Journal of Health and Medical Sciences

Hussain, S., Abbasi, A., Zhang, L. W., & Ainiwaer, J. (2023), Minimally Invasive Thoracoscopic Surgery of Lung Adenocarcinoma in Old Age People. *Journal of Health and Medical Sciences*, 6(4), 229-236.

ISSN 2622-7258

DOI: 10.31014/aior.1994.06.04.296

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The Asian Institute of Research
Journal of Health and Medical Sciences
Vol.6, No.4, 2023: 229-236
ISSN 2622-7258

DOI: 10.31014/aior.1994.06.04.296

Minimally Invasive Thoracoscopic Surgery of Lung Adenocarcinoma in Old Age People

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Abstract
Background: Lung cancer is the most frequent human malignancy and the principal cause of cancer-related death worldwide. Adenocarcinoma is now the main histologic type, accounting for almost half of all the cases. Lung cancer is the leading cause of cancer-related death in most developed countries. Over the last 50 years, the prevalence of adenocarcinoma has been increasing comparative to other lung cancer subtypes. Objective: To determine Minimally invasive thoracoscopic surgery of lung adenocarcinoma in old age. Methods: A cross-sectional study was conducted at Shifa International hospital Islamabad Pakistan, which was performed between April 2020 and January 2022. The total number of patients in our study was 152. The number of Male patients was 62 and female were 90. In 152 consecutive patients who underwent for CT guided biopsy, the needle was used 18 Guage. We diagnosed the Lung adenocarcinoma of all patients on CT scan. The age of all patients was more than 40 years. We took in our study stage (1A) of lung adenocarcinoma, which has further 3 subtypes 1A1,1A2 and 1A3. The size of Stage 1A1 up to 1 cm, Stage 1A2 >1 cm <2cm and stage 1A3 >2cm <3cm. We did for all patients Video-assisted thoracoscopic surgery. The surgeon makes one to five small incisions, each one an about 1 inch in between two ribs. Data was tabulated and analyzed by SPSS. Results: The stage of lung adenocarcinoma 1A1 in male patients were 17 and female were 31. The stage of lung adenocarcinoma 1A2 in male patients were 29 and female were 37. The stage of lung adenocarcinoma 1A3 in male patients were 16 and female were 22. Total male patients were 62 and females were 90. P-value of stages of lung adenocarcinoma in gender was 0.64. The stage of lung adenocarcinoma in the age group of 40-50 years 1A1 were 8, 1A2 were 7 and 1A3 were 2. The total patients with age 40-50 years were 17. The stage of lung adenocarcinoma in the age group of 51-65 years 1A1 were 34, 1A2 were 48 and 1A3 were 19. The total patients with age 51-65 years were 101. The stage of lung adenocarcinoma in the age group of >66 years 1A1 was 6, 1A2 was 11 and 1A3 was 17. The total patients with age >66 years was 34. P-value of stages of lung adenocarcinoma in age group was 0.003. The minimum patient recovery time was 3 weeks and the maximum patient recovery time was 5 weeks. The minimum age group of patient was 43 and the maximum age group of patients was 77. MEAN±SD of age was 59.67±7.85. Conclusion: Video-assisted thoracoscopic surgery (VATS) is a reliable and safe approach for the diagnosis and treatment of lung adenocarcinoma with a low complication rate. Minimally invasive techniques are even more advantageous among the elderly. The patient recovery time from 3 weeks to 5 weeks. The frequency of lung adenocarcinoma is more common in the upper lobe as compare to other lobes. In our study, the prognosis of VATS was better than Open Surgery because the patient's recovery time was less than the open surgery procedure.

