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Review article

Percutaneous transluminal coronary angioplasty (PTCA): Attention on imperative facet

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Abstract

Percutaneous Transluminal Coronary Angioplasty (PTCA) introduced in late 90s and is a relatively new form of treatment for coronary artery stenosis. The PTCA is associated with complications like hypotension secondary to the artery occlusion may cause a decrease of the flow in the other coronary arteries, leading to cardiogenic shock. Such serious problems are necessary to note and resolve immediately. It is very commonly found that the quality of life of people with PTCA procedure (instead of operation) three months after procedure is reduced. Further, it is required during and especially after procedure; this period the patient treatment team supports his family and puts under the necessary training (by physician and nurses) in this period to give appropriate care to patients and encourage them to pursue their condition in better way. Nurses play a strong role in helping patients reduce their risk for disease and make informed lifestyle changes. Importantly, knowledge about quality of life and rehabilitation is well understood by various recent studies on self-instructional module. This is further supported by fact that; self instructional module on post PTCA home care among patients was found to be effective and helped the patients to improve their knowledge about post PTCA home care. Also analysis revealed a very high association between knowledge score with age, gender, education, occupation and income, which further help the patients to increase knowledge and improve the quality of life. This review concentrates mainly in the Percutaneous Transluminal Coronary Angioplasty and related complications, rehabilitation along with the Self-instructional modules (SIM).

Key Words: Percutaneous transluminal coronary angioplasty, Self-instructional modules, quality of life.

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1. Introduction

Percutaneous Transluminal Coronary Angioplasty (PTCA) introduced by Gruentzig in 1977. 1 Percutaneous transluminal coronary angioplasty is a relatively new form of treatment for coronary artery stenosis. The selection of patients and the indications have evolved over the last seven years. For some patients with coronary artery disease, it has become the treatment of choice, and for others, an equal alternative to coronary artery bypass surgery (CABG) [1]. Although percutaneous transluminal coronary angioplasty has been an important advance in the treatment of patients with coronary artery disease, this treatment is associated with complications such as myocardial infarction or the need for emergency bypass surgery in 2% to 7% of patients [2]. Nurses play a strong role in helping patients reduce their risk for disease and make informed lifestyle changes. Reliability of the nurses is critical for them to serve as role models and educators. Quality of life of people with PTCA operation three months after surgery procedure is reduced. It is required during this period the patient treatment team and supports his family and put under the necessary training in this period to give patients and encourage them to pursue their condition should [3]. Recently is noted that the cardiac rehabilitation and the change in score was statistically significant indicating that the self-instructional module was instrumental in increasing knowledge of post-myocardial infarction rehabilitation. The results of this study highlight the need for continuing education of

nurses in cardiac rehabilitation. Self-instructional modules are a useful tool for furthering nurse education [4]. Thus the present review focus mainly in the Percutaneous Transluminal Coronary Angioplasty and related complications, rehabilitation along with the Self-instructional modules, which may help the patients to improve the quality of life.

1. Percutaneous transluminal coronary angioplasty (PTCA): what we know yet?

The past few decades were busy with the discovery and finding reasonable solutions for problems and complications along with possible rehabilitation ways for patients suffering from Percutaneous Transluminal Coronary Angioplasty (PTCA). In late 90s i.e., 1977 the Gruentzig introduced PTCA the specific and revolutionary explanation. The percutaneous transluminal coronary angioplasty is a relatively new form of treatment for coronary artery stenosis. The selection of patients and the indications have evolved over the last seven years. 2' 3 For some patients with coronary artery disease, it has become the treatment of choice, and for others, an equal alternative to coronary artery bypass surgery (CABG) [1].

