ORIGINAL ARTICLE

Open lung biopsy with local anesthesia

HA Mohebbi[1], Sh Mehrvarz*[1], F Panahi[1]

[1]Trauma Research Center, Department of Surgery, Baqiyatallah (a.s) University of Medical Sciences, Tehran, Iran

Abstract

Background: Open lung biopsy may be required in the patients with parenchymal lung disease who do not have a clearly defined diagnosis. There is no doubt thoracotomy with general anesthesia is preferable to local anesthesia; but it is associated with high risks in the severally ill patients. The aim of this study is to review our experience and compare the efficacy and complications of using local anesthesia versus general anesthesia for open lung biopsies in high risk patients.

Methods: From January 2002 to September 2004, Twenty five patients (18 males, 7 females) underwent open lung biopsy using minithoracotomy in the Baqiyatallah hospital in Tehran. 14 (56%) of them had open lung biopsy using general anesthesia (GA) and 11 (44%) selected for this procedure with local anesthesia (LA), all of LA group were excluded from GA because of their poor condition. we reviewed effectiveness of LA for minithoracotomy and also compared the safety, accuracy and various complications of this procedure between the two methods of anesthesia.

Results: The mean age in the first (GA) group was 42.5 (±14.7) years and in the second (LA) group was 49.6 (±12.2) years (NS). The average length of hospital stay, postoperative air leak, and the diagnostic accuracy was not significantly different between the two groups. There was one operative-related mortality in the second group (NS).

Conclusion: In selected patients with diffuse lung disease or peripheral lesions Local anesthesia is an acceptable substitute to general anesthesia for minithoracotomy to obtain adequate lung tissue for accurate diagnosis.

Keywords: Lung disease; Open lung biopsy; Video-assisted thoracic surgery; Local anesthesia

Introduction

The lung biopsy is widely recognized as a valuable tool for the diagnosis and management of diverse pulmonary disorders. Various types of lung biopsies are highly sensitive and specific tests available for diagnosis; they may be fraught with potential problems. Open Lnug Biopsy (OLB) has been advocated as an accurate and safe procedure for etiologic clarification of lung disease in which other less invasive diagnostic methods i.e. Bronchoscopy, Broncho Alveolar Lavage (BAL) and Trans Bronchial Lung Biopsy (TBLB) have not been successful.[1,2] Both limited thoracotomy (open biopsy) and Video Assisted Thoracoscopic Surgery (VATS) can be used for lung biopsies, but both procedures traditionally require general anesthesia. There are advantages and disadvantages with VATS, one advantage of VATS is shorter incision size, it gives better cosmetic results but in the patients with serious cardio pulmonary disease this advantage is not important, in contrast; using general anesthesia may be harmful. From several studies it is clear that the procedure-related costs of video-assisted thoracic surgery are higher than those of a limited thoracotomy, and that a substantial patient benefit has not been clearly demonstrated.[3,4]

***Correspondence:** Shaban Mehrvarz, MD, Associate Professor of Department of Surgery, Baqiyatallah (a.s) Hospital, Baqiyatallah (a.s) University of Medical Sciences, Vanak Square, Mollasadra Ave., Tehran, 1435915371, PO Box: 1455-6437, Iran.
Tel:+98-21-88033539; Fax: +98-21-88053609
Mobile:+98-912-1228658; e-mail: mehrvarz@bmsu.ac.ir

There is no doubt that thoracotomy with general anesthesia is preferable to local anesthesia; but it is associated with high risks in the severally ill patients. Djohar showed that local anesthesia can be a reliable substitute for general anesthesia in the lack of proper condition.[5]

The diagnostic sensitivity of Trans Thoracic Needle Aspiration (TTNA) is high, especially for the larger peripheral-based lung lesions, and TTNA is a relatively rapid procedure. TTNA's sensitivity falls for smaller or more central lesions, where the false negative rate can approach 25% to 30%; risk of pneumothorax and bleeding increases with central biopsies.[6]

The aim of this study is to review our experience and to evaluate whether local anesthesia is feasible to do minithoracotomy for lung biopsy in the patients who are high risk for general anesthesia. We also compared the accuracy and various complications of this procedure between the two methods of anesthesia.

Materials and Methods

From January 2002 to September 2004, Twenty five patients 18 males and 7 females aged from 21 to 73 years (mean 45.8 years) had open lung biopsy with minithoracotomy. 14 (56%) of them had open lung biopsy using General Anesthesia (GA) and 11 (44%) underwent this procedure with Local Anesthesia (LA) because of poor condition due to cardiopulmonary insufficiency or severe illness. None of the patients had definite diagnosis with bronchoscopy and BAL. Ten (40%) of them had negative CT- guided needle aspiration and 15 (60%) were not candidate for CT-guided needle aspiration because of diffuse lung disease or lesions smaller than 1 cm in diameter. In the LA group 8 (72.7%) of the patients had diffuse infiltration and 3 (27.2%) had peripheral lesions localized in the lower or middle lobe. Statistical analysis was done by student's *t* test and the significance of differences between two groups was accepted for *p* value less than 0.05.

