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Research Article

CLINICAL OUTCOME AND INCIDENCE OF PLEURAL EFFUSION IN POST CABG PATIENTS

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Abstract:

Introduction: Pleural effusion usually occurs after CABG. This exudate is usually small and asymptomatic. Large symptomatic exudate is also visible, but in a small proportion of patients. Pleural effusion after CABG may be associated with significant morbidity and a long hospital stay. Early diagnosis and treatment can reduce the patient's morbidity and length of hospital stay.

Aim: The aim of the study is to determine risk factors and severity of pleural effusion in patients with post CABG.

Material and methods: The study was conducted in the ICU cardiac surgery department of Mayo Hospital Lahore for one year duration from January 2019 to January 2020. 100 patients were included in the study after inclusion criteria. The examination procedure was explained to the patient and informed consent was obtained. Demographic data, name, age, gender, details of surgical procedures, comorbidities such as COPD, PE and cigarettes were recorded in the attached form. Patients were kept for at least 7 days in cardiac surgery in the intensive care unit. CXR was evaluated for the presence and severity of pleural effusion. Daily CXR mornings were performed and examined by a specialist in a chest physician. CXR exudate size was classified as follows: small exudate received less than half of the chest, and large exudate took more than half of the chest. Possible risk factors for the development of pleural effusion in patients with posterior CABG have been recorded.

Results: After stroke with pleural effusion, the majority of 100 CABG patients (87%) are men. The mean age of patients was 54.42 ± 9.39 . In most patients (72%) pleurotomy was noted on the left side. LIMA collection was reported to the patient (88%). Most patients (83%) had pleural effusion on the left and 4 (13%) and bilateral pleural effusion on the right. A total of 100 patients (79%) had low pleural effusion (less than half of the chest) and (21%) symptomatic large pleural effusion (more than half of the chest). Every 100 patients (27%) needed pleural aspiration. Serum albumin levels decreased in more patients (90%).

Conclusion: Most patients after CABG showed slight left effusion. There was also a large, but small, pleural effusion. Effusion mainly causes respiratory symptoms requiring pleural aspiration. LIMA harvesting, pleurotomy and hypoalbuminemia are the main risk factors for pleural effusion in patients with after CABG.

Keywords: Left internal mammary artery, CABG = Coronary artery bypass grafting, ICU= Intensive care unit, CXR = Chest X-ray, EF = Ejection fraction, COPD =Chronic obstructive pulmonary disease.

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INTRODUCTION:

In the US, over 600,000 patients undergo coronary artery bypass graft (CABG) every year. Patients often develop pleural effusion that is directly related to this surgery, making this procedure one of the most common causes of pleural effusion. Within a week after CABG, the reported pleural effusion rate ranged from 41% to 87%. Most exudates are small, one-sided, left-sided, and asymptomatic¹⁻². These spills usually disappear gradually over several weeks. However, some patients undergoing CABG sometimes develop medium to large exudates that cause symptoms. Large pleural effusion occurs in the immediate postoperative period from 0.5% to 8.5%. Hurlbut et al. It is reported that 4 (4%) of the 100 patients who received internal mammary artery grafts developed moderately or heavily after surgery. Aarnio and his colleagues monitored the postoperative course of 200 patients receiving internal mammary artery transplants and found that 8.5% required thoracentesis while in hospital³. Despite the large number of predicted effusions developing after CABG, a large series did not identify these wealthy patients. In the perioperative period, there are two separate pleural effusions directly related to CABG: effusion resulting from atelectasis due to diaphragmatic dysfunction and hemorrhagic exudates due to internal mammary artery (IMA) removal. In addition, pleural effusion due to congestive heart failure may occur after CABG⁴⁻⁵. These pleural effusions are associated with various clinical features, pathophysiology, pleural fluid analysis (FP), management and sequelae. Pleural effusion resulting from diaphragmatic dysfunction is often diagnosed based on radiological appearance⁶.

