Original Article

Comparison of the Outcome of Single Port Subxiphoid Vats Thymectomy Versus Transternal Thymectomy

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ABSTRACT

Objective: To compare outcomes of single port sub-xiphoid VATS thymectomy with trans-sternal thymectomy.
Study Design: Retrospective study
Place and Duration of Study: This study was conducted at the Lady Reading Hospital Peshawar for 6 months, Medical records of last 5 years from January, 2018 to June, 2022.
Materials and Methods: All patients that underwent thymectomy by sub-xiphoid VATS or trans-sternal approach were included. VATS indication included Masaoka stage I-II thymoma (diameter <5 cm). Patients were divided into two groups depending upon approach taken for thymectomy, viz. single port sub-xiphoid VATS and trans-sternal thymectomy. SPSS v23.0 was used for data analysis. To test for comparison between outcomes of sub-xiphoid and trans-sternal thymectomy, either independent t-test or Mann-Whitney U tests were applied keeping p-value <0.05 as statistically significant.
Results: 70 patients underwent S-VATS while 55 T-VATS. Mean operative time, blood loss, post-operative pain, duration of chest tube and hospital stay in S-VATS group 87.68 ± 43.15 minutes, 78.19 ± 49.44 ml, 2.65 ± 0.59, 2.98 ± 1.29 days and 4.1± 1.88 days respectively. In T-VATS group, the mean values were 108.33 ± 45.25 minutes, 125.44 ± 98.15 ml, 5.2 ±1.21, 3.19 ± 2.11 days and 5.4 ± 2.14 days, respectively. A significant difference of p<0.01 was reported in-between both the groups [Table II]. A total of 10 post-operative complications were observed in S-VATS group while 14 in T-VATS group.
Conclusion: Both intra-operative and post-operative outcomes were in favorable towards S-VATS when compared with that of T-VATS. Further studies are required to validate the findings of this study.

Key Words: Thymoma**,** Myasthenia Gravis**,** Thymectomy, Sub-xiphoid VATS, trans-sternal VATS

Citation of article: Khan MA, Abdul Baseer, Ali F, Aslam T, Tahir I, Ahmad A. Comparison of the Outcome of Single Port Subxiphoid Vats Thymectomy versus Transternal Thymectomy. Med Forum 2022;33(9):80-84.

INTRODUCTION

The incidence of thymoma in Pakistan is estimated to be about 0.15 per 100,000 [1]. In the management of tumors of the thymus gland through surgical techniques, minimal invasive surgery imparts a key role[2]. The currently popular surgical procedures such as Video-Assisted Thoraoscopic (VATS) thymectomy has shown to have multiple beneficial effects such as low pain levels post-operatively, smaller incisions, lesser peri-operative complications with early rehabilitation and so shorter stays in the hospital [3]. Nonetheless, the conventionally practiced trans-sternal approach according to literature has reported some drawbacks, like poorer visualization of contra-lateral phrenic nerve and mediastinal fat, impairment of costal nerves and difficulties encountered in the resection of upper thymic pole [4].

It is said that for thymectomy the idea approach must have the adequacy of exposing entire mediastinum anteriorly for facilitating resection of all mediastinal fat and thymic tissues [5]. This is why it has been proposed that the sub-xiphoid approach can help in providing an optimum surgical view of complete thymus as well as phrenic nerves bilaterally for easily achieving extended thymectomy in required cases [6].

In treating of thymoma and Myasthenia Gravis (MG), thymectomy is considered to be the most commonly carried out procedure. In patients with non-thymomatous MG, minimally invasive approach for thymectomy has been preferred while for thymoma patients, a median trans-sternal approach is traditionally been given preference [7]. Due to advantages over the trans-sternal thymectomy approach such as improved

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Received: July, 2022
Accepted: August, 2022
Printed: September, 2022

cosmetics, few complications and lesser trauma, VATS thymectomy is more preferred in treating MG and thymoma [8].

Various minimally invasive techniques have been used in thymectomy. These include the trans-cervical approach, sub-xiphoid approach, VATS either unilateral or bilateral, robotic technique or even a combination of the above mentioned approaches [9]. With that said, a consensus has not been reached as to which optimal approach is surgically more advantageous for thymectomy [10]. First introduced by Kido et al in 1999 were the sub-xiphoid approaches [11]. Then Suda et al laid out their experiences using uni-portal sub-xiphoid thymectomy approach. Nonetheless, uni-portal approach did not allow for manipulation easily [12]. Therefore recently, sub-xiphoid and trans-sternal approaches have been developed that not only helps in providing improved operative field of vision of phrenic nerves bilaterally, as well as thymus superior horn [13]. In addition, the main benefit is the easy manipulation and mastery of operating technique [14]. As a result, the objective of this study was to compare the outcomes of single port sub-xiphoid VATS thymectomy with trans-sternal thymectomy.

