IS CHEST TUBE CLAMPING NECESSARY BEFORE REMOVAL? AN EXPERIENCE WITH 2661 CASES OF TUBE THORACOSTOMIES

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ABSTRACT

Objective: The aim of this study was to evaluate outcome of chest tube removal without clamping and relying only on clinical or radiological status for removal.

Study Design: Retrospective descriptive study.

Place and Duration of Study: The study was conducted in CMH Rawalpindi over a period of four years.

Material and Methods: All patients of tube thoracostomies during Jan 2010 to Dec 2013 were included. Sample size was 2661. 1061 intubations were done for trauma, effusions and pneumothoraces, 905 in thoracostomies, 443 in VATS procedures like decortications, apical staplings, pleural biopsies and thymectomies and 252 in miscellaneous procedures such as open pleural biopsies, thoracoplasties and chest wall resections and reconstructions. Chest tube removal was based on absence of air bubbling in chest bottle, clinically or radiologically expanded lung, less than 6 cm excursion of column of chest tube and fluid output of <50ml (pus) and <100ml (clear fluid). It was ensured in all cases that chest tube was not blocked and all tubes were removed by a thoracic surgery trainee. Chest tube was not clamped in any patient before removal to see respiratory distress.

Results: Tube thoracostomies were performed in a vast variety of procedures. 1940 (72.9%) were males and 721 (27.1%) were females. Mean age was 37 years. In 1529 (57.4%) intubation was done on the right side. In 34 (1.27%) there was recurrent fluid collection. Recurrent pneumothorax was seen in 18 (0.67%) while tension pneumothorax was seen in 4 (0.15%). Collective complication rate was in 56 (2.1%). There was no mortality.

Conclusion: Current worldwide practice of clamping chest tube before removal to judge respiratory distress can be challenged by our study. Emphasis is laid on clinical judgment, absence of air leak and minimal excursion sign of well expanded lung before removal of chest tube.

Keywords: Chest Tube, Clamping, Pneumothorax, Thoracotomy.

INTRODUCTION

The large number of indications of chest intubation[1] makes it the commonest procedure performed in general thoracic surgery with the biggest question mark in the management of a chest tube is the timing of its removal. Whether it be done for traumatic hemothorax, pneumothorax or as a post-operative drain in elective surgery, it's removal possesses the possibility of lung collapse or fluid collection resulting in failure of treatment with reported complication rates of tube removal being 9-25%[2,8]. This potential risk makes the surgeon cautious in making a confident decision of removal of the chest tube. Since chest intubation is a lifesaving procedure, it is considered as a mandatory skill for different physicians including general surgeons, intensivists and emergency medical specialists worldwide[3], thereby necessitating the development of a standard algorithm for removal of chest tubes. Currently the most popular method incorporates the "clamping trial" before removal of a chest tube. The idea behind this concept is to simulate the conditions of tube removal and if complication

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occurs then it can simply be managed by unclamping the tube rather to put in another one. However the process of this trial is quite complicated and considering the logistic issues of developing countries like our own, we would like to share our experience of 2661 cases of chest tube removal without the clamping trial, along with review of the complication rates.

MATERIAL AND METHODS

This is a retrospective study of 2661 patients of tube thoracostomies in the department of Thoracic Surgery CMH Rawalpindi between January 2010 and December 2013. 1061 intubations were done for trauma, effusions and pneumothoraces, 905 in thoracotomies, 443 in VATS procedures like decortications, apical staplings, pleural biopsies and thymectomies and 252 in miscellaneous procedures such as open pleural biopsies, thoracoplasties and chest wall resections and reconstructions. Sampling technique employed was to include all such patients coming to thoracic surgery department and after assessment, required chest intubation or underwent surgical procedure in the end of which chest tube was placed in pleural space. There was no exclusion criterion and all chest intubations were included.

The decision for removal of chest tube was done by a consultant thoracic surgeon in all cases and based on absence of air leak even on forceful coughing for the last 24 hours, radiologically or clinically expanded lung, less than 6 cm excursion of the column and minimal drainage of fluid in the previous 24 hours (less than 50 ml for pus and less than 100 ml for clear fluid). None of the chest tubes was clamped before removal. Removal of the tube was carried out by resident surgeon in thoracic surgery and involved two persons. Tube patency was assured and the tube removed in full inspiration with a swift, smooth movement while simultaneous closure of the retained suture (fig-2). Clinical assessment of chest was done at the same place before and after removal of chest tube.

RESULTS

Total of 2661 patients had tube thoracostomies were included in the study. Tube thoracostomies were performed in a vast variety of procedures. 1061 intubations were done for trauma, effusions and pneumothoraces, 905 in thoracotomies, 443 in VATS procedures like decortications, apical staplings, pleural biopsies and thymectomies and 252 in miscellaneous procedures such as open pleural biopsies, thoracoplasties and chest wall resections and reconstructions 1940 (72.9%) were males and 721 (27.1%) were females. Mean age was 37 years. In

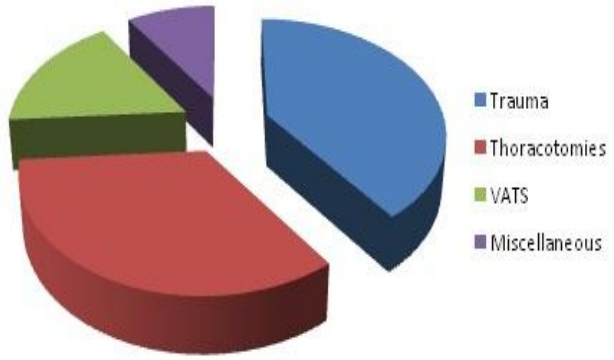

Figure-1: Distribution of chest tubes among all patients.