Keywords: Video-Assisted Thoracoscopic Surgery (VATS), Lung Adenocarcinoma and Minimally Invasive Surgery

1. Introduction

Lung cancer is the most common human malignancy and the principal cause of cancer-related death worldwide. Adenocarcinoma the main histologic type nowadays, accounting for almost half of all the cases (Kuhn et al., 2018). In most developed countries lung cancer is the leading cause of cancer-related death(Nakamura et al., 2014). Comparative to other lung cancer subtypes, the prevalence of adenocarcinoma has been increasing Over the last 50 years (McLean et al., 2018). The mortality and prevalence, of lung cancer in Pakistan are not known, due to consistent statistics on the incidence, the absence of a population-based cancer registry (Sheikh et al., 2022). Many factors have been linked to this change, such as: a) the development of filtered cigarettes with less tar, which permit deeper inhaling and greater peripheral dispersion of cigarette smoke; b) rising air pollution; and c) smoking cessation at an earlier age. In comparison to other histologic subtypes of lung cancer, the proportion of adenocarcinomas has grown due to improved attitudes on the hazards associated with smoking cigarettes (Hutchinson et al., 2019). A significant portion of patients with lung cancer experience severe symptoms, including dyspnea, hemoptysis, tiredness, appetite loss, and weight loss (Lemjabbar-Alaoui et al., 2015). Low-dose CT (LDCT) is now the gold standard for screening for lung cancer. Furthermore, compared to no screening, this particular screening has a 99% specificity and an 85% selectivity, according to a study (NELSON). Lung cancer kills people because it is frequently discovered when the disease has progressed to an advanced stage. Effective early identification, a thorough etiology, and the right medications all contribute to lung cancer treatment (Nooreldeen et al., 2021). Tobacco use is the primary risk factor for all forms of lung cancer, including adenocarcinoma. Because tobacco smoke frequently contains carcinogens, the risk increases with exposure, whether primary or secondary (Myers et al., 2023).

Surgical methods, such as lobectomy or segmentectomy, are the mainstay of treatment for individuals with early-stage lung cancer (Ogawa et al., 2015). Numerous significant prognostic markers, including gender, age, performance status, tumour-node-metastasis (TNM) stage, and histology, have been identified(Sakurai et al., 2014). Men's rates were 40.30 per 100,000 while women's rates were 17.13 per 100,000. Both men's and women's age-standardized mortality rates (ASMR) increased in rural regions. because to changes in the cancer spectrum and the aging population (Cao et al., 2019). The size of the main tumor in the long axis as evaluated by multiplanar reconstruction, as well as its connection with the surrounding structure, determine the tumor stage. Stage 1A1 is up to 1 centimeter, Stage 1A2 is between 1 and 2 cm, and Stage 1A3 is between 2 and 3 cm (Lim et al., 2018). For patients with stage I non-small cell lung cancer (NSCLC), VATS surgery is a safe and feasible option that allows for timely surgical therapy while maintaining the same level of medical care (Jiang et al., 2021). When it comes to postoperative results, the minimally invasive pulmonary resection technique is thought to be the best surgical method for treating early-stage non-small cell lung cancer (NSCLC). It has significant benefits over standard open surgery (Gonfiotti et al., 2018). One of VATS's main advantages is that it causes less discomfort after surgery (Dziedzic et al., 2015). Making 1.5–2 cm access incisions for two to four thoracoscopic ports and 2.6–6 cm access incisions in the frontal region of the thorax for a mini-thoracotomy (utility incision) are the fundamental presumptions of VATS lobectomy. The number of ports (with 1, 2, or 3) that are used to introduce surgical tools varies and is determined by the surgeon's level of skill (Dziedzic et al., 2015). Recently, minimally invasive thoracic surgery (MITS) has been added to the toolkit of thoracic surgeons. It can be used in both therapeutic and diagnostic processes (Hsin et al., 2010). For the diagnosis and treatment of pulmonary disorders, video-assisted thoracoscopic surgery (VATS) is a trustworthy and safe method with a low complication rate (less than 10%) and a mortality rate of less than 1-2 percent (Imperatori et al., 2008). A safe and effective sequential procedure for VATS has been developed, integrating thoracoscopic surgery and intraoperative C-arm CT scanning in a hybrid operating room (Gill et al., 2015). If patients agree to a 23-hour accelerated recovery pathway following a VATS lobectomy, a sizable percentage of them can be safely released (Dumitra et al., 2020). Reductions in blood loss, drainage time, surgical discomfort, and hospital stay were found to be very beneficia (Abouarab et al., 2018). Even more beneficial are less invasive procedures for the elderly and individuals with impaired lung function (Klapper et al., 2015).

