



THORACOTOMY: INDICATIONS, RESULTS AND OUTCOME IN TERMS OF PFT- A PROSPECTIVE STUDY.

CTVS

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ABSTRACT

Objective:-Thoracotomy is a common major surgical procedure. It is associated with high potential risk for postoperative pulmonary complications,.The aim of this prospective audit is to study the demographic and clinical characteristics of patients undergoing thoracotomy due to lung and pleural pathologies of various indications and to evaluate mortality, morbidity and assessment of outcome in terms of PFT.

Method: 60 patients were included in the study who underwent thoracotomy. Parameters studied were demographic and clinical characteristics , pre op PFT, post op morbidity, ICU stay, hospital stay and inhospital mortality , outcome and post operative PFT at 3rd and 6th month.

Result:The mean age were 34.61 ± 12.8 yrs. Indications were benign lesions (5%), malignant lesions (5%) and infectious lesions . (90%). Overall mortality in our series was 5%. In lung resection group spirometry variables (FVC and FEV1)decreased significantly from pre op to 3month after operation and increased again from 3 to 6 month . In decortication group spirometry variable (FVC and FEV1) after 6 months were significantly raised in comparison to pre op values .

Conclusion: In our study, following lung resection, spirometry parameters of the patients were decreased significantly from preoperative to post operative 3rd months and increased again significantly from 3rd to 6th month post resection. Functional loss however was FVC -14.8% & FEV1 -16.8%). Following decortication, there was an increase in FVC from 55% to 83 % and from 59% to 87 % in FEV1 from the predicted value after 6th month.

KEYWORDS

Thoracotomy,PFT,FVC,FEV1

INTRODUCTION

Thoracotomy is a major surgical procedure. It needs Indepth knowledge of cardiorespiratory mechanics and maintenance of very vital organ function such as heart and lungs. The common indications are management of mediastinal tumours, bronchogenic carcinoma, blunt trauma chest, gun-shot and stab wound, tuberculosis and its sequel,encysted empyema and fibrothorax, recurrent pneumothorax with bullae, diaphragmatic hernia repair and oesophageal pathology¹⁻⁵Many studies have shown that major lung resection permanently reduces spirometric values and diffusing capacity by varying degrees, depending on the amount of lung that is resected. When measured 6 months to 1 year postoperatively, segmental or wedge resections reduce lung function by <10%, lobectomy or bilobectomy results in decreases of 5% to 15%, and pneumonectomy reduces values by 20% to 40%.⁷⁻⁹.

The aim of our prospective audit is to examine the indications , to evaluate mortality and morbidity following thoracotomy and assessment of outcome in terms of PFT.

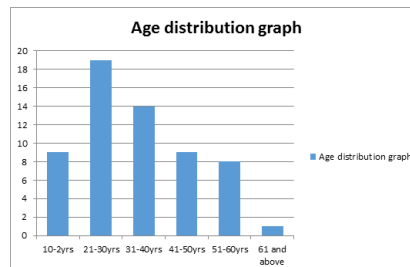
METHOD:

60 patients (aged 12 yrs and above) admitted or referred to CTVS department in period from feb2013 to oct 2014 were prospectively recruited into study.

We have documented demographic and clinical characteristics, pre-op PFT, post op morbidity , ICU stay , hospital stay, inhospital mortality , outcome and post op PFT at 3rd and 6th month . Statistical analysis was done with statistical software SPSS version 20. Normally distributed numerical variables were analyzed by Independent sample student t-test. Mann-Whitney test U test was used for variables which were not normally distributed. Categorical variables were analyzed by Fisher's exact test. Intra group were compared by using repeated measure ANOVA test. All analysis were two tailed , P value <0.05 was considered as statistically significant.

RESULT:

Our study comprises of 60 thoracotomies , performed in 18 months duration . The mean age of patient was 34.6 ± 12.8 yrs (range 16-62 yrs) There were 45 male and 15 female(M:F= 3:1)



Patients admitted with symptoms like cough 36 pts(60%),haemoptysis 30pts (50%),dyspnoea 20 pts(33%),Wt loss 15 pts(25%),Fever 12 pts (20%), chest pain 10 pts(16%),recurrent pleural effusion 6 pts. (10%). Comorbidities in form of tuberculosis was present in 36 pts (60%).They had received antitubercular treatment. Only 2 patients were diabetic & 1 pt was hypertensive . Only 8 patients were addicted to smoking.

