Clinics in Surgery

Research Article
Published: 16 Feb, 2018

Post-Operative Atrial Fibrillation: Reduction of Incidence in Thoracoscopic versus Open Lobectomy for Lung Cancer

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Abstract

Atrial Fibrillation (AF) is the most common arrhythmia after thoracic surgery and is associated with increased morbidity and mortality and has cost implications with increased length of hospital stay. This study aims to compare the incidence of post-operative atrial fibrillation (AF) in patients who had anatomical single lobectomy by Video Assisted Thoracoscopic Surgery (VATS) versus thoracotomy. To our knowledge, such a comparison has not been reported in the literature.

Materials and Methods

At our institution, the records of all patients that underwent anatomical single lobectomy via Video Assisted Thoracoscopic Surgery (VATS) and open thoracotomy between March 2013 and June 2016 were retrospectively analysed. We sought to compare the incidence of post-operative AF in the two groups. The exclusion criterion was history of arrhythmia. Atrial fibrillation was defined by clinical diagnosis with confirmation on electrocardiography. Open lobectomy was performed through a standard posterolateral thoracotomy with epidural catheters for pain control. The VATS group underwent surgery using the anterior approach with a utility incision and two other port incisions. Intercostal block from the third to ninth intercostal spaces was performed under direct vision towards the end of the procedure in addition to an intercostal catheter at the level of the chest drain for local anaesthetic infusion.

The data collated included age, sex, BMI, the side of the lobectomy, length of post-operative stay, and the development of AF. A comparison was made to assess the incidence of post-operative AF between the two groups.

Results

A 377 patients underwent isolated anatomical lobectomies for non-small cell lung cancer at our institution between March 2013 and June 2016 (Table 1). 169 patients had this performed via VAT resection versus 208 by thoracotomy. Using the Student's t-test, there was no significant differences between the 2 groups by age (p=0.19), FEV_1 (p=0.40) and BMI (p=0.11). The overall incidence of AF was 6.3% and found to be significantly lower in VATS group (2.9%vs9.1%, p=0.01). The side of the lobectomy was not found to be a contributing factor and only one patient that developed post-operative AF in the thoracotomy group had a history of ischaemic heart disease. There was no significant difference in mortality between VATS and thoracotomy group (2.9%vs1.5%, p=0.45).

This is a retrospective study that demonstrated VATS to be superior to open thoracotomy in the development of post-operative AF.

Discussion

AF is the most common complication following lung resection [1-4]. The incidence is reported to range from 10%-20% [2,5,12] and is associated with other complications increasing the length of stay with significant cost implications [5]. A number of studies have identified the risks factors for developing AF following thoracic surgery that include age, extent of hilar dissection, pre-existing cardiac disease, red cell transfusion and use of inotropes [3,5,9,10,12,13] however, the exact pathophysiology is likely to be multifactorial. Atrial arrhythmias peak on 2nd to 3rd day post-surgery and likely to be associated with inflammatory changes and sympathetic hyperactivity. Age is linked to degenerative and inflammatory changes in the atrial myocardium increasing the susceptibility to AF [14]. A twofold increase in the white cell count on the first post-operative day corresponds to threefold increase in risk for post-operative AF [15]. The incidence of AF amongst patients who

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Received Date: *15 Jan 2018*
Accepted Date*: 07 Feb 2018*
Published Date*: 16 Feb 2018*

Citation:
Tahir ZA, Hussain A, Khalil M, Qadri S, Habib AM, Chaudhry M, et al. Post-Operative Atrial Fibrillation: Reduction of Incidence in Thoracoscopic versus Open Lobectomy for Lung Cancer. Clin Surg. 2018; 3: 1913.

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Table 1: VATS lobectomy versus Open Lobectomy.

	Open	VATS	Overall
Number of Patients	208 (55%)	169 (45%)	377
Age (Median)	67	69	68
Sex			
Male	104	75	179 (47%)
Female	104	94	198 (53%)
Right sided lobectomy	119	85	204
Left sided lobectomy	89	84	173
AF Incidence	19	5	24
Left sided lobectomy	8	2	
Right sided lobectomy	11	3	
Median hospital stay (days)			
AF group	10	9	10
Non-AF group	6	5	5

undergo non-thoracic surgery is lower. This may correspond to the blunt and sharp surgical trauma to the atria and to the sympathovagal fibres innervating the sinus node [3,4,8]. Autonomic neuronal injury may sensitize the atrial myocardium to catecholamines increasing susceptibility to arrhythmias [14]. The pulmonary veins are known to be an important source of ectopics capable of perpetuating AF [16]. Manipulation around the pulmonary veins could explain the reasons for a higher incidence of AF following pneumonectomy.

There is a controversy whether VATS reduces the incidence of post-operative AF. Some studies have reported a significant reduction in the VATS group [5,9,17] whilst others have failed to demonstrate an association [7,12]. The lower incidence may be related to the fact that VATS is associated with a less atelectasis, fewer transfusions and pneumonia [17]. In addition, we postulate that during an open lobectomy, there is a tendency to place the proximal staple line on the pulmonary veins close to the pericardium to allow adequate space for cutting between it and the distal suture close to the lung hilum. However, in VATS, we tend to staple and divide the vein closer to the lung hilum to prevent a long stump from obscuring the view. With less manipulation of the vein near the pericardium, there is less trauma and inflammation that could predispose to AF. With the absence of rib spreading pain is better controlled in VATS. This promotes deeper breathing, earlier mobility reducing the incidence of atelectasis and chest infections. Pain is linked to increased levels of catecholamine release increasing the susceptibility to atrial tachyarrhythmias [18].

