Percutaneous lung biopsy with a fine bore cutting needle (Vacu-Cut): improved results using drill technique

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Abstract

**Background**—Percutaneous transthoracic needle biopsy is used in the diagnosis of pulmonary and pleural lesions. The standard procedure using the Vacu-Cut cutting type of needle is the “thrust” technique in which the needle is rapidly forced through the lesion. In our experience this technique has a low yield of histological biopsy specimens. The diagnostic yield of a new biopsy technique (“drill” technique) using the Vacu-Cut needle was assessed.

**Methods**—The series comprised 29 consecutive patients, 23 with localised peripheral pulmonary lesions and six with pleural lesions. The Vacu-Cut 1-2 mm needle was rotated and drilled by hand through the lesion.

**Results**—Biopsy specimens 4–30 mm long were obtained in 20 of the 23 patients with pulmonary lesions; in three patients material was available for cytological examination only. The diagnostic yield in the 18 malignant pulmonary lesions was 89% and in the five non-malignant lesions 80%. Biopsy specimens 10–30 mm long were obtained in all patients with pleural lesions. The diagnostic yield in the four malignant and two non-malignant lesions was 100%.

The total diagnostic yield in malignant lesions was 20 of 22 patients and in non-malignant lesions six of seven patients. The diagnostic yield in the entire series was 26 of 29 patients (90%). Pneumothorax occurred in seven of the patients and three needed a chest tube. There was no haemoptysis and no deaths.

**Conclusions**—The drill technique has a high diagnostic yield in both malignant and non-malignant pulmonary and pleural lesions, and is suggested as the ideal biopsy technique when using the Vacu-Cut needle.

(Thorax 1995;50:560–562)

Keywords: lung cancer, lung neoplasm, needle biopsy of the lung.

Percutaneous transthoracic needle biopsy (TNB) of the lung is a frequently used diagnostic procedure in patients with localised peripheral pulmonary and pleural lesions. Small bore needles have been designed for cytological aspiration biopsy and larger cutting needles for histological biopsy.

Our results of lung biopsies using the Vacu-Cut needle (Angiomed, D-75 Karlsruhe) have already been reported. This needle was designed to obtain biopsy specimens for histological examination. According to the designers the operator should thrust the needle through the pulmonary lesion but, although used as recommended, we obtained biopsy specimens for histological examination in only a few procedures. In order to increase the yield of histological biopsies a new biopsy technique was developed in which the needle was drilled through the lesion.

**Methods**

Twenty nine consecutive patients (20 men) of median age 61 years (range 45–79) with solitary pulmonary (n = 23) or pleural lesions (n = 6) were included in the study. The median diameter of the pulmonary lesions on a posterior-anterior chest radiograph was 40 mm (range 10–100) and the median distance from the inside of the thoracic wall to the periphery of the lesions was 40 mm (range 0–100). The
thickness of the pleural lesions on a postero-
anterior or lateral chest radiograph was a
median of 8 mm (range 5–10).

The indications for TNB followed the rec-
ommendations of the American Thoracic So-
ciety. All biopsies were performed under local
anaesthesia by the same operator using a Vacu-
Cut needle with a diameter of 1·2 mm and a
length of 200 mm (figure), yielding a vacuum
assisted full cut biopsy specimen. The biopsy
principle is a modified Menghini technique.
Guided by fluoroscopy in anteroposterior and
lateral projections, the needle, with its trocar
inserted, is introduced through the thoracic
wall. When contact is made with the lesion the
patient is instructed to hold his breath. The
trocar is retracted in order to establish a vacuum
in the needle, and the needle is then rotated
and drilled by hand through the lesion. The
drilling motion is created by rotating the needle
to and fro between the thumb and index finger.

After the needle has been retracted the biopsy
specimen is pushed out with the trocar and
placed on a filter paper. If material for cyto-
logical examination is available smears are
prepared on glass slides. One biopsy pass was
performed in five patients, two in 22 patients,
and three in two patients.

A chest radiograph was routinely taken the
following day in order to check for pneu-
mothorax.

Results

PULMONARY LESIONS

In a total of 43 biopsy passes 31 histological
biopsy specimens (tissue cylinders) with a med-
ian length of 20 mm (range 4–40) were ob-
tained in 20 of 23 patients. In three patients
material was available for cytological ex-
amination only.

Eighteen patients had a final diagnosis of
malignancy (six adenocarcinoma, four squam-
ous cell carcinoma, three metastatic carcinoma,
two unspecified carcinoma, one each of bron-
chioloalveolar cell carcinoma, B cell lymph-
oma, plasmacytoma). In 14 of these patients
histological examination of the biopsy speci-
mens disclosed malignancy, and in two the
cancer was diagnosed by cytological ex-
amination. The overall diagnostic yield for
malignancy was 16 of 18 patients.