The surgical technique used can affect the development of pleural effusion immediately after CABG in the postoperative period. IMA transplantation usually causes ipsilateral pleural effusion more often than saphenous vein transplantation (87% vs. 87% on day 6 after surgery). Other perioperative pleural effusions that are not directly related to coronary artery bypass grafting may be associated with congestive heart failure, pulmonary embolism and pneumonia. In patients after CABG, pleural effusion is observed in a significant number of patients. The population of Pakistan has not been studied too much⁷⁻⁸. This study aimed to assess patients at risk of pleural effusion and determine the severity of exudate requiring pleural aspiration. The results of this study will highlight patients at risk of pleural effusion and allow intensive care advisors / physiotherapists to intervene early to reduce patient morbidity and hospitalization after CABG.

MATERIAL AND METHODS:

The study was conducted in the ICU cardiac surgery department of Mayo Hospital Lahore for one year duration from January 2019 to January 2020, the study design was a cross-sectional identifier, and the sampling technique used was intentional and unlikely. The study included patients who had undergone CABG of both sexes and had pleural effusion. Patients without pleural effusion or documented pleural effusion prior to surgery for any reason such as renal failure, heart failure or respiratory failure were excluded from the study.

After fulfilling the inclusion criteria, 100 patients were enrolled in the study. The test procedure was explained to the patient and informed consent was obtained. Demographic data, name, age, gender, details of surgical procedures, comorbidities such as COPD, PE and cigarettes were recorded in the attached form. Patients were kept for at least 7 days in cardiac surgery in the intensive care unit. The presence and severity of pleural effusion was assessed in CXR. Daily CXR mornings were performed and examined by a specialist in a chest physician. The amount of exudate in CXR was classified as follows: small exudate occupied less than half of the chest, and large exudate occupied more than half of the chest. Possible risk factors for the development of pleural effusion in patients with posterior CABG were recorded, such as LIMA extraction, intact / open pleura, no pump / pump, procedure time, blood transfusion number and SVG number. The data were entered and analyzed using SPSS version 18.0 for Windows software. While all quantitative variables are expressed as mean and standard deviation (SD), frequencies, percentages and pie charts are qualitative variables (sex, DM, cigarette, no pump, outflow rate, shortness of breath, cough, ABG).

RESULTS:

The total sampling units included in this study were 100 (100.0%). The mean age of patients was 54.42 ± 9.39, of which 87 (87.0%) were male. DM was reported in 42 patients (42.0%). 37 (37.0%) were smokers. 27 (27.0%) had COPD. The LIMA collection was reported as 88 (88.0%). 4 patients (4.0%) underwent off pump surgery and 96 patients (96.0%) were operated with on pump. The number of blood transfusions ranged from 1-5. Most patients did not have 47 (47.0%). only 1 (1.0%) had 1 SVG. There was no left pleura in 72 patients (72.0%) on the left, 13 (13.0%) on both sides and 8 patients without open pleura. According to CXR 33 (33.0%), pleural effusion occurred on the left, only 1 had right exudate, and 8 had bilateral effusion on the third day (Table 1).

Table 1: Combined Pleural Effusion

	Right	Left	Both	No	Total
Day 3	1%	33%	8%	58%	100%
Day 5	2%	33%	4%	61%	100%
Day 7	1%	17%	1%	81%	100%
Total	4%	83%	13%		

On the left side 33 (33.0%) pleural effusion was found, 4 had bilateral pleural effusion, 2 had pleural effusion on the right side on the fifth day. On the left side there were 17 (17.0%) pleural effusions, 1 had bilateral and right effusions on the seventh day. Overall, figures showed that 4% of patients had pleural effusion on the right, 83% on the left, and bilateral pleural effusion. Because of this, most patients developed pleural effusion on the left after CABG. In 79 (79.0%) patients' pleural effusion was less than half of the chest, while in 21 (21.0%) it was greater than half of the chest (Table 2).

