



TRANSTHORACIC NEEDLE BIOPSY OF THE LUNGS – COMPARATIVE EVALUATION OF ASPIRATION AND CUTTING TECHNIQUES

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ABSTRACT

Aim: A comparative evaluation of the two different types of TTNB of the lungs based on levels of sensitivity, specificity and accuracy for malignancy, frequency of complications and technical failure in implementation.

Patients and Methods: The author of this article has performed TTNB of the lung on 86 patients within 104 procedures from 2004 to 2009.58 with transthoracic aspiration biopsy (TTAB), 31 with transthoracic cutting biopsy (TTCB) and 15 with both TTAB and TTCB.

Results: For TTAB – sensitivity – 75, 00%, specificity – 88,89%, accuracy – 77,05%.

For TTCB – sensitivity – 61, 76%, specificity – 100%, accuracy – 71, 11%.

Cases of failure to extract tissue specimen – TTAB – 12 (16, 44%), TTCB – 1 (2, 17%). During the procedures complications occurred in overall 26 cases (25, 00%) – TTAB 11 (18, 97%), TTCB 11 (35, 48%), TTAB and TTCB 4 (24, 67%) respectively.

Discussion: The analysis of this series draws the conclusion that TTAB is less traumatic but with a higher frequency of failure. It is statistically valuable in low specificity rates.

Conclusion: The received data supports the notion of more frequent implementation of TTCB.

Key words: diagnosis of lung diseases, primary and metastatic tumors.

INTRODUCTION

The morphological diagnosis of tumorous diseases of the lungs is made by the extraction and testing of tissues specimen acquired straight from the pathological lesion through the implementation of an invasive diagnostic approach – fibrobronchoscopy (FBS), transthoracic needle biopsy (TTNB), video-assisted thoracoscopic surgery (VATS), explorative thoracotomy (ET). FBS is unsuccessful in cases of peripheral localisation of the pulmonary lesion and is unnecessary in cases of generalized malignant tumours (1). VATS and ET are performed under general anaesthesia and lung via a dual lumen endobronchial tube. Due to its relative simplicity, limited, low frequency of post-operational complications and low technical

and financial costs, TTNB is crucial in the diagnosis of primary and metastatic tumors of the lungs (2, 3, 4). There are two types of TTNB with regard to the extraction of tissue specimen – aspiration (TTAB) and cutting (TTCB). TTAB provides tissue specimen for cytomorphology, while TTCB for histology, histoimmunology, histochemistry, cellular differentiation, somatic mutation analysis, molecular fingerprint analysis and electronic microscopy (3).

AIM

A retrospective analysis of a series of patients for the frequency of successful extraction of tissue specimen and complications arising in the two types of TTNB of the lungs. A comparative evaluation of their diagnostic worth for malignancy – i.e. sensitivity, specificity and accuracy

PATIENTS

The authors of this article has performed TTNB on 203 patients; TTNB of the lung on

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86 patients within 104 procedures from 2004 to 2009 in the Thoracic Surgery Clinic, University Hospital, Stara Zagora and in Department of Thoracic Surgery, University Hospital, Pleven. Of them 58 patients with transthoracic aspiration biopsy (TTAB), 31 with transthoracic cutting biopsy (TTCB) and 15 with both TTAB and TTCB.

METHODS

A coaxial Chiba multiple-usage needle with outer diameter of 0,9 and 1,0 mm or a Sonocan- Braun single-usage 1,2 x 160 mm needle are utilized in TTAB. A 1,2 x 160 mm or 1,2 x 150 mm Sherwood ABC (Actuated Biopsy Cutting) multiple-usage with removable stylet is used in TTCB. In order to limit the number of possible complications, patients are selected after interpreting the data received from their coagulation status: fibrinogen, prothrombine time, thrombocytes; function tests: arterial-oxygen saturation, pulmonary function results (VC, FEV), conduction-rhythm disorder. The biopsy needle is monitored by Transthoracic sonography, X-Ray or computed tomography. Premedication is not prescribed. A liquid dissolution of 1% is used for local infiltration anaesthesia. In a single procedure we perform a macroscopic evaluation of the extracted

tissue specimen form 1 to 4 consecutive biopsies. Afterwards the patient is checked by X-Ray or computed tomography in order to prevent possible post-operational pneumothorax or haemothorax. The verification of the disease is conducted through clinical monitoring, autopsy, operative treatment or another invasive test – supra clavicular biopsy, FBS, VATS. Sensitivity, specificity and accuracy are the criteria for evaluating the diagnosis of presence or not of a malign lung disease. An alternative analysis with an evaluation of the t-criteria and level of significance- p is also used.

