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PREVALENCE AND ASSOCIATED RISK FACTORS OF ADHESIVE CAPSULITIS IN POST CARDIAC SURGERY PATIENTS

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Contribution

WAA conceived the idea and designed the study. AA, SK and RK did data collection and manuscript writing. AA and MQ did final review. All authors contributed equally to the submitted manuscript.

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ABSTRACT

Objectives: To find prevalence and associated risk factors of adhesive capsulitis in post cardiac surgery patients

Methodology: This cross-sectional survey was conducted in Surgical OPD of Armed forces Institute of Cardiology and National institute of heart diseases Rawalpindi (AFIC/NIHD). from May 2016 to June 2017. Non probability convenience sampling technique was used to collect data from both the male and female participants undergone cardiac surgery between 3-6 months, coming for follow up with age above 40 years. Semi structured questionnaire regarding risk factors was used to collect data. For association chi-square test was used.

Results: The total of 300 patients were included. The mean age of the study participants was 55.78±7.27 years. The prevalence of the adhesive capsulitis among cardiac surgery patient was found in 87(29%). The results also showed that age (X^2=20.29, p<0.001), gender(X^2=66.48, p<0.001), diabetes (X^2=74.89, p<0.001), shoulder immobility after surgery (X^2=11.99, p<0.001) and physical activity in study participants before surgery was also significantly associated (X^2=46.8, p<0.001) with adhesive capsulitis.

Conclusion: The study concluded that adhesive capsulitis (AC) is highly prevalent in post cardiac surgery patients. It was also concluded increasing age, diabetes, female gender, longer duration of immobility of shoulder and inactivity before surgery significantly contribute in the prevalence of AC in post cardiac surgery patients.

Key Words: Frozen shoulder, adhesive capsulitis, diabetes, cardiac surgery.

INTRODUCTION

Open heart surgery is considered one of most painful surgical procedure in which post operative pain lasts for months.[1] Without proper shoulder function, multiple functional tasks involving mobility, ambulation, and activities of daily living become difficult.[2] Cardiac surgery can lead to shoulder dysfunction because of inability to perform activities freely, incorrect positioning, muscles division during surgery and rib spreading. Some patients suffer from stroke during cardiac surgery; this factor can also be responsible for shoulder immobility. Immobilizing a joint seems to trigger the auto immune response resulting in adhesive capsulitis (AC).[3]

Patients with many cardiac diseases and cardiac surgery had higher incidence of frozen shoulder, than in the general population. In a study the incidence of adhesive capsulitis was 33% among the male patients after cardiac surgery.[4] Presence of adhesive capsulitis after cardiac surgery is not surprising, valve replacement, CABG or other surgeries involve sewing sternum, invasion of visceral tissues and muscles and retraction of ribs resulting in impingement of pain sensitive structures and immobility of shoulder and thus may lead to adhesive capsulitis.[5] Precise etiology is unclear but different theories suggested that there are many secondary causes like fractured ribs, musculoskeletal trauma during surgery, sternal non union, separation of costal cartilages from sternum, presence of sternal wires causing pressure and wound infection are responsible for shoulder immobility after cardiac surgery and thus causing adhesive capsulitis.[5,6] Immobilizing shoulder joint after open heart surgery due to fear of pain or wound care lead to adhesive capsulitis.[7,8]

There was limited literature available on prevalence and risk factors of adhesive capsulitis in patients with cardiac surgery. The disabling effect of cardiac surgery on shoulder function and complication are commonly overlooked, that further decreases quality of life (QOL) by restricting activities of living. Awareness about risk factors would help in earlyprevention from developing AC and thus minimizing its negative effect on QOL. The purpose of this study was to find out the prevalence and associated risk factors of adhesive capsulitis in patients undergoing cardiac surgery in Pakistan.

