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Comparison of Primary Angioplasty Results of a High - Volume Tertiary Center with and without Cardiac Surgery Backup

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Abstract

Objectives: There is a debate about performing primary percutaneos angioplasties (PPA) in patients with acute myocardial infarction (AMI) at hospital without cardiovascular surgery unit.

Methods: Consecutive 88 PPA were made at our hospital before cardiovascular surgery was built. After 88 PPA were done, cardiac surgery facilities started and continue to do and the results of 156 consecutive primary angioplasties were included to the study. The results of PPA' s with surgery and without surgery were compared for the clinical characteristic, angiographic data, procedure success, cardiac complications, death and the need for surgery.

PA of off - site cardiac and on - site cardiac surgery was compared.

Results: All AMI patients referred to emergency department were included in the study. Patient's clinical characteristics and angiographic data were similar. Chest pain presentation time was 261 ± 12 min in on-site group an 302 ± 23 min off-site group p = 0.35. Hospital mortality rate was 4.54% in on-site cardiac surgery and 5.12% in off-site cardiac surgery p = 0.44. Procedure success rate was 94.45% on-site cardiac surgery and 94,23% off-site cardiac surgery relatively p value = 0.54 Major cardiovascular events, urgent surgery, stroke, and repeated angioplasty were not observed

Conclusions: Our on-site PA and off-site PA results were similar. Up to now this is the only study in the literature showing the same hospital's on-site and off-site PPA results. We showed that when rigid programs are established in catheterization laboratory, PPA in AMI can be done effectively and safely in hospitals without cardiac surgery and that way time delays can be prevented in community health.

Keywords: Acute myocardial infarction; Off-site cardiac surgery; Primary angioplasty

Introduction

PA has been showed to be more beneficial than the fibrinolytic therapy for STEMI patients and decrease the stroke, recurrent MI and death by large multi -center randomized trials [1,2]. As a result of major improvements in technology and pharmacology, the need for emergency cardiac surgery is now infrequent (0.3% to 0.6%) [3,4]. Favorable outcomes for PA performed in hospitals without cardiac surgery backup on site have been reported [5,6]. Some studies have extended this concept to both primary and elective PA [7]. Some doctors transfer such patients to a PCI center and cause to prolong the reperfusion time and increase the risk and mortality [8,9]. Doctors that work at hospitals with catheterization laboratories without cardiac surgery laboratories can make PA in AMI patients instead of transferring patients to a tertiary center. These hospitals should spend effort to develop their own safe and effective PA programs.

We undertook this study to evaluate the feasibility, safety and efficacy of emergency coronary angiography and PA performed in patients during AMI at our hospital before on -site cardiac surgery facilities and compared the results with after setting of cardiac surgery backup.

Patients and Methods

Clinical characteristics and in - hospital outcomes were assessed retrospectively in the hospital records of 244 consecutive patients with a diagnosis of AMI who had been treated between January 2012 and December 2012 where approximately > 300 primary coronary angioplasties were performed yearly (Table 1). The patients were divided into 2 categories: 88 consecutive AMI patients until cardiovascular surgery was set at May 2012 at our intuition and 156 consecutive AMI patients after cardiac facilities were available at our hospital. Between January 2012 and December 2012, primary angioplasty procedure performed in our center. The patients were informed about the status of the laboratory and get their permission with our local ethics committee and written consent was signed.

Defining MI and performing PA procedure were made according to guideline criteria. Advancing the guide -wire through the distal to the lumen was defined device success rate and > 50% reduction in the diameter of the stenosis was defined as angiographic success. A 30 - 50% residual stenosis after coronary angioplasty was defined as a sub -

optimal result. Clinical evidence of ischemia and >50% stenosis occurrence was defined as restenosis. The time from the arrival to the time of first treatment device deployment were defined as reperfusions time.

