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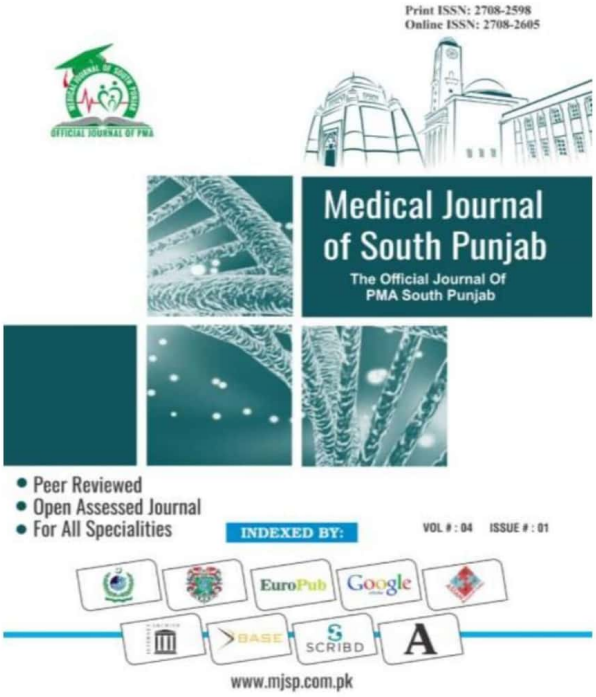

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Authors and Affiliation:

Shahid Hussain[1*], Hamid Mehmood[2], Hira Asad[3], Syed Ali Abbas Rahat[4], Faiza[5], Amna Khan[6]

[1]Murshid Hospital & Health Care Centre, Karachi, Pakistan
[2]Dow University Hospital Ojha, Karachi, Pakistan
[3]Memon Medical Institute Hospital, Karachi, Pakistan
[4]OSH state University, Kyrgyzstan, Russia
[5,6]Jinnah Postgraduate Medical Centre, Karachi, Pakistan
[*]Corresponding Author Email: khokharshahid_dr@hotmail.com

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Original Article

Comparing Pain and Quality of Life Measures after Anatomic Lung Resection Using Either Thoracoscopy or Thoracotomy

Shahid Hussain[1*], Hamid Mehmood[2], Hira Asad[3], Syed Ali Abbas Rahat[4], Faiza[5], Amna Khan[6]
[1]Murshid Hospital & Health Care Centre, Karachi, Pakistan
[2]Dow University Hospital Ojha, Karachi, Pakistan
[3]Memon Medical Institute Hospital, Karachi, Pakistan
[4]OSH state University, Kyrgyzstan, Russia
[5,6]Jinnah Postgraduate Medical Centre, Karachi, Pakistan
[*]Corresponding Author Email: khokharshahid_dr@hotmail.com

ABSTRACT

Objective: *is to compare the pain score and quality of life between thoracoscopy and thoracotomy in lung resection surgery.*

Methods: *Randomized controlled trial was conducted at National Institute of cardiovascular diseases (NICVD) during 1st September 2022 to 30th August 2023. A total of 60 patients were enrolled and dived into two groups 35 patients in thoracoscopy and 25 in thoracotomy groups. Patients were compared in terms of quality of life and pain score. Eight pints scoring scale was for quality of life assessment and Brief pain index scale for pain measurement.*

Results: *The comorbidities in both the groups were almost equal. Adenocarcinoma were noted 20 (80.0%) and 22 (62.9%) in thoracotomy and VATS group, respectively. Further, the mean length of stay of thoracotomy and VATS group was 5.61±2.11 days and 6.31±2.47 days, respectively. The differences were statistically insignificant in both the study groups, (p>0.050). Baseline mental component summary was 45.91±1.82 in thoracotomy and in VATS group it was 44.90±2.11, at 4th month it was 46.89±6.04 and 45.98±4.66, at 8th month it was 48.96±3.44 and 47.94±4.56, at 12th it was 49.48±3.55 and 48.11±4.07 respectively but results were statistically insignificant. (Table. II).*