2. Materials and Methods

A cross-sectional study was conducted at Shifa International hospital Islamabad Pakistan, which was performed between April 2020 and January 2022. The total number of patients in our study was 152. The number of Male patients was 62 and female were 90. In 152 consecutive patients who underwent for CT guided biopsy, the needle was used 18 Guage. We diagnosed the Lung adenocarcinoma of all patients on CT scan. The age of all patients were more than 40 years. We took in our study stage (1A) of lung adenocarcinoma, which has further 3 subtypes 1A1,1A2 and 1A3. The size of Stage 1A1 up to 1 cm, Stage 1A2 >1 cm <2cm and stage 1A3 >2cm <3cm. We did for all patients Video-assisted thoracoscopic surgery. The surgeon makes one to five small incisions, each one an about 1 inch in between two ribs. Data was tabulated and analyzed by SPSS.

2.1. Clinical and laboratory examination

Weight, sex, and age were noted. For all patients, we did CT guided biopsy to confirm Lung adenocarcinoma.

3. Results

Table 1: Patient characteristics of enrolled patients (n=152)

Variables		
Gender	Frequency	Percentage
Male	62	40.8
Female	90	59.2
Age Group		
40-50 years	17	11.2
51-65 years	101	66.4
>66 years	34	22.4
Laterality Lung		
Right lung	95	62.5
Left lung	57	37.5
Stage of Lung Adenocarcinoma		
1A1	48	31.6
1A2	66	43.4
1A3	38	25.0
Smoking		
Yes	49	32.2
No	103	67.8
Cough		
Yes	101	66.4
No	51	33.6
Weight Loss		
Yes	94	61.8
No	58	38.2
Major Complication	0.0	0.0
Cancer spread to mediastinal Lymph nodes or other organs	0.0	0.0
Lung Lobe		
Upper Lobe	107	70.4
Middle Lobe	35	23.0
Lower Lobe	10	6.6

The current study included a total of 152 patients with Lung adenocarcinoma whose characteristics are summarized in Table 2. The frequency of male patients in our study was 62 and their percentage was 40.8. The frequency of female patients in our study was 90 and their percentage was 59.2. The frequency of age group 40-50 years patients

was 17 and their percentage was 11.2. The frequency of age group 51-65 years patients was 101 and their percentage was 66.4. The frequency of age group >66 years patients were 34 and their percentage was 22.4. The frequency of the right lung was 95 and their Percentage was 62.5. The frequency of the left lung was 57 and their Percentage was 37.5. The frequency of the Stage of lung adenocarcinoma in stage 1A1 was 48 and their percentage was 31.6. The frequency of the Stage of lung adenocarcinoma in stage 1A2 was 66 and their percentage was 43.4. The frequency of the Stage of lung adenocarcinoma in stage 1A3 was 38 and their percentage was 25.0. The frequency of smoker in our study were 49 and their frequency was 32.2. The frequency of non-smoker in our study were 103 and their frequency was 67.8. The frequency of cough was 101 and their percentage was 66.4. The frequency of non-cough patients was 51 and their percentage was 33.6. The frequency of weight loss was 94 and their percentage was 61.8. The frequency of patients whose don't lose weight was 58 and their percentage was 38.2. The frequency of cancer spread to mediastinal lymph node or other organs were 0.0 and their percentage was same 0.0. The frequency of the upper lobe of the lung was 107 and their percentage was 70.4. The frequency of the middle lobe of the lung was 35 and their percentage was 23.0. The frequency of the lower lobe of the lung was 10 and their percentage was 6.6.