Conclusion

VATS lobectomy was associated with significant reduction in the incidence of post-operative AF when compared with the open approach. We believe more studies are needed to confirm our novel finding which will add to the list of advantages of the VATS over the open approach in the surgical resection of lung cancer.

References

1. Fernando HC, Jaklitsch MT, Walsh GL, Tisdale JE, Bridges CD, Mitchell JD, et al. The society of thoracic surgeons practice guideline on the prophylaxis and management of atrial fibrillation associated with general thoracic surgery: executive summary. Ann Thorac Surg. 2011;92(3):1144-52.
2. Imperatori A, Mariscalco G, Riganti G, Rotolo N, Conti V, Dominioni L. Atrial fibrillation after pulmonary lobectomy for lung cancer affects long-term survival in a prospective single-center study. J Cardiothorac Surg. 2012;7:4.
3. Vaporciyan AA, Correa AM, Rice DC, Roth JA, Smythe WR, Swisher SG, et al. Risk factors associated with atrial fibrillation after noncardiac thoracic surgery: analysis of 2588 patients. J Thorac Cardiovascu Surg. 2004;127(3):779-86.
4. Lee SH, Ahn HJ, Yeon SM, Yang M, Kim JA, Jung DM, et al. Potentially modifiable risk factors for atrial fibrillation following lung resection surgery: A retrospective cohort study. Anaesthesia. 2016;71(12):1424-30.
5. Roselli EE, Murthy SC, Rice TW, Houghtaling PL, Pierce CD, Karchmer DP, et al. Atrial fibrillation complicating lung cancer resection. J Thorac Cardiovascu Surg. 2005;130(2):438e1-e9.
6. Ivanovic J, Maziak DE, Ramzan S, McGuire AL, Villeneuve PJ, Gilbert S, et al. Incidence, severity and perioperative risk factors for atrial fibrillation following pulmonary resection. Interact CardioVasc Thorac Surg. 2014;18(3):340-6.
7. Park BJ, Zhang H, Rusch VW, Amar D. Video-assisted thoracic surgery does not reduce the incidence of postoperative atrial fibrillation after pulmonary lobectomy. J Thorac Cardiovascu Surg. 2007;133(3):775-9.
8. Passman RS, Gingold DS, Amar D, Lloyd-Jones D, Bennett CL, Zhang H, et al. Prediction rule for atrial fibrillation after major noncardiac thoracic surgery. Ann Thorac Surg. 2005;79(5):1698-703.
9. Giambrone GP, Wu X, Gaber-Baylis LK, Bhat AU, Zabih R, Altorki NK, et al. Incidence and implications of postoperative supraventricular tachycardia after pulmonary lobectomy. J Thorac Cardiovascu Surg. 2016;151(4):982-9.
10. Gomez-Caro A, Moradiellos FJ, AusIn P, Díaz-Hellín V, LarrU E, PErez-Antón JA, et al. Risk factors for atrial fibrillation after thoracic surgery. Arch Bronconeumol. 2006;42(1):9-13.
11. Dyszkiewicz W, Skrzypczak M. Atrial fibrillation after surgery of the lung: Clinical analysis of risk factors1. Eur J Cardio Thorac Surg. 1998;13(6):625-8.
12. Onaitis M, D'Amico T, Zhao Y, O'Brien S, Harpole D. Risk factors for atrial fibrillation after lung cancer surgery: analysis of the Society of Thoracic Surgeons general thoracic surgery database. Ann Thorac Surg. 2010;90(2):368-74.
13. Hollings DD, Higgins RSD, Faber LP, Warren WH, Liptay MJ, Basu S, et al. Age is a strong risk factor for atrial fibrillation after pulmonary lobectomy. Am J Surg. 2010;199(4):558-61.
14. Allessie MA, Boyden PA, Camm AJ, Kléber AG, Lab MJ, Legato MJ, et al. Pathophysiology and Prevention of Atrial Fibrillation. Circulation. 2001;103(5):769-77.
15. Amar D, Goenka A, Zhang H, Park B, Thaler HT. Leukocytosis and increased risk of atrial fibrillation after general thoracic surgery. Ann Thorac Surg. 2006;82(3):1057-61.
16. Haissaguerre M, Jais P, Shah DC, Takahashi A, Hocini M, Quiniou G, et al. Spontaneous initiation of atrial fibrillation by ectopic beats originating in the pulmonary veins. N Engl J Med. 1998;339(10):659-66.
17. Paul S, Altorki NK, Sheng S, Lee PC, Harpole DH, Onaitis MW, et al. Thoracoscopic lobectomy is associated with lower morbidity than open lobectomy: A propensity-matched analysis from the STS database. J Thorac Cardiovascu Surg. 2010;139(2):366-78.
18. Kalman JM, Munawar M, Howes LG, Louis WJ, Buxton BF, Gutteridge G, et al. Atrial fibrillation after coronary artery bypass grafting is associated with sympathetic activation. Ann Thorac Surg. 1995;60(6):1709-15.