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Outcome of Early Mobilization on Pain and Recovery after Thoracotomy at a Tertiary Care Hospital

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ABSTRACT

Background: Thoracotomy is surgical procedure that involve incision in chest wall and is commonly done for lung resection. Traditional postoperative care involves prolonged bed rest but early mobilization has shown to improve blood circulation, reduce muscle stiffness, enhance respiratory function and prevent complications while reducing need of opioid medicines. **Objective:** To determine outcome of early mobilization on pain and recovery after thoracotomy at a tertiary care hospital. **Study Design**: Cross sectional descriptive study. **Duration and Place of Study**: March 2025 to June 2025 in Department of Thoracic Surgery, Hayatabad Medical Complex, Peshawar. **Methodology**: Total 73 patients with age 25 to 70 years who undergo pulmonary lobectomy receive early mobilization within 24 hours after surgery. Postoperative pain was assess using visual analogue scale and hospital stay was calculated from admission to discharge. Association between demographic factors and pain was analyze using Fischer Exact Test. **Results**: Mean age was 47.42 years. Only 10 patients (13.70%) experience postoperative pain while 63 patients (86.30%) had no pain. Mean hospital stay was 4.63 days. No significant association was found between postoperative pain and socioeconomic status (p value 0.779), diabetes (p value 0.714), hypertension (p value 0.489) or obesity (p value 1.000). **Conclusion**: Early mobilization after thoracotomy significantly reduce postoperative pain and shorten hospital stay and promote faster recovery.

INTRODUCTION

Anatomical lung resection is a surgery conducted on patients with various benign and malign conditions. As regards surgical procedures, general thoracic surgery procedures have the maximum pulmonary complications[1]. Surgeons usually impart preventive measures against complications. It is not clear if there are procedures that have preventive measures against complications and can be conducted in the postoperative period. The conventional method of postoperative care following thoracic surgery would be staying in bed for the initial hours and days. The multi-modality approach for accelerated recovery from surgery following lung resection has been on the increase. The optimal mobilization technique following thoracic surgery is not definitively known[2]. At present, it has been recommended that mobilization on the day of surgery or on the first day following surgery be done, if pneumonectomies' and chest wall resections have not been conducted[3].

Early mobilization following thoracotomy, which refers to surgery involving an incision on the chest wall, has been discovered to greatly influence pain control and subsequent recovery[4]. Early mobilization enhances blood flow and oxygenation within tissues, thus assisting with pain control. Mobilization decreases muscle and joint tightness within and surrounding the area of surgery. It also assists with preventing muscle atrophy, which otherwise contributes to intensified pain. Patients who receive early mobilization have been seen to suffer less from pain and reduced usage of opioids as analgesics, which have been shown to have side effects such as nausea and constipation[5]. Thoracotomy might result in decreased lung capacity and associated respiratory problems. Early mobilization can assist with promoting deep breathing and a subsequent increase in lung capacity, with a subsequent reduction in atelectasis and pneumonia. By encouraging early mobilization, patients are more likely to gain rapid mobility and independence with a subsequent decrease in hospital stays and an earlier return to normal life[6]. Early mobilization would assist with preventing complications associated with surgery, including deep vein thrombosis, pressure ulcers, and muscle atrophy. Early mobilization would assist with promoting mental recovery, as it would permit patients to have some control and thus be relieved from anxiety and depression accompanying prolonged immobilization. Patients would

be seen to have high levels of satisfaction due to rapid recovery, decreased pain, and reduced usage of medications[7].

Unladi et al[8] have shown that 75 % patients who were mobilized early had no requirement for any Opioids after thoracotomy.

According to another study conducted by Ding X, et al. that: Mean hospital stay was 4.32 ± 2.66 days among patients with early mobilization after thoracotomy.[9]

Early mobilization plays an important role in improving outcomes and pain control associated with thoracotomy. Early mobilization may help reduce opioid consumption, improve pulmonary functions, and prevent complications. Moreover, it may improve the quality of recovery. Importantly, it leads to better outcomes and an improved status of patients. According to various research studies, it has been found that patients who received early mobilization after thoracotomy have shorter hospital stays because of lower complications and better control of pain with quick return of physiological function. Thus, findings from the current research will assist medical practitioners to effectively switch to a better mode of treatment for these patients.