Figure-2: Removal of chest tube and closure of the retainied suture.

1529 (57.4%) intubation was done on the right side. In 34 (1.27%) there was recurrent fluid collection. Recurrent pneumothorax was seen in 18 (0.67%) while tension pneumothorax was seen in 4 (0.15%) which was successfully managed with reinsertion of chest tube. Collective

complication rate was in 56 (2.1%). There was no mortality.

DISCUSSION

The most common complication of premature tube removal is recurrent pneumothorax[4] with collapse of the lung which may progress to tension pneumothorax thereby, posing a threat to life. The second main complication is accumulation of fluid/pus which adds to morbidity and prolonged treatment. Unnecessary delay in chest tube removal may result in increase of infective complications, pain as well as increase in hospital stay[5].

The process of clamping trial begins with a chest x-ray after which the tube is clamped for 6-24 hours during which the patient is observed for respiratory distress. Another chest x-ray is obtained with the clamped tube and if there is satisfactory expansion of lung, the tube is removed. In developing countries the facility of x-ray is usually not available in the wards and the patients have to be sent to radiology departments which are usually already overbooked and the patients have to wait for long periods of time unaccompanied by a doctor. In addition the tubes have to be kept under strict observation during the clamping period which adds to the workload of the nursing staff that must be very vigilant in identifying respiratory distress. All these factors add to the morbidity and unnecessary delay in patient management.

Whether to clamp a chest tube before removal or not, remains a controversial matter[6]. A consensus statement from the American College of Chest Physicians (ACCP) showed that 59% physicians would clamp the chest tube prior to removal while 41% will not[7]. Although the current BTS guidelines do not favor clamping[8], there are strong supporters of this[2], due to the lethal complications associated with premature removal. Similarly other studies demonstrated no benefit of chest tube clamping prior to removal[9].
In this study the demographic data is comparable to other studies, the higher number of male patients is due to the large number of intubations in trauma cases in which males are more prone to traumatic events. We took fluid output less than 50 ml for pus and less than 100 ml for clear fluid in previous 24 hours as a criterion for removal, although studies demonstrate that tubes may safely be removed with outputs upto 200-450 ml per day[4,10]. For pneumothoraces it was ensured that there was no demonstrable air leak even on forceful coughing, which combined with <6 cm excursion of chest tube column and clinical and radiologically expanded lung, provided safety of tube removal.

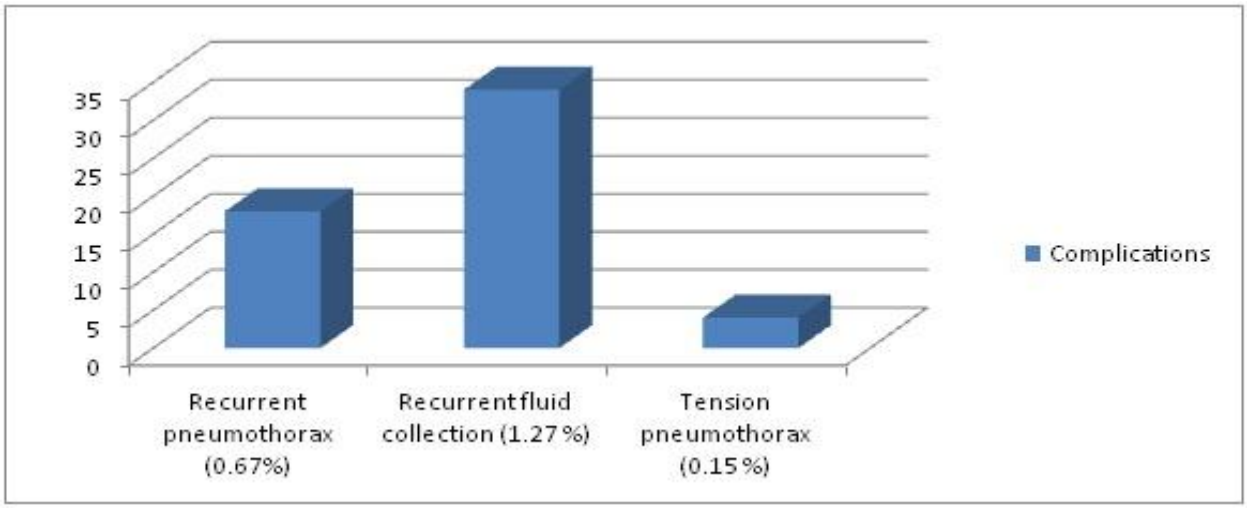

Figure-3: Description of complications among patients (n=56).

Published rates of recurrent pneumothoraces after tube removal range from 2-24%[2,11,12,13] which

in our study amounts to 0.67% which is considerably low. It can be attributed to the standardized method of removal in which meticulous attention was paid to avoid pneumothorax at the time of removal, which emphasizes that the procedure of tube removal should be given the same amount of importance as it is for insertion.

Similarly incidence of recurrent fluid collection after tube removal varies greatly as it depends on the etiology of the effusion and various rates have been published[14]. In our study it was comparable to others.

CONCLUSION

Given the absence of exclusion criteria in our study and the acceptable complication rates we would recommend relying on clinical assessment for chest tube removal as it reduces hospital costs and patient morbidity because the clamping trial results in unnecessary delays and adds to hospital costs which can be avoided in a developing country like our own.

CONFLICT OF INTEREST

This study has no conflict of interest to declare by any author.

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