Conclusion: *Patient-reported Physical Component Summary (PCS) and pain scores were similar in the first 12 months following in two different surgical procedures Video-Assisted Thoracoscopic Surgery (VATS) and thoracotomy.*

Keywords: *Thoracoscopy, Thoracotomy, Quality of life, Pain score, Lung resection*

1. INTRODUCTION

Anatomic lung resection is a surgical procedure performed to remove a portion of the lung that may be affected by a tumor, infection, or other lung disease[1]. This procedure can be done using two different approaches: thoracoscopy (also known as video-assisted thoracoscopic surgery or VATS) or thoracotomy[2]. Each approach has its own advantages and disadvantages, and the choice of which method to use depends on the patient's specific condition and the surgeon's judgment[3]. Most common advantages of VATS include minimally invasive technique, small incision on skin, reduce pain and early recovery and improved cosmesis[4].

Thoracotomy allows for more extensive procedures and can be adapted to various situations[5]. It provides the surgeon with a larger and direct view of the lung, which can be advantageous when dealing with complex cases or larger tumors[5]. The choice between thoracoscopy and thoracotomy depends on factors such as the patient's overall health, the size and location of the lung lesion, and the surgeon's expertise[6].

Lung resection surgery can have a significant impact on a patient's quality of life and may be associated with varying levels of pain[8]. The specific effects on an individual's quality of life and pain can depend on several factors, including the reason for the surgery, the type of procedure performed, the patient's overall health, and their ability to recover. It has emotional and psychological effects on patients. Coping with a diagnosis, undergoing surgery, and dealing with potential changes in physical function can be emotionally challenging[9].

Long-term quality of life after lung resection surgery can vary. Some patients experience minimal long-term effects and return to a near-normal quality of life, while others may have ongoing respiratory symptoms, reduced exercise tolerance, or other issues[10]. While numerous studies have compared clinical outcomes and perioperative variables between thoracoscopy and thoracotomy, there remains a gap in the literature regarding the specific impact on postoperative pain and quality of life. Understanding the differences in pain levels and quality of life outcomes after these surgeries is vital to provide patients with evidence-based information and improve the surgical decision-making process.

2. METHODOLOGY

Study was conducted at National Institute of cardiovascular diseases (NICVD) after approval from the institutional review board (IRB). Study was completed in one year duration from 1st September 2022 to 30th August 2023. All patients who participated in the study gave their informed consent. Patients in the study were eligible if they had either histologically confirmed or suspected clinical stage I non-small cell lung cancer (NSCLC). Patients were divided in two groups (Thoracoscopy and Thoracotomy) by simple randomization method The determination of this stage was made using various diagnostic techniques, such as positron emission tomography (PET), computed tomography (CT), and non-routine invasive mediastinal and/or hilar staging. Patients who had previously undergone a lung resection, who had received preoperative chemotherapy and/or radiation, who were found to have more advanced-stage disease or did not have NSCLC following surgery, were excluded from the study.

Patients were invited to participate in a study after giving their consent for a surgical procedure. The specific surgical approach chosen for each patient

was based on the preferences of the surgeons involved in the study.This is a surgical procedure that typically involves making an incision between the ribs to access the thoracic cavity was considered as thoracotomy. Minimally invasive surgical approach performed through small incisions, typically using a camera and specialized instruments was considered as VATS (Video Assisted Thoracic Surgery).

If the initial attempt at resection was started using VATS but had to be aborted or converted to an open surgery due to technical difficulties or other issues, it may still be considered a conversion procedure. Data was collected on health-related quality of life (QOL) using the Medical Outcomes Study 36-item Short Form Health Survey (SF-36).The SF-36 measures eight health domains, each scored on a Likert-like scale (1 to 5), where higher scores indicate better QOL. Likert-like scale consists of assessing the individual's ability to perform physical activities. Role limitations due to physical problems, bodily pain, general health perceptions, vitality(gauging the level of energy and fatigue), social functioning, role limitations due to emotional problems, mental health and measuring overall psychological well-being.Patients completed the SF-36 survey before their surgery or medical procedure. This provides a baseline measurement of their quality of life before the intervention and then on follow up (at 4 month, 8 month and 12 month) and in case of recurrence survey stopped.

