COMPARISON OF SMALL VERSUS LARGE BORE CHEST DRAIN COMPLICATIONS IN THE MANAGEMENT OF MALIGNANT PLEURAL EFFUSION

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ABSTRACT

Background: A pleural effusion is defined as the accumulation of abnormal volumes of fluid in the pleural space. Malignancies contribute to 22% of pleural effusion. Chest tubes are used to drain air or fluid from pleural space. This study was conducted to compare complications of small versus large bore chest drain in the management of malignant pleural effusion.

Methods: this randomized controlled trial was conducted in the Pulmonology and Cardiology wards/OPD's of Khyber Teaching Hospital, Peshawar in which 80 patients were divided equally into two groups, A and B, by non-probability sampling and were subjected to Small Bore Chest Drain (SBCD) and Large Bore Chest Drain (SLBCD) for effusion drainage. All patients of either gender with malignant pleural effusion were included in the study. Patients with malignant effusion who were terminally ill or having bleeding diathesis, Immunocompomised, diabetics, benign pleural effusions, hydro pneumothorax and empyema were excluded. All patients with pleural effusion were subjected to pleural aspiration and pleural biopsy. Cytology and histopathology was done to diagnose malignant pleural effusion.

Results: Mean SD of Age for Group A (SBCD) was 44.90+15.55 and Mean SD of Age for Group B (LBCD) was recorded as 45.83+15.65. Out of 80 total patients 60 (75%) were male and 20(25%) were female. Overall complications of both groups were only 30% which included 2(5%) pain in Group A (SBCD) as compare with 6(15%) in Group B (LBCD). Drain blockage took place in 8 (20%) patients in Group A (SBCD) as compare with 2 (5%) in Group B (LBCD). Drain dislodgement was in 4 (10%) patients of Group A (SBCD) as compare to 2 (5%) in Group B (LBCD).

Conclusion: As small bore chest drains are easy to insert, less painful and have comparable complications to large bore chest drain, with frequent drain washing can be used in the management of malignant effusion. Small bore chest drain is well tolerated by patients.

Keywords: Malignant pleural effusion, chest drain.

INTRODUCTION

A pleural effusion is defined as the accumulation of abnormal volumes of fluid in the pleural space.[1,2] After the age of 60 years, malignant pleural effusion is the most frequent cause of exudative pleural effusion. This effusion is considered traditionally incurable and significantly alters quality of life. These patients have very poor prognosis with a short survival[3]. Malignant pleural effusions do occur in 15% of patients with advanced malignancies, and are about 22% of all pleural effusions[4]. Symptomatic pleural effusion is one of the most distressing manifestations of advanced malignancy. A number of treatment options are available for managing malignant pleural effusion. These include insertion of large bore chest tube with instillation of pleural sclerosing agent, placement of a pleuroperitoneal shunt, intermittent outpatient thoracentesis, and video-assisted thoracoscopy with instillation of talc and even thoracotomy and pleurectomy. Each modality has its advocates[5,6,7].

Chest tubes are used to drain air or fluid from pleural space[8]. Malignant pleural effusions are effectively managed by complete drainage of the effusion and instillation of a sclerosing agent to promote pleurodesis[9,10]. Chest tubes are hollow cylindrical plastic tubes with drainage side holes designed for placement within the pleural space[11].

Chest tubes are of two sizes i.e. large bore chest tubes and small bore chest tubes. Large-bore chest tubes are defined as 20 French (Fr) or greater in diameter and small-bore chest tubes are less than 20 Fr[12].

Large bore rather than small bore were traditionally used because they were thought to be less prone to obstruction by fibrin plugs[13]. Optimal treatment is still controversial[14]. Three randomized controlled studies comparing large-bore to small-bore chest tubes for pleurodesis, suggests that small-bore chest tubes are as efficacious as large-bore tubes[13]. The advantages

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of the small-bore chest drain are that they are easier to insert, and are of comparable efficacy to large-bore tubes in the management of malignant effusion and pneumothoraces[13]. Pain, intra-pleural infection, wound infection, drain dislodgement and drain blockage are the most common complications of a chest drain[14,15].