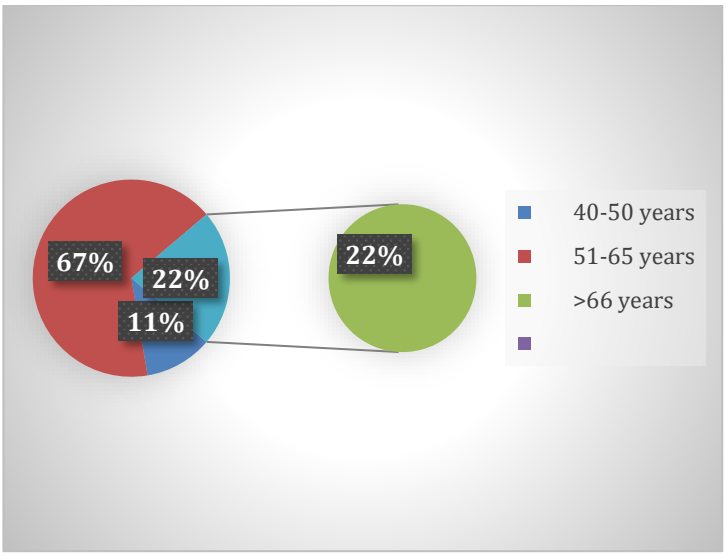

Figure 2: graph showing stages of Lung Adenocarcinoma

Figure 2: The above figure shows lung adenocarcinoma 67% in the age group of 51-65 years. Lung adenocarcinoma 22 % in the age group of >66 years. Lung adenocarcinoma 11% in the age group of 40-50 years.

Table 2: different characteristics of all the enrolled patients (*n=152*)

Variables	Minimum	Maximum	Mean±SD
Age (Years)	43	77	59.67±7.85
Patient Recovery Time (Weeks)	3	5	3.69±0.47
Size of Lung Adenocarcinoma (cm)	---	---	1.418±0.62

According to our study today patients were 152, The minimum age group of patients was 43 and the maximum age group of patients was 77. MEAN±SD of age was 59.67±7.85. The minimum patient recovery time was 3 weeks and the maximum patient recovery time was 5 weeks. MEAN±SD of patient recovery time was 3.69±0.47. Mean±SD of the Size of lung adenocarcinoma was 1.418±0.62.