RESULTS

In 86 consecutive patients were 104 biopsy sessions performed with a total of 258 biopsies - from 1 to 4 of 2.48 per session. Series of patients are 72 men (84%) and women - 14 (16%) with age range 14-77 years, mean age $57,37 \pm 11,22$ years. Biopsy technique is attached: Only TTAB - 58; only TTRB - 31; combination of TTAB and TTRB consistently in one session - 15. Registered security failure of pathological tissue material for morphological outbreak verification and comparing the results between the two groups TTIB techniques are presented in **Figure 1**. The differences were statistically reliable.

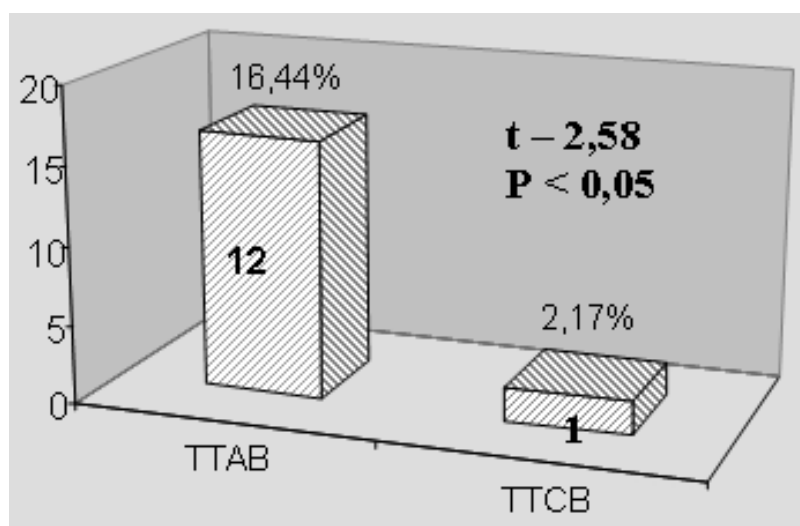


Fig. 1. Registered failure for the extraction of tissue material.

Frequency distribution of the resulting complications during biopsy sessions attached to the biopsy technique is shown in **Fig. 2**.

Figure 3 shows a number of different complications. Of these, only two patients have

had surgery - thoracocentesis due pnevmotoraks total. The rest have been addressed or resolved conservatively spontaneously.

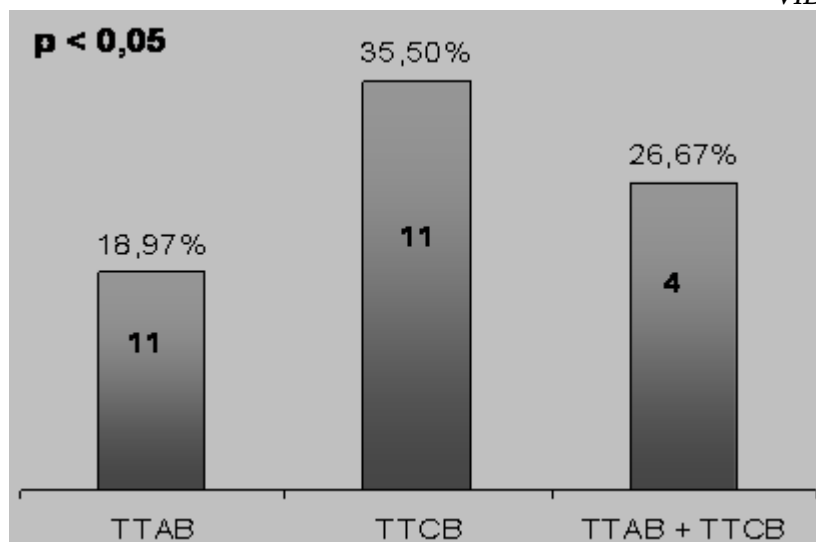


Fig. 2. Frequency of complications resulting from 26 sessions (total 25.00%) of 104 biopsy sessions.