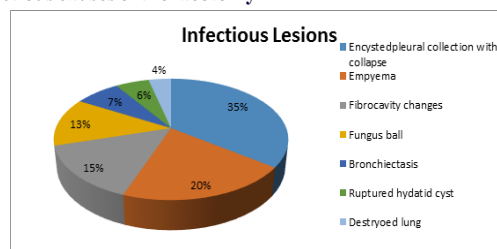
Thoracotomies were performed in the lt& rt side in 30 (50%) & 30 patients(50%) respectively. Posterolateral incision was utilized in 55 patients .(91.6%).

TABLE-1: Common indications for thoracotomy

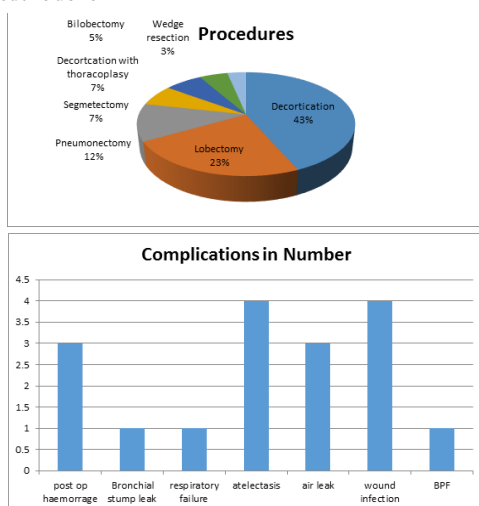
Indications	No. of patients
Benign lesion	3 (5%)
Malignant lesion	3 (5%)
Infectious	54 (90 %)

Benign lesion includes hamartoma, lung cyst & bronchial cyst.

Infectious causes of thoracotomy



Procedure done



In our study mean ICU stay was 3.8 days $\pm$ 2.47days and hospital stay was 11.3days $\pm$ 9.54 days. In our study there were 3 deaths .One died due to post op bleeding & complication of massive blood transfusion .Others died due to respiratory failure & sepsis. In follow up, after 1 month 3 patients (5%) had fever & their chest Xray were suggestive of mild pleural effusion. 9 patients (15%) were having persistent chest pain. In our study we have 30 patients undergone decortication & another group of 30 patients undergone lung resection surgery.

TABLE-3: Spirometry variables in patients treated with thoracotomy & decortication

	Expected	Before surgery	After 3 months	After 6 months
FVC (ml)	3.72 $\pm$ 0.82 (100%)	2.07 $\pm$ 0.82 (55.6%)	2.84 $\pm$ 0.844 (76%)	3.104 $\pm$ 0.88 (83%)
FEV1 (ml)	3.06 $\pm$ 0.76 (100%)	1.81 $\pm$ 0.68 (59.1%)	2.45 $\pm$ 0.59 (80%)	2.69 $\pm$ 0.66 (87%)
FEV1/FVC		86.94 $\pm$ 10.39	87.84 $\pm$ 8.83	88.16 $\pm$ 7.47

TABLE-4: Summary Of FVC In Decortication Group

	Valid no	Mean	Min	Max
FVC Predictive	30	3.72 $\pm$ 0.82	2.05	5.53
FVC1 Observed (Before surgery)	30	2.07 $\pm$ 0.82	1.01	3.78
FVC2 after 3 month	28	2.84 $\pm$ 0.844	1.28	3.66
FVC3 after 6 months	28	3.104 $\pm$ 0.88	1.47	3.89

TABLE-5: Summary Of FEV1 In Decortications Group

	Valid no	Mean	Min	Max
FEV1 predictive	30	3.06 $\pm$ 0.76	1.14	4.63
FEV1(1) observed (before surgery)	30	1.81 $\pm$ 0.68	0.61	3.35
FEV1 after 6 month	28	2.69 $\pm$ 0.66	1.27	3.28

TABLE-6: Spirometry Variables In Patients Treated With Lung Resection Surgery

	Expected	Before surgery	After 3 months	After 6 months	% change
FVC (ml)	3.79 $\pm$ 0.928	2.76 $\pm$ 1.46	2.19 $\pm$ 1.43	2.325 $\pm$ 1.53	-14.8%
FEV1 (ml)	3.21 $\pm$ 0.81	2.43 $\pm$ 1.44	1.871.00	2.02 $\pm$ 1.44	-16.8%
FEV1/FVC		85.47 $\pm$ 14.36	84.48 $\pm$ 15.68	85.61 $\pm$ 16.5	

TABLE-7: Summary Of FVC In Lung Resection Group

	Valid no	Mean	Min	Max
FVC Predictive	30	3.79 $\pm$ 0.928	1.54	5.4
FVC1 Observed (Before surgery)	30	2.76 $\pm$ 1.46	1.18	7.16
FVC2 after 3 month	29	2.19 $\pm$ 1.43	0.76	4.80
FVC3 after 6 months	29	2.325 $\pm$ 1.53	0.83	5.20

TABLE-8 Summary Of FEV1 In Lung Resection Group.