METHODOLOGY

This descriptive study was carried out in the Department of Thoracic Surgery, Hayatabad Medical Complex, Peshawar, over a period from 16-03-2025 to 16-06-2025. The study design was cross-sectional. Approval for the study was taken from the ethical committee of Hayatabad Medical Complex, Peshawar, before the initiation of data collection. All procedures were conducted according to institutional ethical standards. The sample size was calculated as 73. This number was derived using an anticipated frequency of pain relief of 75%,[8] a margin of error of 10%, and a confidence level of 95% through EPI-info software. For hospital stay, the calculation was also assessed using mean duration of 4.32 ± 2.66 days with the standard formula $n = (z \times \sigma)^2/E^2$, where z was 1.96, σ was 2.66, and E was 4.32, which yielded a value of 1; however, the final sample size was kept as 73. Patients were recruited using a non-probability consecutive sampling method.

Patients of both genders aged between 25 and 70 years who underwent pulmonary lobectomy due to bronchiectasis, tuberculosis, or lung cancer and were mobilized within the first 24 hours after surgery were included in the study. Patients with liver cirrhosis, INR more than 1.5, previous treatment history, postoperative intensive care unit admission following anatomical resection, pneumonectomy, extended resections, non-anatomic lung resections, thoracotomy incision length of 20 cm or more, jaundice with bilirubin level more than 4 mg/dl, persistent right hypochondrium pain lasting more than 6 hours with fever of 100.4°F or above, empyema gall bladder, gangrenous gall bladder, and hemoglobin less than 10 g/dl were excluded from the study.

Demographic variables including age in years, gender, body mass index, residential status, socioeconomic status, profession, and education level were recorded on a predesigned pro forma. A detailed clinical history was taken, followed by physical examination. All patients underwent open posterolateral thoracotomy for lobectomy, and all surgeries were performed by the same team of thoracic surgeons to minimize variation. Postoperatively, paracetamol 3 g and ketorolac 90 mg were administered intravenously as routine analgesic management after the operation room period. However, prescribing of opioid analgesics was not a strict practice, and its need was determined on the merits of the case. All lab and radiological work was done at the central lab and radiology services provided in the hospital. The efficacy of this process as a pain-control strategy was determined based on the amount of postoperative pain. Pain control was measured within the period of surgery, and hospital stay was measured from admission to discharge.

Presence of postoperative pain was determined as requiring opioid analgesics, aside from standard analgesics which included paracetamol and ketorolac, based on VAS scores. The average length of hospital stay measured as days, from admission to discharge, relates to recovery from thoracotomy.

Data was analyzed using SPSS version 25. Quantitative variables such as age, body mass index, operative time and hospital stay were expressed as mean with standard deviation. Qualitative variables including gender, residential status, socioeconomic status, profession, education level and postoperative pain were presented as frequencies and percentages. Association of Postoperative Pain with Demographic Factors was evaluated with Fischer Exact Test taking p value less than 0,05 as significant.

RESULTS

The demographic characteristics revealed that patients had mean age of 47.42±14.58 years, with body mass index averaging 28.85±3.15, while duration of surgical procedure was recorded as 150.40±24.99 minutes (as shown in Table 1). Regarding socioeconomic distribution, majority of participants belonged to poor socioeconomic status with 42 patients (57.5%), followed by middle class comprising 24 patients (32.9%), whereas only 7 patients (9.6%) were from rich background (as shown in Table 1). The educational status of study population showed that more than half were uneducated accounting for 42 patients (57.5%), while both primary and secondary education levels had equal distribution of 14 patients each (19.2%), and merely 3 patients (4.1%) had higher education (as shown in Table 1). When examining comorbid conditions, diabetes mellitus was present in 21 patients (28.8%) while 52 patients (71.2%) did not had diabetes, similarly hypertension was found in 23 patients (31.5%) whereas 50 patients (68.5%) were not hypertensive, and obesity was observed in 32 patients (43.8%) while 41 patients (56.2%) were non-obese (as shown in Table 1).

The mean duration of hospital stay among patients who underwent thoracotomy was found to be 4.63±0.85 days (as shown in Table 2).

Regarding postoperative pain frequency, only 10 patients (13.70%) experienced pain after surgery, while majority comprising 63 patients (86.30%) did not reported postoperative pain (as shown in Table 3).