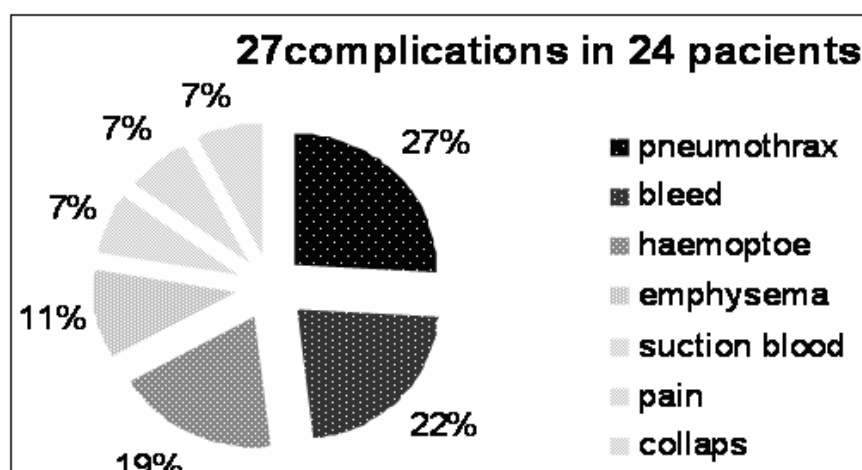


Fig. 3. Types and number of registered complications.

Criteria for calculating the sensitivity, specificity and diagnostic accuracy for assessing the value of both techniques are used TTIB standard 2x2 matrix type (**Table 1**).

Values obtained for real or false positive and false negative real or non-existence malignenost or not the disease.

Table 1. Obtained values of the diagnostic criteria for forward across TTNB techniques.

Criteria	TTAB	TTCB	t - criteria	p - value
Sensitivity	75,00%	61,76%	1,27	> 0,05
Specificity	88,89%	100%	-2,69	< 0,01
Accuracy	77,05%	71,11%	0,62	>0,05

DISCUSSIONS

TTIB a minimally invasive technique for diagnosis of pathologic lesions of oncologic intrathoracic structures: chest wall, pleura, mediastinal disorders, lung (2, 3, 4). Its place in the diagnostic algorithm is then negative FBS or in the presence of contraindications to it (1). Aspiration biopsy is the most widely used diagnostic method in TTIB. However, Cytopathology is problematic result, ie is sometimes difficult to make a proper diagnosis based on several abnormal cells (3, 5). On the other hand, since cutting biopsy provides tissue samples for histopathological diagnosis, the rate of correct diagnosis and prognosis is high, including the opportunity for personalized therapy of cancer (3). Our data showed no significant differences in diagnostic accuracy of malignant lesions between the basic techniques of TTIB. The overall correct diagnosis is only slightly better at cutting biopsy. On the other hand, literature data, cutting biopsy was statistically superior in accuracy for specific diagnosis of benign lesions (6). These advantages of TTRB to TTAB been discussed by other authors (5,7). When Cytopathology not to attend TTAB, as here, the frequency of inadequate samples is inevitably high, despite repeated procedures, it makes TTRB preferred method. Automated device for TTRB Pistol was introduced in late 1980. With the advantage is the quality of the sample, because the needle away from the tissue sample with greater speed and fragmentation of the lung tissue is minimized. (5) The most common complication was pneumothorax, which the literature of the past 30 years has a frequency of 5% - 57%, and the need for drainage is transtorakalen to 1.6% - 17.0% of cases with this complication (6,7,8).

CONCLUSION

In a comparative analysis of the results of diagnostic success and resulting complications between the two techniques TTIB, statistics support the following conclusions:

- The invasive diagnostic method – transthoracic needle biopsy of the lungs is crucial in the diagnostic process because of its comparatively simple technique, low frequency of complications and limited.
- TTAB is less travmatichnost, but with greater

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incidence of failure and low possibility of histological verification;
- Offer to increase accuracy, specificity and sensitivity of the lung TTIB, conduct one session of the two biopsy techniques - cutting and aspiration or cutting only.

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