Overall complication rates are higher in small bore chest drains (36%) than with large-bore drains (9%). Drain blockage and dislodgement is common problem encountered in small bore chest drain as compared to large bore chest drain. Pain is more in large bore chest drain. In recent years, there has been a trend towards using small bore chest drains for drainage of malignant pleural effusions[16, 17].

The aim of the study is to compare the complications of small versus large bore chest drain in terms of pain, drain dislodgement and blockage. In our set up we still use large bore chest tube instead of international tendency to use small bore chest tube. Our study may be helpful to justify the use of small bore chest drain in the management of malignant pleural effusions in our setup.

MATERIAL AND METHODS

This randomized controlled trial was conducted in the Pulmonology and Cardiology wards/OPD's of Khyber Teaching Hospital, Peshawar from 20 October, 2015 to 25 April, 2016, in which 80 patients were divided equally into two groups, A and B, by non-probability sampling and were subjected to Small Bore Chest Drain (SBCD) and Large Bore Chest Drain (SLBCD) for effusion drainage. The sample size was calculated using the WHO software for sample size determination in health studies by using the following parameters: 1. Complications of small bore chest drain (36%) 2. Complications of large bore chest drain (9%), with 5% Significance level and 90% Power of test. All patients of either gender, aged 18-65 years with malignant pleural effusion were included in the study. Patients with malignant effusion who were terminally ill or having bleeding diathesis, Immunocompomised, diabetics, benign pleural effusions, hydro pneumothorax and empyema were excluded.

All patients with malignant pleural effusion (diagnosed on the basis of pleural fluid cytology and biopsy/ histopathology) presenting to pulmonology/cardiology wards/OPD were enrolled as per criteria after taking a written informed consent. All patients were admitted in pulmonology department and were randomly allocated through lottery method into two groups, group A was subjected to small and group B to large bore chest drain. All drains were passed by experienced post graduate trainee of 3rd year. Drains were washed twice daily. The patients in both groups were assessed for post tube insertion pain, tube dislodgement and blockage. Pain was calculated according to numerical pain rating scale, scores >3 were taken as painful.

Statistical analyses were carried out with on SPSS version 16.0. Mean ± standard deviation (SD) was calculated for continuous variables like age. Frequency and percentages were presented for all qualitative variables (sex, tube dislodgement, pain and blockage).

RESULTS

Out of 80 total patients 60 (75%) were male and 20(25%) were female. 32 (40%) male were in Group A and 28(35%) were in Group B. Similarly 8 (10%) females were in Group A and 12(15%) were in Group B (Fig 1). Mean SD of Age for Group A (SBCD) was 44.90±15.55 and Mean SD of Age for Group B (LBCD) was recorded as 45.83±15.65. The procedure as a whole was well tolerated in both Groups. There was no single death reported during this study. There is no case of haemothorax or significant bleeding. Complications rate in both Groups was 30%. Pain in Group A (SBCD) was recorded in 2 (5%) patients while in Group B (LBCD) it is recorded in 6 (15%) patients. Drain blockage took place in 8(20%) patients in Group A (SBCD) as compare with 2 (5%) in Group B (LBCD). In group A (SBCD), Drain dislodgement was noticed in 4 (10%) of patients while it is noticed only in 2(5%) of patients in group B (LBCD) (Fig 2). Complications rate as a whole was 14 (35%) in Group A (SBCD) as compare to 10 (25%) in Group B (LBCD) which is not significant.

Table 1: Gender distribution n= 80

Gender	Groups		Total
	SBCD	LBCD	
Male	32	28	60
	40%	35%	75%
Female	8	12	20
	10%	15%	25%
Total	40	40	80
	100%	100%	100%

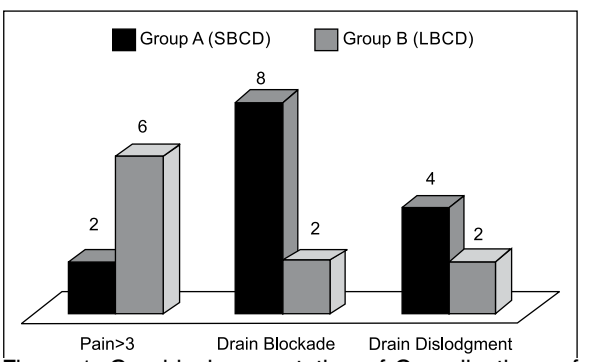

Figure 1: Graphical presentation of Complications of SBCD and LBCD

DISCUSSION

The development of malignant pleural effusion is poor prognostic factor. Recurrent pleural effusion

can cause severe debilitating symptoms and impaired quality of life[18]. Treatment of malignant pleural effusion is palliative and therefore, should be associated.