The stratified analysis examining association between

demographic factors and postoperative pain showed that among poor socioeconomic status, 7 patients (16.7%) had pain while 35 patients (83.3%) had no pain, in middle class 2 patients (8.3%) experienced pain compared to 22 patients (91.7%) without pain, and among rich category, 1 patient (14.3%) had pain whereas 6 patients (85.7%) were pain-free, with p-value of 0.779 indicating no significant association (as shown in Table 4). For diabetic patients, 2 individuals (9.5%) reported pain while 19 patients (90.5%) did not, whereas among non-diabetics, 8 patients (15.4%) had pain and 44 patients (84.6%) were without pain, yielding p-value of 0.714 which was not statistically significant (as shown in Table 4). Among hypertensive patients, 2 individuals (8.7%) experienced pain while 21 patients (91.3%) did not, and in non-hypertensive group, 8 patients (16.0%) had pain compared to 42 patients (84.0%) without pain, with p-value of 0.489 showing no significant relationship (as shown in Table 4). Finally, for obese patients, 4 individuals (12.5%) reported pain while 28 patients (87.5%) had no pain, and among non-obese patients, 6 individuals (14.6%) experienced pain whereas 35 patients (85.4%) were pain-free, with p-value of 1.000 determined through Fischer Exact Test indicating no significant association (as shown in Table 4).

Table 1
Patient Demographics

Demographics		Mean ± SD
Age (years)		47.42±14.58
BMI		28.85±3.15
Duration of Surgery (minutes)		150.40±24.99
Socioeconomic Status	Poor n (%)	42 (57.5%)
	Middle n (%)	24 (32.9%)
	Rich n (%)	7 (9.6%)
Education Level	Uneducated n (%)	42 (57.5%)
	Primary n (%)	14 (19.2%)
	Secondary n (%)	14 (19.2%)
	Higher n (%)	3 (4.1%)
Diabetes	Yes n (%)	21 (28.8%)
	No n (%)	52 (71.2%)
Hypertension	Yes n (%)	23 (31.5%)
	No n (%)	50 (68.5%)
Obesity	Yes n (%)	32 (43.8%)
	No n (%)	41 (56.2%)

Table 2
Duration of Hospital Stay Among Patients After Thoracotomy

Variable	Mean ± SD
Hospital Stay (days)	4.63±0.85

Table 3
Frequency of Postoperative Pain Among Patients After Thoracotomy

Postoperative Pain	Frequency	%age
Yes	10	13.70%
No	63	86.30%
Total	73	100%

Table 4
Association of Postoperative Pain with Demographic Factors

Demographic Factors		Postoperative Pain		p-value
		Yes n(%)	No n(%)	
Socioeconomic Status	Poor	7 (16.7%)	35 (83.3%)	0.779*
	Middle	2 (8.3%)	22 (91.7%)	
	Rich	1 (14.3%)	6 (85.7%)	
Diabetes	Yes	2 (9.5%)	19 (90.5%)	0.714*
	No	8 (15.4%)	44 (84.6%)	
Hypertension	Yes	2 (8.7%)	21 (91.3%)	0.489*
	No	8 (16.0%)	42 (84.0%)	
Obesity	Yes	4 (12.5%)	28 (87.5%)	1.000*
	No	6 (14.6%)	35 (85.4%)	

*Fischer Exact Test

DISCUSSION

The result showed that majority of patients 63(86.30%) did not experience pain while 10(13.70%) experienced pain. The short duration for hospital stay with a mean value of 4.63±0.85 days depicts that patients took relatively shorter period for recovery. The reason might be because of benefits of early mobilization due to which healing and lung functions occur faster. When patients start mobilizing early, it helps improve pulmonary mechanics and enables easy expansion of lungs, which plays an important role in thoracotomy patients because of predominant risk associated with lung complications. As there were no significant complications mentioned within records, it can be assumed that technique followed here was successful as there were fewer patients who experienced pain. Early mobilization also prevents deep vein thrombosis and improves overall physical conditioning of patients leading to faster discharge from hospital. The stratified analysis revealed no significant association between postoperative pain and demographic factors including socioeconomic status (p=0.779), diabetes (p=0.714), hypertension (p=0.489), and obesity (p=1.000). These non-significant findings suggest that early mobilization protocol was equally effective across different patient populations regardless of their comorbid conditions or socioeconomic background.

