MEAN CHANGE IN FEV1 BY COMPARING POSTERO-LATERAL THORACOTOMY VERSUS MUSCLE SPARING THORACOTOMY

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ABSTRACT

Objective: To compare mean change in forced expiratory volume FEV1 before and after muscle sparing mid axillary vertical thoracotomy and postero lateral thoracotomy in patients of clotted hemothorax.

Place and Duration: Department of Thoracic Surgery Postgraduate Medical Institute, Govt. Lady Reading Hospital Peshawar from Feb. 2014 to Feb. 2015

Material and Methods: All patients presenting with clotted hemothorax were admitted through OPD and ER department and were subjected to detailed history and clinical examination and routine pre operative investigations. Preoperatively spirometry was done in all patients to record base line FEV1. All patients were randomly allocated in two groups by lottery method. Patients in group A were subjected to muscle sparing mid axillary vertical thoracotomy and patients in group B were subjected to posterolateral thoracotomy. All patients were followed up at 14th post operative day and spirometry was done to record post operative FEV_1. All the data were stored and analyzed in SPSS version 14.

Results: A total of 216 patients were observed, which were divided in two equal groups i.e Group A (MST) and Group B (PLT). Average pre operative FEV1 in postero lateral thoracotomy was 2.79+0.72SD while in muscle sparing mid axillary vertical thoracotomy group average FEV1 was 2.88+0.82SD which was insignificant with p value=0.405. Similarly when compared FEV1 after 14th post operative day the average FEV1 in potero lateral thoracotomy was 2.677+0.78SD while in muscle sparing mid axillary vertical group FEV1 was 2.76+0.81SD which shows also insignificance with p- value=0.405.

CONCLUSION: The exposure is adequate in both methods without favoring the one over the other concerning postoperative pulmonary function.

Keywords: thoracotomy; postero lateral thoracotomy; FEV

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INTRODUCTION

Among a list of surgeries, thoracic and abdominal surgeries carry a great deal of post operative morbidity. The cost of postoperative pulmonary complications was well recognized at the beginning of the 20th century, at which time a number of clinical reviews identified the mortality rate associated with the development of postoperative pneumonia among 40,000 patients to be in excess of 40%[1]. The conventional postero-lateral thoracotomy needs to divide the large thoracic muscles, latissimus dorsi and serratus anterior, which can lead to postoperative pain and limitation in the motion of the shoulder and upper extremities. Patients usually experience decreased pulmonary function from immobilization, increased atelectasis from over-use of analgesia and increased pulmonary morbidity, especially in elderly patients[2,3].

On the contrary several modifications of the muscle sparing thoracotomy have been attempted. Many authors reported that muscle-sparing thoracotomy is an excellent alternative because of less postoperative pain, morbidity and better cosmetic results than the standard postero-lateral thoracotomy[4].

The muscle-sparing thoracotomy was described by Bethencourt and Holmes in 1988 and does not involve transection of the major thoracic muscles[5]. Muscle-sparing thoracotomy incision provides adequate exposure for most pulmonary procedures. It provides more rapid recovery of lung function, shoulder mobility, less severe postoperative pain, quicker closure, a better seal and undivided muscles, may be used subsequently for a flap. Variably surgeons have preferred the incision for decortication for empyema[5,6], sympathectomy[7], upper and middle lobectomies[7], plurectomy[8], surgical removal of hydatid cysts[9].

Muscle sparing Thoracotomy results in less decrease in pulmonary function as compared to standard postero lateral Thoracotomy due to no muscle cutting, less post operative pain and early mobilization of the patients post operatively[10]. Early postoperative pulmonary function is severely impaired by thoracotomy. It rehabilitate gradually with time but after muscle sparing thoracotomy pulmonary functions come to near normal early as compared to standard postero lateral thoracotomy[11].

In a study conducted by Kalliopi Athanassiadiet al the pulmonary function were found higher in patient who underwent muscle sparing thoracotomy as compared with standard posterolateral Thoracotomy. They concluded that mean change in forced expiratory volume at 1 second (FEV_1) from pre operative FEV_1 in liters was 0.34 + 0.18 in the postero lateral thoracotomy group and 0.4 + 0.13 in the muscle sparing mid axillary thoracotomy group.[12]

The purpose of this study is to compare mean change in forced expiratory volume before and after muscle sparing mid axillary vertical thoracotomy and postero lateral thoracotomy in patients of clotted hemothorax.

METHODOLOGY

All patients presenting with clotted hemothorax were admitted in thoracic unit through OPD and ER department and were included in the study. All patients were subjected to detailed history and clinical examination and routine pre operative investigations were done in all patients. Preoperatively spirometry was done in all patients to record base line FEV1. All patients were randomly allocated in two groups by lottery method. Patients in group A were subjected to muscle sparing mid axillary vertical thoracotomy and patients in group B were subjected to postero lateral thoracotomy on next available operation list.

All the patients were kept in ward for 3-5 days post operatively and were discharge if indicated. All the patients were followed up at 14th post operative day for re evaluation and spirometry was done to record post operative FEV_1. All the data were stored and analyzed in SPSS version 14.

RESULTS

A total of 216 patients were observed, which were divided in two equal groups. Patients in Group A were managed by Muscle Sparing Mid Axillary Vertical thoracotomy and the patients in Group B were operated by postero lateral thoracotomy. Sex wise distribution shows that out of 108 patients 73 (67.6%) were male and 35 (32.4.5%) were female in Postero lateral thoracotomy group while in Muscle Sparing Mid Axillary Vertical thoracotomy group contains 74 (68.5%) male and 34 (31.5%) female. Male to female ratio was 2.13:1. Sex distribution among the groups was insignificant with p-value=0.884 (Table 1).