Atherosclerosis is a disease of the arteries and culprit is cholesterol and fatty deposits build up on the walls of the arteries, which restricts blood flow and causes obstruction. Such serious steps, when this build-up happens in the heart, it may lead to a heart attack. Generally the lifestyle changes and medications can be used to treat atherosclerosis. If they are not enough, an angioplasty may be done [3]. Further, the possible complications are (if you are planning to have an angioplasty), your doctor will review a list of possible complications, which may include., bleeding at the point of catheter insertion, damage to the walls of arteries, causing you to need more procedures or surgery, heart attack or abnormal heart beats called arrhythmia, allergic reaction to x-ray dye, blood clots, infection, stroke and temporary kidney failure. Some other factors that may increase the risk of complications include: allergies to medications, shellfish, or x-ray dye, obesity, smoking, bleeding disorder, increased age, recent pneumonia, recent heart attack, diabetes and kidney disease This procedure is done electively after a diagnostic coronary angiogram showing lesions amenable to percutaneous transluminal coronary angioplasty (PTCA) [5]. Moreover, the basic approach is similar to a routine heart catheterisation. In most instances, a femoral route is used, although a brachial approach can be used if necessary. After full heparinisation, a preshaped guiding catheter is introduced retrogradely and placed at the coronary ostium; the aortic pressure is measured through this catheter. A dilator Marquis of the Division of Cardiology, catheter is inserted through the guiding catheter. This catheter has a double lumen and an inflatable balloon at the tip. The length of the balloon is 2,5 cm and the inflated diameter varies between 2,0 and 4,2 mm, the usual size used being 3,0 mm [5].

2. Complications after Percutaneous Transluminal Coronary Angioplasty (PTCA):

PTCA is a major event and may be associated with complications. In following up this complicated process the various complications may observed in patients during and after the process. Since decade the various scientists focus on the PTCA and related complication. In one study, the results of follow-up angiography in patients from 27 clinical centers enrolled in the PTCA Registry were analyzed to evaluate restenosis after PTCA. Of 665 patients with successful PTCA, 557 (84%) had follow-up angiography (median follow-up 188 days). Restenosis, defined as an increase of at least 30% from the immediate post-PTCA stenosis to the follow-up stenosis or a loss of at least 50% of the gain achieved at PTCA, was seen in 187 patients (33.6%). The incidence of restenosis in patients who underwent follow-up angiography was highest within the first 5 months after PTCA. Restenosis was found in 56% of patients with definite or probable angina after PTCA and in 14% of patients without angina after PTCA. Twenty-four percent of patients with restenosis did not have either definite or probable angina. Multivariate analysis selected 4 factors associated with increased rate of restenosis: male sex, PTCA of bypass graft stenosis, severity of angina before PTCA and no history of MI before PTCA [6].

Further, the problems and complications related to PTCAs are well discussed between 1981 and 1990, 714 patients underwent 756 percutaneous transluminal coronary angioplasty (PTCA) procedures. A total of 52 patients (6.9%) had major in-hospital complications: 5 patients (0.66%) died, Q-wave or non Q-wave myocardial infarction were observed in 13 patients (1.66%) during procedure and in 8 (1%) outside the catheterization laboratory, before discharge. Because of per procedural occlusion 11 patients (1.5%) were managed with bypass surgery, 8 (1%) had a transient occlusion that was reopened with PTCA. 21 patients (2.8%) were not re-dilated but managed pharmacologically. Dissection, intracoronary thrombus and previous thrombolytic treatment were often associated with occlusion. The risk of dissection was related to lesion morphology. Long-(more than 1 cm) lesion, eccentric stenosis and tortuosity of the vessel segment undergoing dilatation were risk factors for occlusive dissection. There was a high risk of side branch occlusion if its take-off was narrowed and side branch originated from the target lesion. One of the most important risk predictors is the amount of jeopardized myocardium supplied by the target coronary artery. Acute closure of an artery supplying large amount of myocardium may cause abrupt hemodynamic collapse. Hypotension secondary to the artery occlusion may cause a decrease of the flow in the other coronary arteries, leading to cardiogenic shock. Although it is important to note that patients with unstable angina, intracoronary thrombus, long and complex lesion, severe multivessel disease and compromised left ventricular function are at higher risk of acute complication, PTCA is a relatively safe procedure. [7]. In addition to this, Health care providers are under increasing pressure to combine

diagnostic and interventional coronary procedures to reduce costs. However, the risk associated with combined procedures has not been rigorously assessed. The serious complications are revealed by Kimmel et al., 1997, and a multicenter cohort study of 35,700 patients undergoing elective PTCA from 1992 through 1995 was performed to determine the risk of major complications (myocardial infarction, emergency coronary artery bypass graft surgery or death) from combined relative to staged procedures (i.e., performing PTCA at a session subsequent to diagnostic catheterization). Combining PTCA with diagnostic catheterization appears to be safe in many patients. However, several subgroups of patients may be at increased risk. Careful patient selection will most likely remain critical to ensuring the safety of combined procedures [8].