MATERIALS AND METHODS

This was a retrospective study which was carried out Lady Reading Hospital Peshawar for 6 months. Medical records of last 5 years (from January 2018 to June 2022) were included in the study. The sampling technique was non-probability consecutive sampling technique. All the data obtained were from medical records. Any record having missing data was excluded from the study. Patients that underwent thymectomy using single port sub-xiphoid VATS or through trans-sternal approach were included in the study.

The pre-operative routine investigations recorded included electrocardiograms (ECG), and ultrasound cardiogram and laboratory examination. Computed tomography (CT) scan was done for evaluating tumor of thymus. VATS indication included Masaoka stage I-II thymoma (of diameter less than 5 cm), thymic cysts which could not be distinguished from thymoma and thymic gland hyperplasia along with MG. If patients reported having symptoms of MG, then their neurological consultation was acquired and assessed by a neurologist.

The patients were divided into two groups depending upon the approach taken for thymectomy, viz. single port sub-xiphoid VATS in one group and trans-sternal thymectomy in another group. All the procedures had been carried out by 4 surgeons of the hospital having at least 5 years of experience. It was up to the discretion of the surgeon to choose the approach for thymectomy. Demographic details of patients were noted along with parameters for the surgical technique/approach, diagnosis, any complications that occurred peri-operatively and the outcome of surgery (immediate and primary) both were recorded and compared between the two approaches.

Post-operatively, patients were kept in the recovery room for about 1-2 hours before being transferred to Intensive care unit (ICU). The pre-operative medications (anti-biotic, analgesics) etc. were continued post-operatively as well. Evaluation of post-operative pain was done on Visual Analogue Scale (VAS) for pain ranging from zero 0-no pain to 10-worst imaginable pain. Intact chest tube was removed if volume of drainage recorded less than 100 ml having no leakage of air. Chest tubes were removed when patients were independently mobilized and had normal reports on chest radiograph.

Data Analysis: For data analysis, SPSS v23.0 was used. For quantitative continuous variables, mean and standard deviation were reported while for qualitative data, frequency and percentages were recorded. To test for comparison between outcomes of sub-xiphoid and trans-sternal thymectomy, either independent t-test or Mann-Whitney U tests were applied. In testing of comparisons, p-value was taken as <0.05 for statistical significance.

RESULTS

From the total of 125 patients included in the study, 70 patients had undergone sub-xiphoid VATS while 55 patients underwent trans-sternal VATS. The mean age of patients undergoing S-VATS was 52.44 ± 11.37 years while for T-VATS was 50.61 ± 12.58 years having an insignificant difference of p-0.24. 38 (54.3 %) patients were male while 32 (45.7 %) were females in the S-VATS group. Likewise, 29 (52.7 %) were males and 26 (47.2 %) were females in T-VATS group. The mean weight of patients in the S-VATS group was 62.23 ± 14.33 kg and in T-VATS group was 61.12 ± 12.85 kg with an insignificant difference of p-0.35. Mean height in S-VATS group was 158.2 ± 14.88 cm while in T-VATS group was 154 ± 14.25 with a insignificant difference of p-0.25. In S-VATS group, 24 (34.3 %) had Myasthenia Gravis (MG) while 19 (34.5 %) had MG in T-VATS group with a significant difference of p-0.03. According to Masaoka staging, 11 patients from S-VATS group were stage I were 13 stage II. 08 patients in T-VATS group were reported to have stage I and 17 stage II with a significant difference of p-0.04. Mean diameter of lesion in S-VATS group was 28.94 ± 19.42 mm while in T-VATS group was 30.22 ± 17.86 mm having an insignificant difference of p-0.53 [Table I].

The mean operative time in S-VATS group was 87.68 ± 43.15 minutes while in T-VATS group was 108.33 ± 45.25. Mean operative blood loss in S-VATS group was 78.19 ± 49.44 ml while in T-VATS group was 125.44 ± 98.15 ml. Post-operative pain score mean in S-VATS group was 2.65 ± 0.59 while in T-VATS group was 5.2

±1.21. A significant difference of p<0.001 was observed in the above groups. Mean duration of chest tube in S-VATS group was 2.98 ± 1.29 days while in T-VATS group was 3.19 ± 2.11 days. Mean duration of hospital stay was 4.1± 1.88 days while in T-VATS group was 5.4 ± 2.14 days. A significant difference of p<0.01 was reported in-between the group [Table 2].

A total of 10 post-operative complications were observed in S-VATS group while 14 in T-VATS group [Figure I].