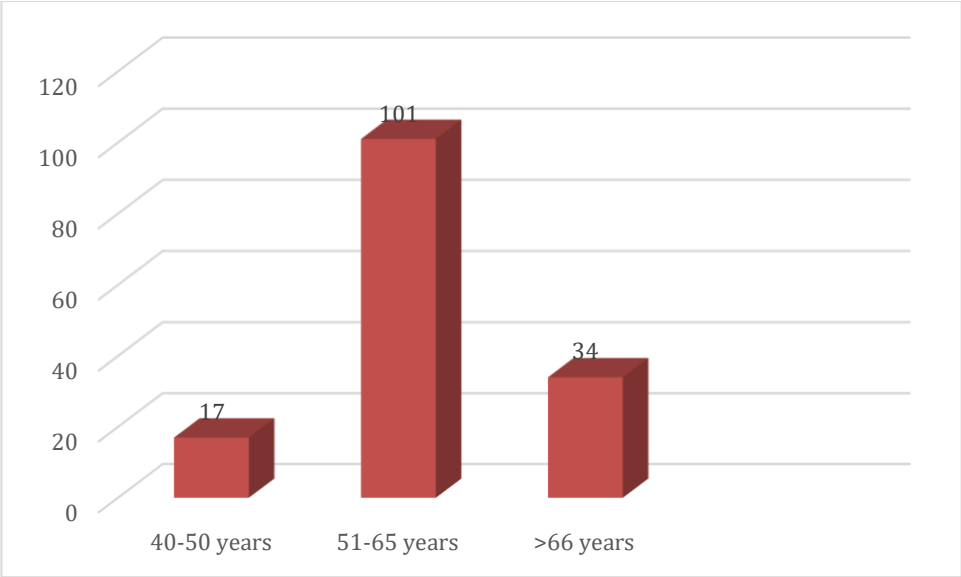

Figure 3: Patients distribution on the basis of Lung Lobe

Figure 3: The above figure shows patients distribution on the basis of Lung Lobe. The number of patients have lung adenocarcinoma in the upper lobe was 101, middle lobe was 34 and lower lobe was 17.

Table 3: stratification of Stage of Lung Adenocarcinoma on the basis of gender and age group (*n=152*)

	Stage of Lung Adenocarcinoma			Total	P-value
	1A1	1A2	1A3		
Gender					0.64
Male	17	29	16	62	
Female	31	37	22	90	
Age Groups					0.003
40-50 years	8	7	2	17	
51-65 years	34	48	19	101	
>66 years	6	11	17	34	

The stage of lung adenocarcinoma 1A1 in male patients were 17 and female were 31. The stage of lung adenocarcinoma 1A2 in male patients were 29 and female were 37. The stage of lung adenocarcinoma 1A3 in male patients were 16 and female were 22. Total male patients were 62 and females was 90.

P-value of stages of lung adenocarcinoma in gender was 0.64.

The stage of lung adenocarcinoma in the age group of 40-50 years 1A1 were 8, 1A2 were 7 and 1A3 were 2 . The total patients with age 40-50 years were 17. The stage of lung adenocarcinoma in the age group of 51-65 years 1A1 were 34, 1A2 were 48 and 1A3 were 19. The total patients with age 51-65 years were 101. The stage of lung adenocarcinoma in the age group of >66 years 1A1 was 6, 1A2 was 11 and 1A3 was 17. The total patients with age >66 years was 34.

P-value of stages of lung adenocarcinoma in age group was 0.003

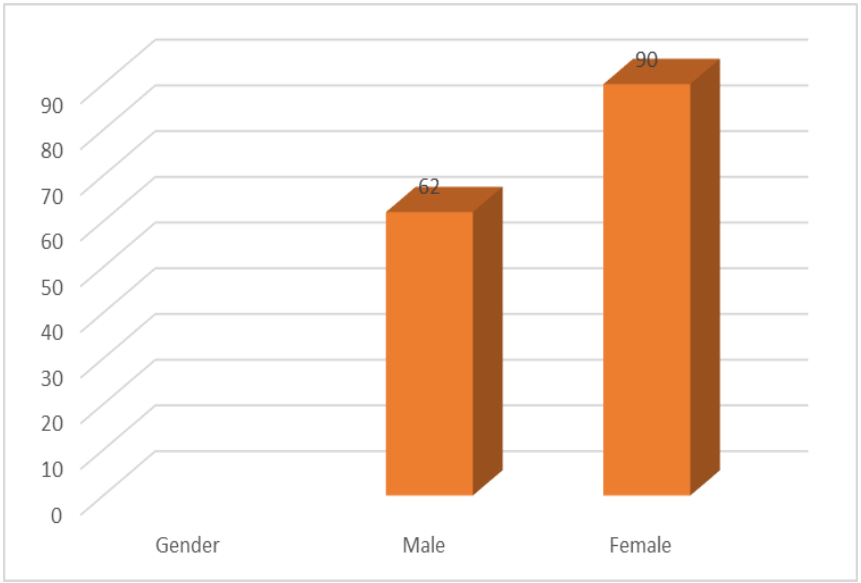

Figure 1: Bar graph showing gender distribution *(n=152).*

In the above bar graph gender distribution the total number of patients was (n=152). The number of male patients in this study was 62 and the number of female patients was 90.