	PA before On -Site Site Cardiac Surgery Backup (N:88)	PA after On -Site Site Cardiac Surgery Backup (N: 156)	P value
Age (years: mean ± SD)	64.8 ± 11	63.6 ± 13	0.56
Female sex -no. (%)	23/ 88 - 26.13	46/ 156 - 29.48	0.45
Left ventricular ejection fraction -%	53. 2 ± 8.72	51. 7 ± 10.43	0.38
Medical history - no./total no. (%)			
Stroke	10/ 88 - 11.36	16/ 156 - 10.25	0.62
Smoking	51/ 88 - 57.95	89/ 156 - 57.05	0.64
Diabetes Mellitus	23/ 88 -26.13	42/ 156 - 26.92	0.53
Hypertension	49/ 88 - 55.68	85/ 156 - 54.48	0.55
Previous PCI	4/ 88 - 4.5	10/ 156 - 6.41	0.48
Previous CABG	9/ 88 - 10.22	17/ 156 - 10.89	0.56
Indication for Primary PCI – no./total no. (%)			
Cardiogenic shock	4/ 88 - 4.54	8/ 156 - 5.12	0.66
Acute anterior MI	29/ 88 - 32.29	54/ 156 - 32.05	0.65
Acute inferior MI	59/ 88 - 67.04	102/ 156 – 65.76	0.45
Time From Chest Pain to Presentation (min)	261 ± 12	302 ± 23	0.35
Door - to - Balloon Time (min)	38 ± 19	43 ± 11	0.25
Reperfusion time (h: mean ± SD)	2. 33 ± 9.1	2.61 ± 8.4	0.23
Location of vessel - No. of patients/total no. (%)			
Left main coronary artery	0/ 88	0/ 156	0
Left anterior descending artery	29/ 88 - 32.29	54/ 156 - 32.05	0.56
Circumflex artery	20/ 88 - 22.72	33/ 156 - 21.15	0.65
Rigth coronary artery	39/ 88 - 44.31	69/ 156 - 44.23	0.45
Trombus aspiration	4/ 88 - 4.54	8/ 156 - 5.12	0.56
Vascular complication	2/ 88 - 1.36	3/ 156 - 1.25	0.45
İntraaortic balon pump 5/ 88 - 5. 68	5/ 88 - 5.68	0/ 156	0.0001

Table1: Clinical angiographic characteristics and overall procedural data of patients

Complications

Major ischemic events were death, MI and the emergency bypass surgery need. The patients were hospitalized for stroke and the other major ischemic complications.

Data collection and Statics: All data are given as mean ± SD. The without surgery and the with surgery groups were compared by the chi - squared test for discrete variables and unpaired Student' s t - test for continuous variables according to standard statistical methods. In all analyses, significance was accepted at $p < 0.05$.

Results

The patient's baseline angiographic and clinical and angiographic data were summarized and compared before and after cardiac surgery unit setting at our hospital in (Table 1). The patients with hypertension were 54. 48% in off - site cardiac surgery group and 54.68% in on - site cardiac surgery group $p = 0.55$) and smoking was 57.05% in off - site cardiac surgery group and 57.95% in on -site cardiac surgery group $p = 0.65$ and diabetes mellitus was 26.92% in off - site cardiac surgery 26.13 in on - site cardiac surgery $p = 0.50$. Chest pain presentation time was 261 ± 12 min in on - site group an 302 ± 23 off - site group $P = 0.35$. The mean stent deployment pressure was 13.4 ± 2.6 atm. Intraaortic - balloon pump usage was higher in on - site cardiac surgery 68 % and 0 % in off - site cardiac surgery $p < 0.001$. Sub-acute stent thrombosis stent dislocation and balloon burst were not observed. In 1 out of 88 off - site cardiac surgery patients and 3 out of 156 on - site cardiac surgery patients stent was lost and successfully deployed in lesion after take -off. All patients were used platelet glycoprotein 2 b/3a receptor blockers. The results of all PCI procedures were summarized in (Table 2). PCI procedure success rate was 94.45% and 94.23% $p = 0.54$ relatively that 4 out of 88 off - site cardiac surgery patients and in 9 out 156 off - site cardiac surgery patients the guide wire could' t passed to distal in the lumen. In - hospital mortality rate was 5.12% in off - site cardiac surgery and 4. 54% in on - site cardiac surgery $p = 0.44$. All of these patients were in cardiogenic shock at presentation. Stroke, urgent surgery need or repeated

Angioplasty during follow -up were not observed. Major cardiac events weren't observed during the hospitalization.

