

## TRANSTHORACIC NEEDLE BIOPSY (TNB)

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**Abstract** — With increasing use and experience, the transthoracic needle biopsy (TNB) has become a standard part of the diagnostic armamentarium in the work-up of a suspected intrathoracic malignancy. It is rather safe, cheap, efficient, accurate and speedy, its main drawbacks being dependence on an experienced cytologist and its inability to diagnose benign lesions reliably and thus to rule out cancer. This latter represents the main limitation of its usefulness. All lesions are accessible to TNB. The procedure is relatively simple to perform and easy to learn.

**UDC:** 616.2-006.6-076

**Key words:** thoracic neoplasms, biopsy needle-methods

**Review paper**

**Radiol ugosl** 1989; 23: 245—7

During the past two decades this technique has become a standard procedure in the diagnosis of pulmonary, hilar and mediastinal lesions (1). Developed in Sweden in the early sixties (2), it has been accepted in other countries rather reluctantly in the beginning, for two main reasons: a) uncertainty about possible spread of tumor cells along the needle track and b) the time it takes for a pathologist to learn and gain experience in aspiration cytology of pulmonary and mediastinal lesions, usually several years.

Once learned and accepted, however, the TNB has become an effective diagnostic tool with many advantages and only a few drawbacks.

The main advantages of TNB are:

— all intrathoracic lesions are accessible to the needle with almost no variation in the diagnostic accuracy and the rate of complications (3),

— it is a rather safe procedure, the complications are never serious and consist of pneumothorax, hemoptoe and pain, all of them self-limiting as a rule (4),

— its efficacy and accuracy are rather high, over 80% and 90% in cancerous lesions (5),

— the procedure is simple and, as opposed to the cytologic interpretation, easy to learn. It is therefore cheap in terms of time as well as money (6).

The main drawback of TNB is its low diagnostic accuracy in benign lesions. In other words, it is very difficult to prove that the lesion in question is not malignant. Such information, of course, would be decisive for the management of the patient. The probability of a lesion being malignant decreases, naturally, with each consecutive »negative« biopsy, provided that the sample is in fact representative. An arbitrary limit to the number of repeated TNB may be drawn but should probably be kept flexible, taking into account the clinical circumstances.

Since a cancer-suspect lesion ought to be treated as cancer and since a TNB as a rule cannot rule out cancer, it is therefore not to be used routinely in the diagnostic work-up of such patients as it would not, in most cases, alter the management of the patient. It is probably impossible to make a comprehensive list of indications for a procedure like TNB, which is only a part of extensive diagnostic work-up of a cancer-suspect lesion. There are, however, identifiable clinical situations in which TNB has proved its value. Here are a few examples:

— TNB may speed up the diagnostic process by establishing the diagnosis within an hour or so.

— Either the patient or the surgeon may need additional motivation to undergo resp. perform a thoracotomy for a cancer-suspect lesion.

— Operability may be assessed of a pulmonary lesion by performing TNB on an enlarged hilar or mediastinal lymphnode, or by performing it on a pulmonary lesion in the case of a malignant tumor elsewhere in the body.

— TNB may yield result when a biopsy through a bronchoscope has not been diagnostic, as may be the case in hilar, mediastinal or parenchymal extrabronchial (usually metastatic) lesions.

— When there is need for repeated biopsy specimens, e.g. following the effect of therapy, TNB is more practical than bronchoscopy.

— In an obviously inoperable patient, who will therefore not undergo bronchoscopy, there may still be need for cytological diagnosis for the purpose of chemo- or radiation therapy.

There are very few contraindications to TNB. A patient who will not tolerate pneumonectomy because of low pulmonary function is also at risk if a pneumothorax develops following TNB. Coagulopathy should be known in advance and hilar lesions should be approached very, very carefully in patients with pulmonary arterial hypertension.