3. Percutaneous Transluminal Coronary Angioplasty: Rehabilitation

As limited information is available on the usefulness of exercise and rehabilitation programs in PTCA. Further**,** supervised exercise cardiac rehabilitation programs have been suggested to all patients specially patients with post-myocardial infarction (MI) for many years. This was a semi-experimental randomized study. It included seventy two (35 cases, 37 controls) post-MI patients aged 40 to 67 years. They were randomly selected from those with MI based on WHO criteria that were referred to cardiac rehabilitation unit of Isfahan Shahid Chamran cardiovascular research center. After initial measurements including weight, height, functional capacity, diastolic blood pressure (DBP) and systolic blood pressure (SBP) in both resting and exercise states, patients were randomized into either the training group (n=35) or the control group (n =37). The training group had supervised aerobic training program, three times a week, with 60–70% of the maximal heart rate (HR) reserve for two months. After the training program was completed, all measurements were repeated in both groups. Data were analyzed using one-way analysis of variance (ANOVA) with repeated measures. The results from the study showed that a 2-month exercise rehabilitation program in post-MI patients is useful for improving both blood pressure and exercise capacity and should be encouraged more commonly [9]. Several studies on employment patterns after coronary artery bypass surgery (CABS) or percutaneous transluminal coronary angioplasty (PTCA) have recently appeared. Johnson et al. (1982) reported on 2229 consecutive male CABS patients. They found that in younger patients' employment before and after CABS was equal. In older patients accelerated retirement with CABS became evident. The fraction of patients working without limitation, however, was increased by 20% after CABS. Almeida et al. (1983) gathered data on 2284 consecutive patients. They found that 66% of patients either working at the time of CABS or having discontinued work because of cardiac symptoms returned to work. Danchin et al. (1983) found no improvement in employment after CABS compared to medical treatment in 76 male patients randomly assigned to either therapy [10]. The study on home-based versus centre-based cardiac rehabilitation gives details idea about **t**he burden of cardiovascular disease world-wide is one of great concern to patients and health care agencies alike. Traditionally centre-based cardiac rehabilitation (CR) programmes are offered to individuals after cardiac events to aid recovery and prevent further cardiac illness. Home-based cardiac rehabilitation programmes have been introduced in an attempt to widen access and participation. The effectiveness of home-based cardiac rehabilitation programmes were compared with supervised centre-based cardiac rehabilitation on mortality and morbidity, health-related quality of life and modifiable cardiac risk factors in patients with coronary heart disease is measure. The updated search of a previous review was done by searching the Cochrane Central Register of Controlled Trials (CENTRAL) in The Cochrane Library (2007, Issue 4), MEDLINE, EMBASE and CINAHL from 2001 to January 2008. Reference lists were checked and sought advice was sought from experts. No language restrictions were applied. Randomized controlled trials (RCTs) that compared centre-based cardiac rehabilitation (e.g. hospital, gymnasium, sports centre) with home-based programmers, in adults with myocardial infarction, angina, heart failure or who had undergone revascularisation. Studies were selected independently by two reviewers, and data extracted by a single reviewer and checked by a second one. Home- and centre-based cardiac rehabilitation appeared to be equally effective in improving the clinical and health-related quality of life outcomes in acute MI and re - vascularisation patients. This finding, together with an absence of evidence of difference in healthcare costs between the two approaches, would support the extension of home-based cardiac rehabilitation programmes such as the Heart Manual to give patients a choice in line with their preferences, which may have an impact on uptake of cardiac rehabilitation in the individual case [11]. In addition to this, the study of Home-based versus centre-based cardiac rehabilitation discussed as cardiovascular disease is the most common cause of death globally.

Traditionally, centre-based cardiac rehabilitation programmes are offered to individuals after cardiac events to aid recovery and prevent further cardiac illness. Home-based cardiac rehabilitation programmes have been introduced in an attempt to widen access and participation. This is an update of a review originally published in 2009. The study compared the effect of home-based and supervised centre-based cardiac rehabilitation on mortality and morbidity, health-related quality of life, and modifiable cardiac risk factors in patients with heart disease. To update searches from the previous Cochrane review, we searched the Cochrane Central Register of Controlled Trials (CENTRAL, the Cochrane Library, Issue 9, 2014), MEDLINE (Ovid, 1946 to October week 1 2014), EMBASE (Ovid, 1980 to 2014 week 41), PsycINFO (Ovid, 1806 to October week 2 2014), and CINAHL (EBSCO, to October 2014). Reference lists were checked lists of included trials and recent systematic reviews. No language restrictions were applied.