At the time of surgery close observation were done by an anesthesiologist; the patients received intravenous sedation and oxygen by mask without intubation. Under cardiac monitoring a pulse- oxymeter was used to monitor the oxygen saturation. The patients prepared and draped for anterolateral minithoracotomy in supine position, with a long roll under their right or left shoulder and hip. Proper anesthesia obtained by infiltration of 20 mL Lidocaine 0.5% in the surgical incision site. A 6-8 cm skin incision was made under mammary fold along the fifth intercostal space. Deeper dissection was done near the parietal pleura with more Lidocaine infiltration up to 5 mg/Kg, if needed. We avoided excessive retraction with rib retractor in these patients and tried to take a portion of lung tissue with a triangular lung clamp and exit it from pleural cavity, so it was difficult to explore the upper lobe without enough retraction. Then we applied two long curved clamps in base of specimen in opposite direction and sew with continuous Vicryle 3/0 sutures in first line. After removal of specimen and release of clamps, the next layer with continuous locked sutures was inserted. After insertion of a chest tube through the lateral side of incision the intercostal muscle and other layers repaired. Before completion of the procedure to achieve longer time relief of postoperative pain we injected 5 mL of Bupivacain 0.5% in the same intercostal space and in the incision site.

In GA group, the position of patients, skin incision and the other details of the procedure was the same. All patients admitted in surgical ICU until they become stable, intravenous Pethedine was administered 20-25 mg/PRN for pain management in the first postoperative day. Chest tubes were removed when there was no air leak and daily drainage becomes less than 100 mL. Before and after of chest tube removal, the lung expansion evaluated by chest X-Ray. The patients followed at least 30 days after surgery, looking for possible complications.

Results

Exposure within the GA group was more satisfactory than LA, but in the both group procedures were done under adequate exposure. All of the obtained specimens were diagnostic except one of the specimen in the LA group; he was injured by chemical war agent 16 years ago. Diagnostic accuracy was not significant in the two groups; 100% vs. 91% respectively. The duration of operation was 67.5±6.7 min in GA and 68.6±9.5 min LA groups (NS).

Duration of air leak or discharge via the chest tube in the both groups was not significant; duration of chest tube indwelling was 2.8±0.8 days by GA and 3.0±0.9 days by LA groups (NS). There was not any unusual bleeding and sever pain in the postoperative period. Postoperative days of hospitalization between the GA and LA groups were not significant; 6.9±4.1 days and 7.1±4.7 days respectively. There was one

postoperative-related mortality in the LA group in the 8th post operation day because of persistent air leak and subsequent respiratory failure due to diffuse metastatic carcinoma (NS).

Discussion

OLB is the ideal method to obtaining lung tissue for histopathologic study, it provides high diagnostic yield and is associated with a low perioperative mortality rate and acceptable morbidity rate.[7,8] The lung biopsy is widely recognized as a valuable tool for the diagnosis and management of diverse pulmonary disorders. The transbronchial lung biopsy (TBLB), open lung biopsy (OLB), and Video Assisted Thoracoscopic Surgery (VATS) biopsy are the principal tools that have been developed for obtaining lung tissue for histopathological examination.[1]

We demonstrate that it is possible to do minithoracotomy under local anesthesia. In most patients this incision allows adequate exposure to lower lobe and makes it possible to palpate the lung tissue in the plural cavity but doesn't give enough access to upper lobe and apex of lung. Additionally this procedure requires no special instruments.

In our study the sample size was small in number and the patients' all were adults. Doing a procedure with local anesthesia requires patient cooperation, so patients who aren't cooperative and children are not suitable for the surgery with local anesthesia.

This study suggests that in selected patients open lung biopsies can be accomplished by minithoracotomy with local anesthesia; it is safe for the patients who are high risk for general anesthesia because of sever pulmonary or underling disease. It is reliable and provides adequate tissue for definite diagnosis with avoiding the potential problems of general anesthesia. Using LA is not recommended for the central and apical pulmonary lesions.

References

1 Gal AA. Use and abuse of lung biopsy. *Adv Anat Pathol 2005*;**12(4):**195-202.

2 Pearson FG, Deslauviers J, Ginsberg RJ. *Thoracic Surgery*. 5th edition. Churchill Livingstone, New York; **1995**. p. 841.

3 Van-Schil P. Cost analysis of video-assisted thoracic surgery *versus* thoracotomy: critical review. *Eur Respir J 2003*;**22:**735-8.

4 Yim APC. Cost-containing strategies in video-assisted thoracic surgery. An Asian perspective. *Surg Endosc 1996;***10:**1198–200.

5 Djohar A. Thoracotomy under local anesthesia: personal experiences in 215 cases. *Arch Chir Neerl 1976*;**28(4):**233-41.

6 Yung RC. Tissue diagnosis of suspected lung cancer: selecting between bronchoscopy, transthoracic needle aspiration, and resectional biopsy. *Respir Care Clin N Am 2003*;**9(1):**51-76.

7 Shah SS, Tsang V, Goldstraw P. Open lung biopsy: a safe, reliable and accurate method for diagnosis in diffuse lung disease. *Respiration 1992*;**59(4):**243-6.

8 Soh LH, Chian CF, Su WL, Yan HC, Perng WC, Wu CP. Role of open lung biopsy in patients with diffuse lung infiltrates and acute respiratory failure. *J Formos Med Assoc 2005*;**104(1):**17-21.