The technique of TNB has undergone few changes since its beginnings. It is performed either under fluoroscopy or under CT-guidance. If under fluoroscopy, the x-ray machine used should have an arch arrangement or it should at least make bi-plane fluoroscopy possible. That is necessary in order to visualize the tip of the needle when performing the biopsy in a co-axial way. It should be possible, as it is on CT, to document the position of the needle tip within the lesion, thus adding weight to a »negative« reading of the specimen.

There are several types of biopsy needles, the original one developed by Nordenstroem (7), consisting of a hollow needle 1 mm outer diameter, with a bevelled tip and a fitting mandrene, attachable to an ordinary disposable plastic syringe and 12—16 cm long.

The best approach, usually through either the anterior or the posterior chest wall, is decided upon on the basis of radiograms, the skin is marked, cleaned and punctured for local anesthesia to the pleura. The biopsy needle is inserted co-axially with the central beam and only moved in that direction in order to facilitate the »aiming« as well as minimize the trauma. The

lesion usually moves a bit when the tip of the needle enters it, but the position of the tip ought to be checked on fluoroscopy from a different angle. With the tip in satisfactory position the mandrene is withdrawn, a syringe attached and aspiration performed while gently moving the needle in order to dislodge some material from the lesion. The needle is then withdrawn and its contents expressed on slides for cytological examination. It is practical to have the cytologist nearby so that the biopsy can be repeated, in case the aspirate is not satisfactory, with the patient staying on the table. Most procedures can be done on an out-patient basis with proper explanation about possible pneumothorax or hemoptysis.

The complications consist mostly of pneumothorax or minor bleeding. Most authors report the frequency of pneumothorax after TNB in the range of 15—30% (8), the most important contributing factor being pre-existent chronic obstructive lung disease (COPD). In most cases of post-TNB pneumothorax this may be left untreated and will regress spontaneously; it will require a chest tube if it is symptomatic, which again, happens more often in patients with COPD.

Post-TNB hemoptysis is self-limiting as a rule.

Only 2 cases of air embolism as a complication of TNB have been reported (9, 10), one of them fatal. Also, 2 cases have been reported of malignant seeding of the needle track: in one (11) the tumor had already invaded the chest wall before the biopsy, in the other (12), the seeding was discovered within the surgical specimen at the time of surgery 16 days after TNB.

The sensitivity of TNB for peripheral lung cancer exceeds 90% in most series (13), it is essentially the same for more centrally located pulmonary cancer as well as for hilar and mediastinal cancer (13). Curiously enough, it is slightly less when TNB is performed with the help of computerized tomography in which case the complication rate also tends to increase (14). The longer time necessary for the procedure with CT and a possible selection toward more difficult cases may offer an explanation. The cost of TNB in an average hospital in the USA is about one third of that of a fiberoptic bronchoscopy, data for Slovenia are not available (15). The time consumed for an uncomplicated TNB is about 10—12 minutes, the presence of only an assistant nurse and, if feasible, a cytologist, in addition to the performing physician, is necessary.

The main advantage of TNB, when used judiciously, is speeding up the work-up of the patient. In a classic study (16) where the mean »doctors delay« was 2.6 months, the time-lapse bet-

ween TNB and definitive treatment was 3.6 days. Assuming the use of TNB earlier in the diagnostic process, there is a remarkable potential for gain of time, a crucial factor in cancer treatment.

### Povzetek

#### TRANSTORAKALNA ITELNA BIOPSIJA

Z naraščajočo uporabo in izkušnjami je transtorakalna igelna biopsija postala standardni del diagnostičnega postopka pri intratorakalnih lezijah, sumljivih za malignom. Metoda je dokaj varna, cenena, učinkovita, natančna in hitra; njeni glavni pomanjkljivosti sta odvisnost od izkušenega citologa in omejena možnost diagnoze benignih lezij, torej izključitve malignoma. Ta okolnost predstavlja tudi poglavitno omejitev njene uporabnosti. Vse lezije so dostopne igelni biopsiji. Postopek je relativno preprost in se ga je lahko naučiti.

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