Pain was assessed using Brief Pain Inventory (BPI), which shows severe pain, least pain, average pain and pain right now. Pain interference was measured in terms of pain at work, during routine activity, mood swing or emotional, interference in enjoyment, sleep, walk and ability to maintain relationship. SPSS version 27 was used for data analysis keeping 5% level of significance.

3. RESULTS

Overall, 60 patients were included in this study. The study comprised of two groups as thoracotomy 25 (41.7%) and VATS 35 (58.3%). The mean age of thoracotomy and VATS group was 65.32±2.61 years and 64.71±2.52 years, respectively. There were 12 (48.0%) females in thoracotomy group and 18 (51.4%) females in VATS group. According to smoking status, 6 (24.0%) were current smokers in thoracotomy group and 10 (28.6%) were current smokers in VATS group. The mean pack years of thoracotomy and VATS group was 26.04±4.15 years and 25.11±4.28 years, respectively. There were 17 (68.0%) patients had Ia clinical stage of disease in thoracotomy group and 24 (68.6%) patients had Ia clinical stage of disease in VATS group. The comorbidities in both the groups were almost equal. Adenocarcinoma were noted 20 (80.0%) and 22 (62.9%) in thoracotomy and VATS group, respectively. Further, the mean length of stay of thoracotomy and VATS group was 5.61±2.11 days and 6.31±2.47 days, respectively. The differences were statistically insignificant in both the study groups, ($p>0.050$). (Table. I).

Baseline mental component summary was 45.91±1.82 in thoracotomy and in VATS group it was 44.90±2.11, at 4th month it was 46.89±6.04 and 45.98±4.66, at 8^{th} month it was 48.96±3.44 and 47.94±4.56, at 12^{th} it was 49.48±3.55 and 48.11±4.07 respectively but results were statistically insignificant. (Table. II).

The distribution of pain at baseline, postoperative, 4^{th} month, 8^{th} month and 12^{th} of thoracotomy patients was 5 (20.0%), 5 (20.0%), 6 (24.0%), 7 (28.0%) and 7 (28.0%), respectively. Whereas, the distribution of pain at baseline, postoperative, 4^{th} month, 8^{th} month and 12^{th} of VATS patients was 6 (17.1%), 11 (31.4%), 8 (22.9%), 5 (14.3%) and 6 (17.1%), respectively. The differences were

statistically insignificant, (p>0.050). (Table. III).

Table. I

Demographic and comorbidities of both the study groups

Variable	Thoracotomy 25 (41.7%)	VATS 35 (58.3%)	p-value
Age (years)	65.32±2.61	64.71±2.52	0.370
Sex			
Male	13 (52.0)	17 (48.6)	0.793
Female	12 (48.0)	18 (51.4)	
Smoking status			
Current	6 (24.0)	10 (28.6)	0.824
Former	12 (48.0)	14 (40.0)	
Never	7 (28.0)	11 (31.4)	
Pack years	26.04±4.15	25.11±4.28	0.406
FEV1%	96.48±9.86	95.81±13.16	0.919
DLCO%	81.96±5.55	82.38±5.66	0.781
Clinical stage			
Ia	17 (68.0)	24 (68.6)	0.963
Ib	8 (32.0)	11 (31.4)	
Comorbidities			
Pulmonary	10 (40.0)	15 (42.9)	0.825
Cardiac	11 (44.0)	25 (71.4)	0.033
Endocrine	21 (84.0)	18 (51.4)	0.009
Renal	20 (80.0)	30 (85.7)	0.558
Other cancers	7 (28.0)	8 (22.9)	0.650
Pathology			
Adenocarcinoma	20 (80.0)	22 (62.9)	0.153
Others	5 (20.0)	13 (37.1)	
Length of stay (days)	5.61±2.11	6.31±2.47	0.246