	Primary PCI at Hospital before On -Site cardiac Surgery (N:88	Primary PCI at Hospital when On - Site cardiac Surgery services available (N: 156)	P value
Total mortality (no/ total no - %)	4 / 88 - 4.54	8/ 156 - 5.12	0.44

Death during PCI (no/ total no - %)	0/ 88 - 0	0/ 156 - 0	0.46
Need for repeat PCI (no/ total no - %)	0 / 88 - 0	0/ 156 - 0	0.55
Need for urgent surgery (no/ total no - %)	0 / 88 - 0	0/ 156 - 0	0.56
Stroke (no/ total no - %)	0/ 88-0	0/ 156-0	0.56
PCI procedure success (no/ total no - %)	84/ 88 - 95.45	147/ 156 - 94. 23	0.54

Table 2: Early outcome of all PCI procedures

Discussion

Patients are admitted to hospitals without cardiac surgery, there are 2 options of therapeutic Strategy. One is the subsequent PA or the thrombolytic therapy at those non - surgical hospitals and the other is the transfer to the surgical centers for PA. Large studies have shown that PA is superior to fibrinolytic therapy in AMI patients with good result in short and long term and encourage performing to a much broader spectrum. Fibrinolytics are eligible in only one in three patients and receive and actually only one in four receives it [10] In the NRMI - 3 database 16 % of patients with ST - segment elevation AMI were treated with PA [11]. This is partly due to the fact that most patients with AMI do not present to angioplasty centers. The routine emergent transfer of patients with AMI, however, presents many difficulties [12]. In the NRMI - 2 and -3 registries, transfer for PA in the U. S. was associated with median delay in time to reperfusion of 90 minutes, compared with on-site PA (195 min.vs.105 min, $p < 0.001$) [13]. In this registries, patients who were treated after 150 min had a 60% increase in mortality, compared with patients treated within 60 min ($p < 0.001$) [14]. All of these considerations support the need to expand the availability of centers that capable of offering PA. The availability of qualified hospitals and operators who perform PA is limited in part by various local requirements for on - site cardiac surgery. According to the American College of Cardiology/ American Heart Association guidelines for PCI, a class 2b' indication was given PA at hospitals without cardiac surgical unit [15]. The efficacy and safety of PA versus fibrinolytic therapy at hospitals with off-site surgical backup was recently demonstrated in the Cardiovascular Patients Outcomes Research Team (C - PORT) trial [16]. This 453 - patient study and a report from the NRMI investigators support for PA at hospitals without on-site cardiac surgery [17-19]. The authors of 1,935 of these procedures were performed at 97 hospitals without on-site cardiac surgery said that this urgent treatment was an alternative to transfer to PCI centers with on-site cardiac surgery and may have implications for public health with no added risk at nonsurgical hospitals.

In this study, all clinical outcomes were collected and adjudicated by a single coordinating center, and all angiograms were submitted for core laboratory analysis. This study demonstrates that clinical outcomes in patients treated with PA at hospital when off-site cardiac surgery backup are similar to outcomes of patients treated with PA at hospital when on-site cardiac surgery backup. The present study is the first to compare the results of PA onsite and off-site cardiac surgery of the same hospital.

Conclusions

Community hospitals wishing to establish successful PA programs must adopt rigorous Standards for operators, staffing, laboratories, equipment, and case selection and maintain ongoing analysis and case review. We don' t want mean that PA can be done at every hospital without cardiac surgery facilities but this report does suggest that without cardiac surgery backup you should not limit PA applications with the fear of the safety or efficacy problems in these venerable AMI patients.

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