Randomised controlled trials (RCTs) that compared centre-based cardiac rehabilitation (e.g. hospital, gymnasium, sports centre) with home-based programmes in adults with myocardial infarction (MI), angina, heart failure or who had undergone revascularisation. Two authors independently assessed the eligibility of the identified trials and data were extracted by a single author and checked by a second. Authors were contacted where possible to obtain missing information. This updated review supports the conclusions of the previous version of this review that home- and centre-based forms of cardiac rehabilitation seem to be equally effective for improving the clinical and health-related quality of life outcomes in low risk patients after MI or revascularisation, or with heart failure. This finding, together with the absence of evidence of important differences in healthcare costs between the two approaches, supports the continued expansion of evidence-based, home-based cardiac rehabilitation programmes. The choice of participating in a more traditional and supervised centre-based programme or a home-based programme should reflect the preference of the individual patient. Further data are needed to determine whether the effects of home- and centre-based cardiac rehabilitation reported in these short-term trials can be confirmed in the longer term. A number of studies failed to give sufficient detail to assess their risk of bias [12].

4. Percutaneous Transluminal Coronary Angioplasty (PTCA): Self-instructional modules (SIMs)

Percutaneous Transluminal Coronary Angioplasty (PTCA) is the most common procedure done for the treatment of coronary artery disease.

The post-PTCA care is equally necessary to prevent the further complications. Care at home should be effective of which the sensitization should be done before discharge of the patient from the hospital. However, a very few studies were conducted on this aspects. Especially many Indian studies have not been carried on this aspect. A study was conducted by the author to evaluate the effectiveness of Self Instructional Module (SIM) on knowledge regarding post PTCA home care among fifty patients in the selected hospitals of Navi-Mumbai. The findings showed that in post test 10% of the patients had excellent level of knowledge, 58% of them had very good, 30 % of the patients had good knowledge, 02% of the patients had average knowledge score. Thus, it was concluded that self instructional module (SIM) on post PTCA home care among patients was found to be effective. It can be concluded that the self instructional module (SIM) helped the patients to improve their knowledge about post PTCA home care. Also analysis revealed a very high association between knowledge score with age, gender, education, occupation and income [13]. A quasi experimental study with one group pretest and posttest without control group design was undertaken in Vinayaka Missions Hospital, Salem to assess the effectiveness of self instructional module regarding emergency management of patient with myocardial infarction on knowledge among staff nurses Data was collected from 98 staff nurses selected by convenient sampling technique using closed ended questionnaire from 19.09.2009 to 02.10.2009. Data was analyzed by using descriptive and inferential statistics. Demographic characteristic reveals that the highest percentage (69%) of the staff nurses were in the age group of 21-25 years, were females (74%) were having B.Sc. nursing degree (80%). Highest percentage were having 3-4 yrs years of experience (69%), were working emergency unit (3%), ICU (20%), and general ward(29%) and other wards (48%) and did not attend in-service program (93%). The overall pretest mean score 22.06+1.92 which is 48% whereas in the post test the mean score (30.04+2.82) which is 65% of the total score with an overall difference of 17% of pretest score reveals good knowledge. Highly significant difference found between the pretest and posttest knowledge score ($P<0.01$) but no significant association was found between the posttest knowledge score when compared with the demographic variables of staff nurses ($P<0.05$) [14]. Nurses play a strong role in helping patients reduce their risk for disease and make informed lifestyle changes. Reliability of the nurses is critical for them to serve as role models and educators. The aim of the present study was to improve nurse knowledge of post-myocardial infarction rehabilitation at selected hospitals in Navi Mumbai through a newly designed self-instructional module. Sixty cardiac center staff nurses were administered a questionnaire, a pre-test on cardiac care and the self-instructional module. Five days after the nurses were administered the module, a post-test was given to assess the gain in knowledge on in post-myocardial infarction cardiac rehabilitation. The results of this study highlight the need for continuing education of nurses in cardiac rehabilitation. Self-instructional modules are a useful tool for furthering nurse education [4].

Conclusion

This kind of review tried to enlighten on the various aspects of Percutaneous Transluminal Coronary Angioplasty and related complications. However, rehabilitation with the use of Self-instructional modules (SIM) probably will help the patients to improve knowledge regarding home care and subsequent improvement in quality of life.

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