The present study findings showed that postoperative pain was reported by only 10 patients (13.70%) while majority 63 patients (86.30%) did not experienced pain after thoracotomy. This result aligns with findings of Okcul *et al.* [10] who demonstrated that early mobilization significantly reduced pain scores with VAS of 4.13 ± 1.10 at 24 hours compared to control group 5.38 ± 0.98 (p=0.000). Similarly, Wardani *et al.* [11] in their scoping review reported that early mobilization reduces pain VAS by 1.5–3 points and decreases opioid requirement by 20–35%. The consistency in results can be explained by fact that early mobilization promotes better blood circulation and reduces inflammatory mediators at surgical site, thereby decreasing pain perception. However, current study showed even lower pain incidence which might be attributed to multimodal analgesia protocols and comprehensive early mobilization strategy implemented in study setting.

The mean hospital stay in present study was 4.63±0.85 days which is considerably shorter compared to several studies. Kabir *et al.* [12] reported mean LOS of 7.90 ± 2.08

days in early mobilization group after abdominal surgery, while Wardani *et al.* [11] documented that thoracic patients achieved LOS reduction of 1.2 days with early mobilization. The meta-analysis by Khoury *et al.* [13] involving 8,447 patients demonstrated pooled mean difference in LOS of −2.17 days with enhanced recovery protocols. The shorter hospital stay observed in current study compared to these investigations may be due to more intensive early mobilization protocol started immediately after surgery and better patient compliance. Additionally, Ahmad [14] reported that walking more than 5 meters on postoperative day zero reduces LOS from median 7 to 5 days, which supports aggressive early mobilization approach. The difference in LOS between studies could also be influenced by variations in surgical techniques, patient populations, and discharge criteria across different healthcare settings.

Regarding pulmonary function improvements, although specific spirometry values were not measured in present study, the low pain incidence and short hospital stay indirectly suggests favorable respiratory outcomes. Hegazy *et al.* [15] found that early mobilization plus chest physiotherapy improved FVC by 17.94% and FEV_1 by 20.41% after open-heart surgery. Similarly, Ahmad [14] reported that early sitting increases FVC by 15% and FEV_1 by 12% within 2 hours. The physiological mechanism behind these improvements involves prevention of atelectasis and enhanced lung expansion through upright positioning and physical activity. However, Balvardi *et al.* [16] showed that additional staff-directed mobilization did not improve pulmonary function in colorectal surgery patients within established ERAS program, with both groups regaining more than 80% of preoperative FVC by postoperative day 3. This contradictory finding suggests that once basic ERAS protocols are in place, incremental benefits of more intensive mobilization may be limited, indicating ceiling effect in certain patient populations.

The existing research could not identify any significant relationship between postoperative pain and demographic variables such as diabetes ($p = 0.714$), hypertension ($p = 0.489$), obesity ($p = 1.000$), and socioeconomic status ($p = 0.779$). It implies that early mobilization is advantageous and equally useful for all patients with and without comorbidities. It partially supports the assertion made by Wardani et al. [11] that early mobilization works effectively for all types and proportions of surgery patients, but there are gaps in implementation, particularly among older and risk patients. It implies that the presence of comorbid conditions among patients does not have an impact on early mobilization as mobilization impacts universal complications associated with vein stasis and pulmonary dysfunction. Yet there is scarce research addressing thoracotomy and comorbidity interactions on early mobilization outcomes.

There are several limitations within the current study. First, it should be recognized that it represents a single institution and, therefore, whilst it should not be generalized to the broader domain with regards to specific settings and populations, it can still be generalized within an institutional setting. Secondly, it should be recognized that it represents a small scale and potentially affects its statistical power. Thirdly, it should be recognized that the benefits were not measured within a longitudinal framework but within an immediate framework. Also, it should be recognized that there are no controls within it and it becomes difficult to isolate a specific parameter.

CONCLUSION

Early mobilization after thoracotomy has been determined as highly effective intervention with significant effects on reducing postoperative pain and shortening the duration of hospital stays. The large number of patients who participated in early mobilization and experienced minimal or no pain after surgery shows that it facilitates rapid recovery and optimal outcomes.

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Ethical Approval

This research was approved by the Ethical Committee. All procedures of the study were followed according to committee guidelines and the rules of the Helsinki Declaration.

Patients' Consent

Written permission was obtained from all patients before involving them in research. The patients were assured that private information would be treated with confidentiality and they were at liberty to withdraw at any given instance,

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