With a low morbidity and mortality rate. Treatment options are variable and findings in some reports however, have demonstrated small-bore catheters (8-10 Fr in one study & 7-24 Fr in another) are as effective as large chest tubes in the treatment of malignant effusions[18,19]. Interest in the use of small-bore catheters for effusion drainage and sclerotherapy is based on the premise that it may be less invasive as a procedure and thus better tolerated by patients compared to standard large bore chest tubes, with no Compromise in efficacy[20,21].

In this study, a controlled randomized study on 80 patients with malignant pleural effusion was done, they were divided into two groups; Group A (40 patients) used small bore chest tube and group B (40 patients) used a large-bore chest tube. Although male constituted about 75% of total study cohort but male and female distribution in the two groups was almost same. The two groups were comparable in their basic characteristics with no significant differences in ages, genders. Many studies[22,23-26] had compared the efficacy of small bore chest tube against standard large-bore chest tube and the results showed that the small bore chest tubes were at least as successful as the traditional large bore tubes.

In our study there is no casualty reported and as a whole the procedure was well tolerated and has a satisfactory response with minimal complications. This is in accordance with comparative study of small bore catheter versus traditional large chest tube in management of malignant pleural effusion by Sourour et al[27] and supported the role of small bore catheter in the management of malignant pleural effusion. In our study there is no reported case of haemothorax or excessive bleeding. This is supported by studies of Putnam et al.[28] Reinhold et al[29] and Gammie et al[30].

Drain dislodgement was high in 4 (10%) patients of Group A (SBCD) as compare to 2 (5%) in Group B (LBCD). This is almost similar to study by Abdel Maguid Ramadan, et al where 1 (6.6%) case of dislodgement was reported in Group A (SBCD) only[31]. This may be because of poorly securing the drain to the chest wall.

Pain was measured by numerical pain Rating Scale>3 (score from 0 to 10) post tube insertion. It was significantly high in Group B (LBCD) as compared to Group A (SBCD). In 6(15%) patients in group B pain was recorded as compared to 2(5%) patients in group A. This finding is observed in study by Najib M. Rahman et al[32] that demonstrates that smaller (12F) chest tubes are associated with less pain than larger (24F) tubes. Rahman NM et al[33] also described pain during chest tube insertion and while the tube was in place in 22/41 (54%) of patients with large bore tube (≥15 F), compared to only 21/77 (27%) of patients treated with small tube (<15 F). Analgesia in the form of NSAIDS was used to relieve the pain. Threshold of Pain perception of individuals should also be considered keeping in mind the difference in frequency of pain from our study.

Small-bore chest tubes appear to be at greater risk of blockage, kinking. Studies suggested that a blockage rate of small-bore tubes of 8.1% compared to 5.2% for large-bore tubes in a prospective (non-randomized) study[34]. In our study this ratio was 8(20%) and 2(5%) respectively. Chest tube quality, number of pores in it and intubation technique may contribute to this high rate of tube blockage in our setup.

Overall 14 (35%) complication were found in Group A (SBCD) as compare to 10 (25%) complications in Group B (LBCD). This satisfies our result with Light et al[13] that both small chest drains and large bore chest drains have comparable complications. Though complications were high in small bore chest drain 35% as compared to large bore chest drain 25% but most of complications i.e. 8(20%) in small bore chest drain were due to drain blockage which can be minimized with frequent drain washing. Thus small bore chest drains can be opted in the management of in the management of malignant pleural effusions in our setup.

CONCLUSION

Non-RCT data suggests that pleural infection may be successfully managed with small bore drains but it is unclear whether small bore chest tubes are as effective as larger drains for pleurodesis for malignant effusions. As small bore chest drains are easy to insert, less painful and have comparable complications to large bore chest drain, with frequent drain washing can be used in the management of malignant effusion. Small bore chest drain is well tolerated by patients.

STUDY LIMITATIONS

There was no standardization of timing and wash of the tube in this study that might led to manipulation of the study results.

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