METHODOLOGY

This cross-sectional survey was conducted in Surgical OPD of Armed forces institute of cardiology and National institute of heart diseases Rawalpindi (AFIC/NIHD) for 1 year (May 2016 to June 2017) after approval of ethical committee. Non probability convenience sampling technique was used to collect data from both the male and female participants who underwent cardiac surgery at least 6 months before, coming for follow up with age above 40 years. Participants with previous history of adhesive capsulitis, Parkinson's disease, arthritis, stroke and thyroid issue were excluded. While conducting research ethical guidelines declaration of Helenski and Pakistan Medical research Council (PMRC) was observed. Prior recruitment, written Informed consent was obtained from all the study participants. The diagnose AC was made on the basis of limited AROM & PROM of shoulder joint. Structured questionnaire regarding risk factors was prepared from the literature data collection.

Mean±SD were used for continuous variable and n(%) for categorical variables. For association chi-square test was used and level of significance was set $p \leq 0.05$. SPSS version 21 was used for data analysis.

RESULTS

Total 300 patients were included. The mean age of the study participants was 55.78±7.27 years. The prevalence of the adhesive capsulitis among cardiac surgery patient was found n=87(29%). (Figure 1) It was shown that out of n=300, n=229 (76.33%) underwent CABG, n=37(12.33%) underwent MVR, n=9(3.01%) had ASD closure, n=25(8.33%) DVR surgeries. Frequency distribution of risk factors associated with adhesive capsulitis after cardiac surgery is shown in table 1. The results showed age(X^2=20.29, p<0.001), female gender(X^2=66.48, p<0.001), diabetes (X^2=74.89, p<0.001) was significantly associated with development of AC in post cardiac surgery patients. It was also found that patients those were instructed by surgeon to keep their shoulder immobile for the period of 1, 2 & 4 weeks was significantly associated (X^2=11.99, p<0.001) with AC. Lack of physical activity in study participants before surgery was also significantly associated (X^2=46.8, p<0.001) with adhesive capsulitis. Duration of stay at hospital after surgery(X^2=4.59, p=0.100), history of trauma to shoulder joint before surgery (X^2=0.41, p=0.52) and following physical therapist's instructions after surgery(X^2=3.57, p=0.058) were not significantly associated with adhesive capsulitis after cardiac surgery (Table 1).

Figure 1: Prevalence of Adhesive Capsulitis in Post Cardiac Surgery Patients (n=300)

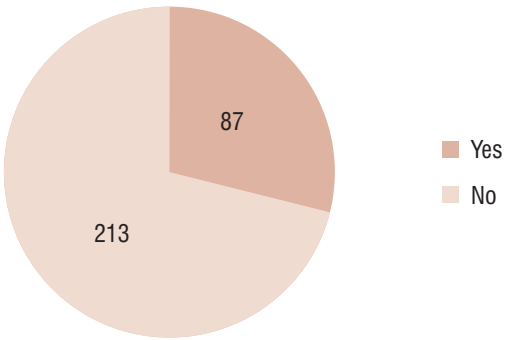

Table 1: Risk Factors Associated with Adhesive Capsulitis After Cardiac Surgery (n=300)

			Adhesive capsulitis		X^2	P-value
			n=87(29%) Yes	n=213(71%) No		
		n(%)	n(%)	n(%)		
Age (Category)	41-50 51-60 61-70	98(32.67%) 134 (44.67%) 68(22.66%)	13(4.33%) 44 (14.67%) 30(10%)	85(28.33%) 90(30%) 38(12.67%)	20.29	<0.001
Gender	Male Female	225(75%) 75(25%)	37(12.33%) 50(16.67%)	188(62.67%) 25(8.33)	66.48	<0.001
Diabetes	Yes No	71 (23.67%) 229 (76.33%)	50(16.67%) 37(12.33%)	21(7%) 192(64%)	74.89	<0.001
Duration of shoulder immobility after surgery	1 week 2 weeks 4 weeks	12 (04%) 76 (25.3%) 212 (70.7%)	2(0.67%) 34(11.33) 51(17%)	10(3.33) 42(14%) 161(53.67%)	11.99	<0.001
Duration of Hospital stay after surgery	<10 days 11-20 days >20 days	163 (54%) 89 (30%). 48(16%)	46(15.33%) 32(10.67%) 9(3%)	117(39%) 57(19%) 39(13%)	4.59	0.100
Physical active before surgery	Yes No	212 (70.67%) 88 (29.33%)	37(12.33%) 50(16.67%)	175(58.33%) 38(12.67)	46.8	<0.001
Previous H/O trauma to shoulder joint	Yes No	39 (13%) 261 (87%)	13(4.33%) 74(24.67%)	26(8.67%) 187(62.33%)	0.41	0.52
Followed instruction of physical therapist after surgery	Yes No	62 (20.7%) 238 (79.3%)	24(8%) 63(21%)	38(12.67%) 175(58.33%)	3.58	0.058