Table 2: Size of Pleural Effusion

Size of Pleural Effusion	Frequency	Percent
Less than mid chest	79	79.0
More than mid chest	21	21.0
Total	100	100.0

Left Mild Pleural Effusion**Right Moderate Effusion**



Although aspiration was only required in 27 (27.0%) patients, 73 (73.0%) was not required in most patients. Patients requiring exudative aspiration had the following problems: 27 (27.0%) shortness of breath, cough 9 (9.0%), ABGs abnormality 18 (18.0%), 10 (10.0%) atelectasis. Postoperative aspiration was reported on the seventh day after surgery, postoperative aspiration 6 (6.0%), 3 (3.0%) on days 5, 8, 10 and 13. Most 72 patients (72.0%) had no pleural aspiration anywhere. Five (5.0%) had aspiration on the right and only 1 had bilateral

aspiration. One patient (1.0%) sucked 2400 ml, but most patients did not aspirate 74 (74.0%). Pre-operative EF 70 (70.0%) patients were normal, but on the seventh day after surgery 29 (29.0%) had poor EF.

DISCUSSION:

In the US, over 600,000 patients undergo coronary artery bypass graft (CABG) every year. Patients often develop pleural effusion that is directly related to this surgery, making this procedure one of the most common causes of pleural effusion. This study shows the occurrence of small and large symptomatic pleural effusion in the first week in patients with CABG. In the week after CABG, pleural effusion was reported to be between 41% and 87%. Most exudates are small, one-sided, left-sided, and asymptomatic⁸⁻¹⁰. These spills usually disappear gradually over several weeks. However, some patients undergoing CABG sometimes develop medium to large exudates that cause symptoms. Large pleural effusion appears from 0.5% to 8.5% directly in the postoperative period. The incidence depends to some extent on the method used to detect pleural effusion¹¹⁻¹². This study shows that 83% of patients developed pleural effusion on the left in the first week of CABG, only 4% of patients experienced pleural effusion on the right, and 13% developed bilateral pleural effusion. 79% of 100 patients have symptomatic slight (less than half of the chest) exudation and are asymptomatic, and 21% have large (over half of the chest) symptomatic exudate comparable to previous studies¹³⁻¹⁴. Aarino et al. The frequency of pleural effusion was assessed in 50-75% of patients in the first week after CABG surgery. They also followed the postoperative course of 200 patients who received an IMA transplant and found that 8.5% required immediate thoracotomy after surgery. After 3 months, 20% of patients had pleural effusion, but only 1% required thoracotomy. Landy more and Howell¹³ reported that none of the 67 patients needed thoracotomy during 3 months of follow-up¹⁵. No features of pleural fluid were identified in any of the three studies. In our study, 27% of patients had atypical signs of pleural effusion such as cough, shortness of breath, atelectasis and ABG, and were treated with therapeutic toriodesis. Most patients (73%), despite conservative treatment by emphasizing anti-inflammatory agents, diuretics, non-invasive ventilation using a CPAP mask or deep breathing exercises (spirometry).

There are several factors associated with the development of pleural effusion after CABG. Some authors have found that pleural effusion is more common after the LIMA harvest. This may be due to a pleurotomy that allows the blood to get into the pleural cavity, or the LIMA extraction itself, which leaves the raw surface, which can be a source of serous fluid. This study also showed that 88% of the LIMA and open pleura collections were reported in 72% of patients. Regarding demography, the study showed that 87% were men and 13% women, and

the average age of pleural effusion in patients with CABG was 54.42 ± 9.39 . Observing co-morbidities such as EF%, the study highlighted that 71% of 100 patients had normal EF, only 29% were weak EF% after the first week of CABG. On the other hand, renal function tests (urea, creatinine) remained normal in most patients after CABG surgery, while serum albumin levels dropped significantly in most patients with CABG. Therefore, it has become clear that hypoalbuminemia can cause pleural effusion in patients with posterior CABG.

CONCLUSION:

As a result, the results of this study showed a high incidence of pleural effusion in the first week of CABG surgery. Most patients with CABG develop left sided pleural effusion (less than half of the chest). There is also a large size (over half of the chest) of pleural effusion, but in a small proportion of the population. Minor pleural effusion can be managed by anti-inflammatory agents, diuretics, non-invasive ventilation using a CPAP mask or by encouraging patients to perform deep breathing exercises, such as incentive spirometry. While large symptomatic effusion requires therapeutic thoracotomy. The most common risk factors for pleural effusion are LIMA harvesting, pleural opening and hypoalbuminemia. Early diagnosis and effective treatment can reduce the patient's morbidity and length of hospital stay after CABG.

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