	Valid no	Mean	Min	Max
FEV1 predictive	30	3.21 $\pm$ 0.81	1.01	4.5
FEV1(1) observed (before surgery)	30	2.43 $\pm$ 1.44	0.39	6.95
FEV1(2) after 3 month	29	1.87 $\pm$ 1.33	0.58	4.5
FEV1(3) after 6 month	29	2.02 $\pm$ 1.44	0.35	4.90

Compared results of main values of spirometry tests in different time intervals in patients with lung resection group and decortication. Software used-GraphPad Prism version 5 (San Diego, California: GraphPad Software Inc,2007)

GROUP 1: Lung resection (Table-9)

Comparison over time by Repeated Measures ANOVA:FVC

No of data sets compared 3 F value 21.329 P value<0.001

Tukey's Multiple comparison Test	Mean Diff.	q	P value	95% CI of diff
FVC1 vs FVC2	0.57897	8.6905	<0.001	0.35195 to 0.8059
FVC1 vs FVC3	0.47000	7.0549	<0.001	0.02429 to 0.6970
FVC2vs FVC3	-0.10897	1.6356	ns	-0.3359 to 0.1180

GROUP 1: Lung resection (Table-10)

Comparison over time by Repeated Measures ANOVA:FEV1

No of data sets compared 3 F value 25.121 P value<0.001

Tukey's Multiple comparison Test	Mean Diff.	q	P value	95% CI of diff
FEV1-1 vs FEV1-2	0.56759	9.5201	<0.001	0.3644 to 0.7707
FEV1-1 vs FEV1-3	0.44586	7.4784	<0.001	0.2427 to 0.6490
FEV1-2vs FEV1-3	-0.12172	2.0417	Ns	-0.3248 to 0.0814

GROUP 2: Decortication (Table-12)

Comparison over time by Repeated Measures ANOVA: FVC

No of data sets compared 3 F value 36.706 P value<0.001

Tukey's Multiple comparison Test	Mean Diff.	q	P value	95% CI of diff
FVC1 vs FVC2	-0.2125	5.4037	<0.01	-0.3466 to -0.0783
FVC1 vs FVC3	-0.4756	12.094	<0.001	-0.6097 to -0.34144
FVC2vs FVC3	-0.2631	6.690	<0.001	-0.3972 to -0.1289

GROUP 2: Decortication (Table-13)

Comparison over time by Repeated Measures ANOVA: FEV1

No of data sets compared 3 F value 20.417 P value<0.001

Tukey's Multiple comparison Test	Mean Diff.	q	P value	95% CI of diff
FEV1-1 vs FEV1-2	-0.13143	3.1306	ns	-0.2746 to 0.0118
FEV1-1 vs FEV1-3	-0.37393	8.9069	<0.001	-0.5171 to 0.2306
FEV1-2vs FEV1-3	-0.2425	5.7763	<0.001	-0.0.3857 to -0.09926

Comparison over time by repeated measure ANOVA shows

In lung resection group –spirometry variables (FVC & FEV1) decreased significantly from pre op to 3 months after operation & increased again from 3 to 6 months..Difference between preop - post op (3 month)& preop-postop(6month) was significant.However, change in FEV1/FVC was not significant. Functional loss in FVC and FEV1 after 6 month was about -14.8% and -16.8 % respectively.

In decortication group-spirometry variables (FVC & FEV1) after 6 months were significantly raised in comparison to pre op values. However, change in FEV1/FVC was not significant.FVC was raised from 55% to 83 % (of predicted value) and FEV1 raised from 59 % to 87 % (of predicted value) after 6 month.

DISCUSSION

Indication in our study were mainly infectious lesion (90%) that includes encysted pleural collection, empyema, fibrocavitary changes, fungus ball, destroyed lung, ruptured hydatid cyst.The mean age of patient was 34.61 $\pm$ 12.8 yrs (range-16-62 yr).There were 45 male & 15 female (M:F=3:1).

Thoracotomies were performed in the lt& rt side in 30 (50%) & 30 patients(50%) respectively. Posterolateral incision was utilized in 55 patients (91.6%).Anterolateral incision was given in rest of the patients.