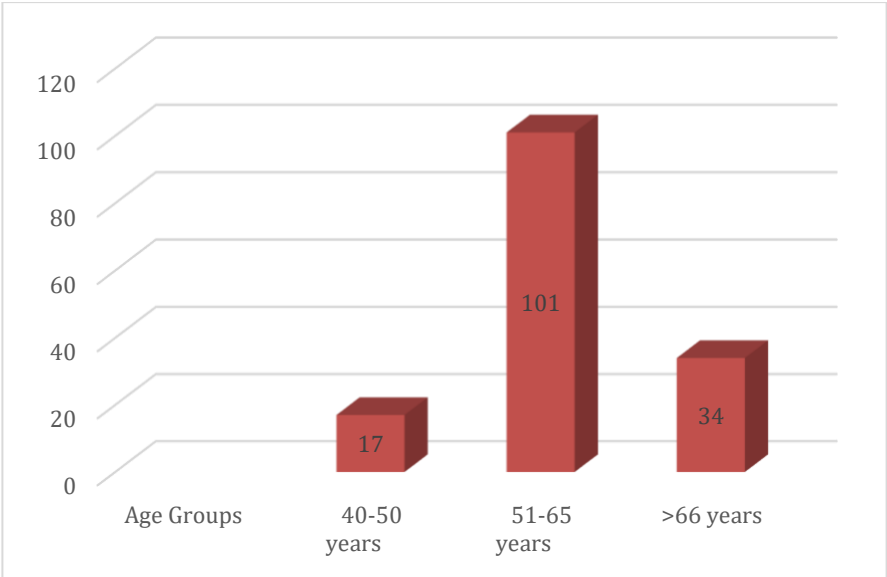

Figure 4: Patients distribution on the basis of Age groups

Figure 4: The above figure shows patients distribution on the basis of age group. Age group of 51-65 years patients was more 101. Age group of >66 years patients was 34. Age group of 40-50 years patients was 17.

4. Discussion

The NCCN guidelines have recommended Video-assisted thoracoscopic surgery (VATS) lobectomy as the preferred surgical procedure for non-small cell lung cancer (NSCLC). Since its inception twenty years ago, it has become more well-established worldwide for the treatment of lung cancer, particularly in the early stages of non-small cell lung cancer. When compared to open thoracotomy, VATS lobectomy presents a number of potential advantages, including a shorter hospital stay, less discomfort following surgery, a lower inflammatory response, expedited access to adjuvant chemotherapy, and accelerated recuperation. Many facilities now treat early-stage lung cancer with VATS lobectomy with lymph node dissection as the standard of care because of the favorable short- and perioperative outcomes it provides, such as shorter hospital stays, shorter chest drain times, and less

intraoperative blood loss (Augustin et al., 2016). There are three types of VATS resections for lung cancer: standard, limited, or sub-lobar, and extended. A VATS lobectomy combined with a lymphadenectomy constitute a standard resection. In most facilities, it is now the norm for treatment, and long-term survival rates are comparable to those of traditional thoracotomies. It is limited to early-stage peripheral lung malignancies when endostaplers can be used to separate the bronchial and lobar vascular systems with fissures (Augustin et al., 2013).

5. Conclusion

Video-assisted thoracoscopic surgery (VATS) is a reliable and safe approach for the diagnosis and treatment of lung adenocarcinoma with a low complication rate. Minimally invasive techniques are even more advantageous among the elderly and those with limited pulmonary function. Lung adenocarcinoma is more in females as compare to males. After Video-assisted thoracoscopic surgery (VATS) the patient recovery time from 3 weeks to 5 weeks. The frequency of lung adenocarcinoma is more common in the upper lobe as compared to other lobes. The patient's weight is slightly reduced. In our study, the prognosis of VATS was better than Open Surgery because the patient's recovery time was less than the open surgery procedure.

Author Contributions: All authors contributed to this research.

Funding: Not applicable.

Conflict of Interest: The authors declare no conflict of interest.

Informed Consent Statement/Ethics Approval: Not applicable.

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