DISCUSSION

The objective of the study was to find out prevalence of adhesive capsulitis (AC) and its associated risk factors in post cardiac surgery patients. The results of the study showed that AC is 29% prevalent in post cardiac surgery patients. A study was conducted in Dhaka, Bangladesh to find prevalence of AC among patients undergoing cardiac surgery. It was found that 35% patients developed AC after cardiac surgery.[7]

In literature prevalence of AC in post cardiac is very limited but in thoracotomy, shoulder dysfunction occurs in 10-26% of the patients following first year of surgery.[9] After thoracotomy, in early postoperative period commonly occurring complication is Shoulder dysfunction.[10] Studies reported that 15-33% patients still experienced subjective restriction of ipsilateral shoulder function after more than 1 year of thoracotomy.[9,10]

AC is more prevalent in sixth decade of life.[11] In current study it was found that older patients developed AC as compare to young after cardiac surgery. A study conducted in Dhaka also reported that AC is significantly associated (X^2=12.71, p,0.001) with older patients (≥60 years) than young patients (<60 years).[7]

Current study showed that gender has significant association with AC in post cardiac surgery patients, and females were more prone to develop AC than males. A study contradicted the results of current study that showed incidence of AC in post cardiac surgery patients was more in male patients than female.[7] Tuten et al. conducted a study on only males to explore incidence of Adhesive capsulitis in post cardiac surgery patients and found that 33% male patients developed AC after surgery.[4]

The current study also showed significant association between AC and diabetes in post cardiac surgery patients. In diabetic patient increased glycosylation leads to accumulation of protein molecules that cross linkages may cause joint stiffness.[12] In the presence of diabetes along with lack of mobility of shoulder further contribute in AC.[2,12]

It was also observed in present study immobility of shoulder joint after cardiac surgery advised by surgeon for 1-4 weeks significantly associated AC. Postoperative shoulder dysfunction after immobility may be caused by improper positioning of the patient, muscle division, injury to the long thoracic nerve, and postoperative pain.[13-15]

Present study shows that AC was also significantly associated with lack of physical activity before surgery in post surgery patients. One study conducted in physiotherapy department of

PrinceHashim Military Hospital Jordan in 2006 reported that majority of the affected individuals had sedentary life style at the time of the sickness and patients with diabetes mellitus were at a particular risk for having AC.[16]

Adapting active life style, performing certain amount of overhead activity and shoulder exercises after cardiac surgery, control of blood sugar level, blood pressure and avoidance of complete immobility of the shoulder after surgery can prevent AC. Reasons for AC after cardiac surgery could be lack of awareness, education and collaboration with surgeons. There might be lack of proper physical therapy guidelines to prevent AC.[17]

Current study also showed that previous history of trauma to shoulder joint was not significantly associated with AC in post cardiac surgery patients. But literature support that history of shoulder trauma was found to be a risk factors of adhesive capsulitis.[18]

There were certain limitations in the study that could influence the results including single centered study with low sample size. The study design was cross-sectional survey in which only association was measured and odd ratio/relative risk were missing so true relationship is difficult to establish.

CONCLUSION

Adhesive capsulitis (AC) is highly prevalent (29%) in post cardiac surgery patients. It was also concluded increasing age, diabetes, female gender, longer duration of immobility of shoulder and inactivity before surgery significantly contribute in the prevalence of AC in post cardiac surgery patients.

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