Table 1: Sex Distribution Among The Groups

		Thoracotomy		Total	p-value
		Postero lateral	Muscle Sparing Mid Axillary Vertical		
Gender	Male	73	74	147	0.884
		67.6%	68.5%	68.1%	
	Female	35	34	69	
		32.4%	31.5%	31.9%	
Total		108	108	216	
		100.0%	100.0%	100.0%	

Average age was 56.92 years+ 11.35SD with rang 36-76 years. The age distribution among the group was also insignificant with p-value 0.274(Table 2).

Average pre operative FEV1 in postero lateral thoracotomy was 2.79+0.72SD while in muscle sparing mid axillary vertical thoracotomy group average FEV1was 2.88+0.82SD which was insignificant with p-value=0.405. Similarly when compared FEV1 after 14th post operative day, the average FEV1 in potero lateral thoracotomy was 2.677+0.78SD, while in muscle sparing mid axillary vertical group FEV1 was 2.76+0.81SD showing insignificance with p-value=0.405(Table 3).

Gender wise distribution shows that Pre and post FEV1 were also insignificant with p value=0.676 and 0.586 respectively. The average pre FEV1 was 2.85+0.77SD in male patients while in female it was 2.80+0.77SD.The post operative reading of average FEV1 at 14th day in male was 2.73+0.71SD while in female it was 2.68+0.71SD(Table 4).

Table 2: Age wise distribution in both the groups

		Thoracotomy		Total	p-value
		Postero Lateral	Muscle Sparing Mid Axillary Vertical		
Age (in years)	<= 50.00	31	38	69	0.274
		28.7%	35.2%	31.9%	
	51.00 - 60.00	35	28	63	
		32.4%	25.9%	29.2%	
	61.00 - 70.00	21	28	49	
		19.4%	25.9%	22.7%	
	71.00+	21	14	35	
		19.4%	13.0%	16.2%	
Total		108	108	216	
		100.0%	100.0%	100.0%	

Table 3: Pre and Post Op Comparison of FEV1 in both the groups

	Thoracotomy	N	Mean	Std. Deviation	p-value
Pre Operative FEV1	Postero lateral	108	2.7970	.72056	0.405
	Muscle Sparing Mid Axillary Vertical	108	2.8850	.82474	
FEV1 after 14th post operative day	Postero lateral	108	2.6770	.78036	0.405
	Muscle Sparing Mid Axillary Vertical	108	2.7650	.81471	

Table 4: Gender wise distribution of Pre and Post FEV1

	Gender	N	Mean	Std. Deviation	p-value
Pre Operative FEV1	Male	147	2.8561	.77720	0.676
	Female	69	2.8088	.77136	
FEV1 after 14th post operative day	Male	147	2.7361	.71732	0.586
	Female	69	2.6888	.71142	

DISCUSSION

Posterolateral thoracotomy (PLT) is the historic gold standard for thoracic incisions[11]. Several authors have proposed muscle-sparing thoracotomy (MST) in order to minimize the detrimental effects of the muscular cut[12.13.14.15]. Advantages asserted for the MSTs include less acute and chronic pain improved pulmonary and shoulder function, faster recovery, and superior cosmetic results. Some authors admitted that MSTs offered rather substandard access to the intra-thoracic organs when compared with PLTs[18, 19, 20].

Despite claims of better clinical outcome for MST, there has been a lack of evidence in the literature mainly due to study design[21, 22]. It could be assumed from published data that pulmonary function is not affected by thoracotomy type[23, 24, 25]. On the contrary, MST results in better postoperative shoulder motion range, and strength[25].

Designing our prospective, controlled, randomized and double-blind study we worked to avoid the biases of the previous published data. The study population was homogeneous: we chose only evacuation of clotted hemothorax performed by the same surgeon. . In contrast to the results of Ponn et al[26], and Lemmer et al.[27] pulmonary function tests did not reveal any statistically significant difference in patients undergoing either PLT or MST in term of mean change in FEVI pre and postoperatively. This is expected since neither the latissimus dorsi nor the serratus anterior contribute to the respiratory function[25].

Kushibe et al. observed daily changes for up to 6 days after surgery. The FEV1 ratio recovered from 71.2% on the day after surgery to 92.8% 6 days after surgery[28]. It has been reported that VC recovered the most within 2 weeks to 1 month after surgery, and FEV1 recovered 1-3 months after Surgery[29,30]. It has been reported that VC recovered the most within 2 weeks to 1 month after surgery, and FEV1 recovered 1-3 months after Surgery[29,30].

Varela et al. reported that preoperative FEV1, the postoperative pain score and epidural analgesia were independently and reliably associated with the postoperative FEV1 ratio[31]. Nomori et al. reported that pain scores between 1 week and 6 months after surgery were significantly lower after anterior limiting thoracotomy (ALT) than after PL[144], and that VATS resulted in a further lowering of the pain score for 1 week following surgery. However, no significant difference in pulmonary function between after ALT and after VATS has been found [32]. In the present study, FEV1 were higher in older (>68 years) patients than in young patients, perhaps because older patients tend to tolerate pain relatively better[33.]Like our study, in different studies, the preoperative lung function as measured by FEV1 fell significantly when measured 1 week after the operation; no difference could be seen in these changes between both groups[34,35].

CONCLUSION

The exposure is adequate in both methods without favoring the one over the other concerning postoperative pulmonary function.

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