

Unintentional Pleurotomy during Sternotomy: Prospective Randomized Study at Department of Cardiothoracic Surgery at Rajiv Gandhi Govt. General Hospital.

G. Joseph Raj¹, Pradeep Anand²

¹Director, Institute of Cardiovascular & Thoracic surgery, ²MCH Resident
Dept. of Cardiovascular & Thoracic Surgery,
Rajiv Gandhi Govt. General Hospital. & MMC. Chennai, Tamilnadu, India

Abstract

Sternotomy is the commonest access for cardiac surgeries and mediastinal surgeries. Many a times pleura is inadvertently opened during sternotomy, which may require chest tube insertion and added morbidity. To avoid accidental pleurotomy, various methods has been postulated to avoid the same. Commonest method being deflating Lungs before sternotomy. Delaying the sternotomy for a few seconds after Deflation of Lungs and whether it reduces accidental pleurotomy is to be studied. This is considered as the Lungs take a while to deflate after disconnection of circuit. Study was done among 100 patients who underwent sternotomy during the period of November 2018-November 2019. They were divided into three groups viz. A. Sternotomy with no Lung deflation. B. Sternotomy after five second of Lung deflation. C. Sternotomy after 10 seconds of Lung deflation. Data was collected, tabulated and analyzed.

Keywords: Sternotomy, Cardiac Surgeries, Mediastinal Surgeries, Deflation of Lungs

Introduction

Pleura consists of two layers Viz. Parietal and visceral. Visceral layer lines the Lungs and the former lines the costal, mediastinal and diaphragmatic surfaces of the thoracic cavity. Mediastinal pleura meets at the anterior border underneath the sternum and this does not correspond to the midline, but varies [1,2]. The right and left anterior border of the pleura meet at the sterna angle. At the 6th or 7th cartilage diverges to form the inferior border. The left pleura, after crossing the 6th or 7th costal cartilage, becomes more lateral. This lateral displacement of left anterior pleura between 4th and 6th cartilage is called cardiac notch [3]. Sternotomy was introduced by Milton as an access route for mediastinal structures and was popularized by Julian and colleagues for the cardiac surgeries compared to bilateral anterior thoracotomy done till 1957 [4]. Sternum can be divided using an electric/pneumatic saw, oscillating saw or b using a Gigli's wire [5]. Incidence of accidental pleurotomy during sternotomy varies in different studies ranging from 7% to 82% [6]. Guizilini et al noted poor pulmonary outcome in patients undergoing CABG using

LIMA in whom pleura was opened [10]. Lim et al noted that pleurotomy increased the rate of at lectas is but did not necessarily associate with an adverse outcome [8]. Atay et al in their study noted the blood loss and post operative blood requirements were higher in patients with pleurotomy [9]. Goskin I, Gullu et al, OZ BS et al, Pick A et al, Lichenstein SV et al, Ronday M et al, Stock MC et al all the studies discussed about pluerotomies during sternotomy and their disadvantages.

Aim of the study

1. To evaluate the practice of Lung deflation for reducing unintentional Pleurotomy during Sternotomy.
2. To evaluate whether delaying the sternotomy after Lung deflation reduces the rate of unintentional Pleurotomy.

Materials and Methods

A prospective randomized study conducted among patients who underwent Sternotomy, for cardiac or mediastinal procedures. With a sample size of 100, divided into three subsets with minimal sample size of 25 in each group. Group A- sternotomy without Lung deflation. B- sternotomy after 5 seconds of deflation. Group C -sternotomy after 10 seconds of deflation.

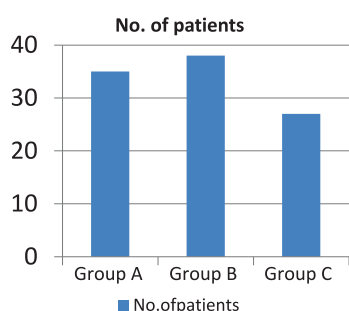
Patients undergoing re-sternotomy were excluded from the study.

Address for Correspondence

Dr. Pradeep Anand, Mch Resident, Dept. of Cardiovascular & Thoracic Surgery, Rajiv Gandhi Govt. General Hospital & MMC. Chennai, Tamilnadu, India
Mobile: +91 9884313989
E-Mail: Pradeeep111@yahoo.com

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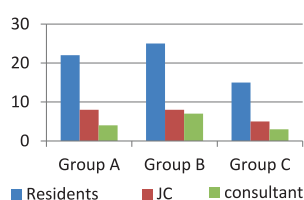
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Case distribution

Surgeries done via Sternotomy in our study

	Group A	Group B	Group C
MVR	10	13	12
AVR	2	4	3
DVR	2	2	2
Bentall	1	0	1
CABG	8	12	4
Myxoma	0	2	1
ASD, ICR	11	4	2
VSD, ICR	0	1	1
Med. mass	1	0	1
Total	35	38	27



Sternotomy done by surgeon

Incidence of pleurotomy among groups.

	Group A	Group B	Group C	Total
Pleurotomy	12 [34.3%]	20 [52.6%]	8 [29.6%]	41
No Pleurotomy	23 [65.7]	18 [47.4%]	19 [70.4%]	60
Total	35	38	27	100

Chi square 4.093, degree of freedom 2.

P value 0.13- not significant. Yates p value .22- not significant.

Results

Among the 100 cases taken up for study, group A had 35. B had 38 and C had 27 cases. Males constituted 58%, and females 42%. Valve replacement surgeries, Bypass grafting and ASD closure were the commonest surgeries performed through sternotomy among the 100 cases. Smoking/COPD was not found to be a contributor for causing unintentional pleurotomy. Sternotomies usually were performed from sterna notch downward 98 %, Xiphoid technique in 2% cases as sternotomy could not be done from above. Our study had 41 % incidence of unintentional pleurotomy, while the literature shows a wide range of 4-80%. The pluerotomies were 98 % on the right side and 2% on the left side.

Lichtenstein V et al study showed 92 % right pleurotomies. This one sidedness could be due to position of surgeon on the right or handedness of the surgeon or anterior attachment difference between right and left pleura. No deflation/5/10 second deflation had similar incidence of pleurotomy and did not confer any additional advantage. In our study, intercostals pleural drains were placed in about 80 % of cases, mediastinal drain in addition to intercostals drain was placed in few cases. Drain tubes were removed around 3-5 days post operatively. Prolonged air leak was noted in 1 patient Lung injury due to chest tube was found to be the reason. No patient required additional ventilatory support because of pleurotomy. Pain at the drain site was the commonest morbidity encountered.

Conflict of interest:	All authors declare no COI
Ethics:	There is no ethical violation as it is based on voluntary anonymous interviews
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Guarantor:	Dr. Pradeep Anand will act as guarantor of this article on behalf of all co-authors.

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