] Whether thrombectomy can influence LVEF should be confirmed by new studies and long-term clinical follow-up in patients with STEMI. When considerable thrombus is present, AT may not be efficacious as rheolytic thrombectomy and might result in deficient thrombus removal, no-reflow, and/or distal emboli.[22] No flow was present in two and 40 of the study and control group respectively No-reflow results in sustained myocardial ischemia after brief obstruction and reperfusion of an epicardial artery during PCI after AMI and affects prognosis.[9] Many interventional cardiologists encountered one or more drawback from AT such as left main thrombus emerging from target vessel, left main dissection, other

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CONCLUSION

Combination of AT using Aspiration Catheter (INVATEC SPA DIVER C.E. MAX) with primary stenting can better restore epicardial coronary flow and myocardial perfusion, while LV function had subtle change in AMI when compared to primary stenting after balloon predilation without thrombectomy.

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He who kneels before God can stand before anyone.

– Unknown –

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5	Umbreen Bano	Writing support, data interpretaion.	