Table. II

Comparison of life quality scores among the study groups

Period	Thoracotomy 25 (41.7%)	VATS 35 (58.3%)	p-value
Mental component summary			
Baseline	45.91±1.82	44.90±2.11	0.060
Postoperative	47.68±1.79	47.25±1.51	0.313
4 months	46.89±6.04	45.98±4.66	0.153
8 months	44.46±202	43.82±3.08	0.358
12 months	49.48±3.55	48.11±4.07	0.178
Physical component summary			
Baseline	51.81±2.46	51.09±4.96	0.334
Postoperative	46.16±1.85	45.19±6.25	0.082
4 months	47.41±2.43	46.64±3.24	0.246
8 months	48.96±3.44	47.94±4.56	0.292
12 months	50.80±3.24	52.32±5.65	0.664

Table. III

Comparison of pain among the study groups

Period	Thoracotomy 25 (41.7%)	VATS 35 (58.3%)	p-value
Baseline	5 (20.0)	6 (17.1)	0.778
Postoperative	5 (20.0)	11 (31.4)	0.324
4 months	6 (24.0)	8 (22.9)	0.918
8 months	7 (28.0)	5 (14.3)	0.190
12 months	7 (28.0)	6 (17.1)	0.314

4. DISCUSSION

Patient-reported outcomes (PROs) have indeed gained significant attention in the medical and healthcare literature in recent years. This growing focus on PROs stems from an evolving understanding of healthcare, where the emphasis has shifted from purely clinical measures to a more patient-centered approach[11]. In our study physical component of quality of life shows 52.32±5.65 score in VATS group as compared to 50.80±3.24 score in thoracotomy group at 12th month post operative period.

Similar study was conducted by Rizk NP et al[12] and reported findings that patients' reported scores for Postoperative Complications (PCS) and pain were similar in the first 12 months after undergoing Video-Assisted Thoracoscopic Surgery (VATS) and thoracotomy.Another study by Cerfolio et al[13] reported that impact on quality of life can extend beyond the immediate postoperative period. Many patients continue to experience reduced physical functioning, particularly in the first 6 to 12 months after surgery.

Singer et al[14] also reported that Assessing the quality of life (QOL) after lung cancer surgery is an important aspect of patient care and research. Current evidence indicates that patients undergoing minimally-invasive pulmonary resection with a thoracoscopic approach tend to experience better QOL during recovery when compared to patients who undergo thoracotomy, particularly in the domains of physical functioning and pain. In another stud Brunelli et al[15] reported similar findings that decrease in quality of life after lobectomy is natural

response that can be handled till 12 months follow up.

Sugiura et al[16] addresses an important aspect of evaluating robotic lung resections, specifically focusing on the need to consider both short-term and long-term outcomes.Improved short-term outcomes, such as reduced pain and shorter hospital stays, are important for immediate recovery, but they do not necessarily guarantee better long-term results. In another study Rauma et al[17] reported that video-assisted thoracoscopic surgery (VATS) was generally associated with several potential benefits compared to open thoracotomy for certain lung and chest procedures, including reduced pain, shorter hospital stays, and faster recovery.

In another study Avery et al[18] also reported similar findings that video-assisted thoracoscopic surgery (VATS) was generally associated with several potential benefits compared to open thoracotomy for certain lung and chest procedures, including reduced pain, shorter hospital stays, and faster recovery.

Another randomized trial was conducted by Bendixen et al[19] and reported that patients in the VATS group reported significantly less clinically relevant moderate to severe pain scores during the immediate recovery period and VATS reported better self-reported overall Quality of Life (QOL) during the first 52 weeks after surgery. Surgery for lung cancer, regardless of the specific surgical technique used, was found to be generally well-tolerated. minimally-invasive thoracoscopic approach to lung cancer surgery tends to result in better Patient-Reported Outcomes (PRO) when compared to other surgical techniques[20].

5. CONCLUSION

Patient-reported Physical Component Summary (PCS) and pain scores were similar in the first 12 months following in two different surgical procedures Video-Assisted Thoracoscopic Surgery (VATS) and thoracotomy.

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