Table No.1: Baseline demographics of patients included in the study (n=125)

Variables		S-VATS (n=70)	T-VATS (n=55)	p-value
Age (years)		52.44 ± 11.37	50.61 ± 12.58	0.24
Gender	Male	38	29	
	Female	32	26	
Weight (kg)		62.23 ± 14.33	61.12 ± 12.85	0.35
Height (cm)		158.2 ± 14.88	154 ± 14.25	0.25
Myasthenia Gravis	Yes	24	19	0.03
	No	46	36	
Co-morbid	Cardiac	09	06	
	Respiratory	11	09	
	Diabetes	19	13	
	Smoker	16	18	
	Thymoma	22	18	
Masaoka Stage	I	11	08	0.04
	II	13	17	
Diameter of Lesion (mm)		28.94 ± 19.42	30.22 ± 17.86	0.53

Table No.2: Comparison of operative outcome in-between the two approaches (n=125)

Variables	S-VATS	T-VATS	p-value
Mean operative time (minutes)	87.68 ± 43.15	108.33 ± 45.25	<0.001
Mean operative blood loss (ml)	78.19 ± 49.44	125.44 ± 98.15	<0.001
Duration of chest tube (days)	2.98 ± 1.29	3.19 ± 2.11	<0.01
Post-operative pain score	2.65 ± 0.59	5.2 ±1.21	<0.001
Duration of hospital stay (days)	4.1± 1.88	5.4 ± 2.14	<0.01

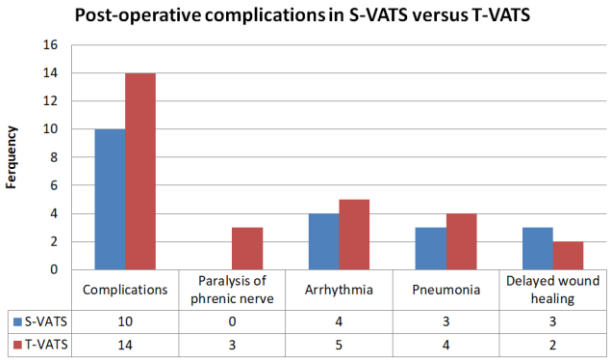

Figure No.1: Post-operative complications in |S-VATS versus T-VATS (n=125)

DISCUSSION

In the treatment of thymoma, MG and other anterior mediastinal tumors, thymectomy is regarded as the cornerstone [15]. Since it has substantial technical benefits and better oncological results, for many years trans-sternal approach of thymectomy was termed as gold standard for resectable surgeries [16]. Recently, an alternate approach to thymectomy through minimally invasive techniques is being widely accepted, thereby ensuring complete removal of the tumor and avoids the complications related to open surgeries [17]. Nonetheless, researches have not yet completely regarded minimally invasive thymectomy to be efficacious from oncological perspective. Thoracoscopy might raise risk for cardiac, pulmonary complications, incomplete resection leading to regional recurrence [18].

In our study, patients with early-stage thymoma that were stage I and II of Masaoka stage were used so that a better outcome could be compared in-between S-VATS and T-VATS. None of the patients were found to have an incomplete resection and since the study was retrospective in nature, there follow ups were not recorded. However, with regards to the post-operative outcomes in-between S-VATS and T-VATS, the overall post-operative complications reported in S-VATS group were 10 in number, being 14 % while in T-VATS group were 14, 25 % in number. Most common complication in S-VATS group was post-operative pneumonia in 5 patients while 5 patients had

arrhythmia in T-VATS group. The overall mean operative time, blood loss, duration of chest tube, post-operative pain and hospital stay all were lesser in the VATS group when compared with that of T-VATS group. Similar findings have been observed in other studies as well [19].

Similarly, another retrospective study by Chen et al observed that thymectomy by sub-xiphoid approach was associated with being a safer and feasible technique in treatment of thymoma, MG and other anterior mediastinal tumors. The mean operative time noted was 109 minutes (while in our study it was 88 minutes. Mean blood loss in the study was 47 ml as opposed to 78 ml in our study. An overall 87.8 % of patients were reported to have positive outcomes, free from complications [20]. Likewise in our study as well, majority of patients had positive outcomes, being free from any complications.

In yet another study by Suda et al, it was reported that single port thymectomy via sub-xiphoid approach showed better results than other approaches. However, the study observed that the procedure required that all instruments be inserted through a single port which may lead to interference with each other, leading to reduction in instruments maneuverability [21].

Published literature suggests that S-VATS is the preferred option for thymoma that are below 5 cm in diameter. Likewise, the mean diameter of lesion in our study was 28.94 ± 19.42 mm for S-VATS while 30.22 ± 17.86 mm for T-VATS. Nevertheless, for lesions above 5 cm, and open thymectomy are usually done [22].

CONCLUSION

According to the results of the study, single port thymectomy using sub-xiphoid approach showed better outcomes in comparison to trans-sternal thymectomy approach. Both intra-operative and post-operative outcomes were in favorable towards S-VATS than to T-VATS.

Author's Contribution:

Concept & Design of Study:	Mohammad Abid Khan
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Conflict of Interest: The study has no conflict of interest to declare by any author.

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