Five patients had non-malignant lesions (ne-
crotising sarcoid granulomatosis, sarcoidosis,
Wegener’s granulomatosis, hamartoma, fib-
rosing pneumonia). A correct diagnosis was
obtained by histological examination in four
of these patients. The procedure was non-
diagnostic in the patient with pneumonia in
whom no biopsy specimen was obtained on
two passes.

In total, a clinically relevant diagnosis was
obtained in 20 of 23 patients.

PLEURAL LESIONS

In a total of 12 biopsy passes 10 histological
biopsy specimens (tissue cylinders) with a med-
ian length of 15 mm (range 10–30) were ob-
tained from all six patients. Four patients had
malignant lesions (two mesothelioma, two ad-
enocarcinoma), and in all these histological
examination disclosed malignancy. Two
patients had non-malignant lesions (one fib-
rosis, one post-traumatic organising haem-
atoma); a correct diagnosis was obtained by
histological examination in both patients.

Thus, a clinically relevant diagnosis was ob-
tained in six patients.

Complications

Pneumothorax was observed in seven of the 23
patients with pulmonary lesions and in one of
the six patients with pleural lesions – that is,
in total eight of 29 patients (28%) developed a
pneumothorax. Of these, five patients managed
without treatment while three with pulmonary
lesions required a small bore chest tube. No
haemoptysis or mortality was observed.

Discussion

Fine bore needles used for TNB are designed
to yield cytological biopsy specimens. In most
cases cytological examination is sufficient
to identify malignant cells in the lesion,
but often the specific type of cancer cannot be
classified. Likewise, the diagnostic yield from
cytological examination in non-malignant
lesions is very low.

Cutting needles provide biopsy specimens for
histological examination, giving the pathologist
the opportunity to use special staining tech-
niques to classify the tumour. In non-malignant
lesions histological examination is necessary to
make a reliable diagnosis.

The Vacu-Cut 0·95 mm needle was de-
scribed by Köhler et al in 1987. The authors
used a guide needle to introduce the Vacu-
Cut. The biopsies were taken with the thrust
technique and specimens for histological ex-
amination were obtained in 44 of 49 patients,
giving a diagnostic yield of 90% in the entire
series (33 malignant, 11 non-malignant). The
diagnosis in eight patients was unspecified
inflammation.

In a retrospective study of TNB with the
Vacu-Cut 1·2 mm needle involving two op-
erators (including the present author) both
using the thrust technique, the diagnostic yield
in malignant lesions after one biopsy pass
was 67%, almost exclusively by cytological ex-
amination. Due to the overall scarcity of speci-
mens for histological examination the Vacu-
Cut did not yield a diagnosis in patients with
benign lesions. In another series (Milman N,
unpublished data) using the thrust technique
the diagnostic yield in malignant lesions was
16 of 24 patients (67%), almost exclusively by
cytology, and the total diagnostic yield (malign-
ant + non-malignant) was 16 of 28 patients
(57%).

In the present series biopsy specimens for
histological examination were obtained in 31
of 55 of the biopsy passes. The diagnostic yield
in malignant lesions was 20 out of 22 patients,
and in non-malignant lesions six out of seven
patients. The diagnostic yield in the entire
series was 26 of 29 patients (90%), which is
Single lung transplantation for end stage emphysema

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Abstract

Background – The first successful single lung transplantation was carried out in 1983 for pulmonary fibrosis. Because of the inherent advantages of single lung transplantation, a transplantation programme has been started for patients with end stage lung disease due to emphysema.

Methods – Between October 1990 and August 1993 25 patients with severe emphysema (15 men, mean age 51 years) received a single lung transplant at our institution. All patients were severely disabled with a mean (SD) 12 minute walking distance of 281 (165) metres. There were five deaths in the series, four in the first 20 days and one on day 503. Two patients suffered graft compression by air trapping in the native lung. Bronchial narrowing requiring insertion of endobronchial stenting occurred in four patients.

Results – Mean (SD) FEV₁, improved from a preoperative value of 17·8(13)% predicted to a six month value of 53·6(13)% and FEV₁/FVC from 23·8(12)% to 68·6(15)%.

Conclusions – Single lung transplantation is an effective treatment for end stage lung disease due to emphysema and carries an acceptable mortality and morbidity. (Thorax 1995;50:562–564)

Keywords: single lung transplantation, emphysema.