However in series by Softah et al¹⁰ there were 94 patients. Mean age of

the patient was 40.8±17.1 year (range 13 to 80 yrs). M:F ratio was 3.3:1. Rt & Lt thoracotomy were performed in 39.4% & 57.5% patients respectively. Posterolateral incision was given in 91.5% of patients

In study by Softah et al¹⁰ indication were mainly infectious (31%) & benign lesion (21%). Rest include malignancy , trauma & other causes (like esophageal, diaphragmatic & cardiac causes).

In our series re-exploration for complication was done in 5(8.3%) patients. In study by Softah et al¹⁰ it was 3.1%. while Sirbu et al¹¹ reported re-exploration in 3.7% cases.

In our series chest re-exploration was mainly due to bleeding - 60%, BPF - 20% & air leak -20 %. Sirbu et al¹¹ reported chest re-exploration after complications to be about 3.7% (main by for bleeding, 52% ; BPF, 17.8% ; permanent air leak 10.9%).

Post –operative atelectasis was present in 4 patients (6.6%), while In study by Softah et al¹⁰ they have reported it to be 6.4%.

Incidence of post operative bleeding in our series was 5%, while it was being identified to be 2.9% after lobectomy & 3% after pneumonectomy¹². In our series 3.3% patients developed BPF. Dewan et al¹³ reported this complication in 7.28% of cases.

The overall mortality in our series was 5%. While In study by Softah et al¹⁰, they have reported it to be 2.6% in their elective cases. Sen et al¹⁴ reported it to be 2.7%.

In our study we have two groups .Onegroup,in which lung resection surgery was performed . Another group includes patients who have undergone decortication or decortication with thoracoplasty.

In lung resection group spirometry variables (FVC & FEV1) are shown in Table 6 & table 9. Spirometry variables (FVC & FEV1) were decreased significantly from preoperative to post operative 3rd months and increased again significantly from 3rd to 6th month post resection. Functional loss however was FVC -14.8% & FEV1 -16.8%).

Our findings were in accordance with study by Van Mieghem W et al¹⁶ & Elias Amorim et al¹⁷. **Elias Amorim et al¹⁷** have assessed preoperative and postoperative spirometry values in patients undergoing lobectomy for sequelae of pulmonary tuberculosis. A total of 20 patients (10 males) with history of treatment for tuberculosis and presenting with symptomatic sequelae (repeat infection or hemoptysis) were selected for the study. In this study they have noted functional loss (at 6 month) of FVC about 15 % and of FEV1 of about 11%. They have concluded that, at 12th postoperative month, spirometric parameters of patients had returned to preoperative levels.

In decortications group, spirometry variables (FVC & FEV1) after 6 months were significantly raised in comparison to pre operative values. FVC was raised from 55.6% (of predictive value) to 83% (of predictive value) 6 months post operatively. FEV1 was raised from 59.1% (of predictive value) to 87% (of predictive value) 6 months post operatively (Table 3 & Table 10).

This corresponds to study by Kondov G et al¹⁸, where also there were increase in respiratory volume and capacity at post operative 3rd & 6th months with statistical significance. FVC was raised from 61% (of predictive value) to 82% (of predictive value) 6 months post operative. FEV1 was raised from 50% (of predictive value) to 85% (of predictive value) 6 months post operative. These findings corresponds to the findings of studies conducted by Ruzman et al¹⁹ & Metrol et al²⁰. Ruzman refers to FVC increasing from 63 % to 79.8% and FEV1 increasing from 50 % to 69 %. Metrol²⁰ refers to FEV1 increasing from 61 % to 79% and FVC from 61% to 77%.

CONCLUSION:

The indications for thoracotomy in our environment differ from those reported from the more industrialized countries. The management of inadequate initial treatment of lung infections ,complicated tuberculosis and its sequelae, empyema constitute the largest group of indications for thoracotomies in our region. The mortality in this series is within the level reported worldwide.

In our study, following lung resection, spirometric parameters of the

patients were decreased significantly from preoperative to post operative 3rd months and increased again significantly from 3rd to 6th month post resection. Functional loss however was FVC -14.8% & FEV1 -16.8%).

Following decortication, there was an increase in FVC from 55% to 83 % and from 59% to 87 % in FEV1 from the predicted value after 6th month.

Thoracotomy with decortication is a useful method of treatment of fibrinopurulent phase of empyema, which solves the problem and also significantly improves lung function, especially at follow-up after 6 months.

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