

# Lung biopsy with the high speed drill in a developing country

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**ABSTRACT** The results of high speed air drill lung biopsy during 38 months in Addis Ababa is reported. Even though the diagnostic yield was only 49%, trephine lung biopsy has a place in the investigation of diffuse and accessible localised lesions of the lung. It has proved to be a relatively safe and simple procedure. Nineteen male and 20 female patients were studied and in addition eight postmortem specimens of lung tissue were included. The chest radiograph showed diffuse pulmonary infiltrates in 42 and localised in six, with diagnostic biopsy specimens in 20 and five respectively. Biopsy of the inferior lung in the lateral decubitus position in patients with diffuse lung lesions has yielded larger specimens than has routine biopsy performed in the sitting position. Since the only patient who developed appreciable haemoptysis was the single patient with chronic cor pulmonale, caution should be exercised in such cases. A chest radiograph is indicated after biopsy only when the clinical condition of the patient warrants it.

Steel's trephine has been used for biopsy of both diffuse and localised lesions of the lung for over two decades. Several investigators have found the procedure satisfactory,<sup>1-3</sup> while others have not.<sup>4</sup> The trephine biopsy is superior to aspiration needle biopsy, introduced almost four decades ago.<sup>5</sup> The Vim-Silverman, Franklin-Silverman, and Jack needles produced very small fragments of tissue, which were usually inadequate for interpretation and the procedure was occasionally complicated by death.<sup>6-8</sup> Recently, however, Trucut lung biopsy, using a different technique, has proved to be very useful.<sup>9</sup>

In developing countries such as Ethiopia, where there is an extreme shortage of surgeons and resources, high speed drill lung biopsy offers a simple and inexpensive alternative to thoracotomy in the diagnosis of diffuse and localised peripheral lung lesions. Upper lobe lesions and those near the mediastinum are best avoided. This report documents 38 months' experience of trephine biopsy of the lung (from July 1982 to August 1985) in Addis Ababa. I am not aware of any other report of its use from Africa.

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## Methods

Patients with accessible localised lesions in the mid or lower lung zones or diffuse lung lesions undiagnosed by sputum examination, or in some cases by bronchoscopy, were subjected to trephine biopsy.

The technique of trephine biopsy of the lung described by Steel<sup>10</sup> was modified in this study. Firstly, routine thin needle aspiration of homogeneous masses was performed before biopsy to make sure that they were not fluid collections. Secondly, in patients who were too weak to sit, biopsy was taken from the inferior lung in the decubitus position. Thirdly, a 20 ml syringe was half filled with normal saline instead of citrate solution to suck up the biopsy specimen when the trephine was withdrawn. Fourthly, routine chest radiographs were not taken after the procedure.

Fifty one trephine biopsy attempts were made in 39 patients. Eight of the samples were obtained postmortem. The biopsies were studied only histologically as a mycobacterial laboratory was not readily available.

## Results

There were 19 male and 20 female patients, aged 17-74 years. The mean age of the men was 45.7 and of the women 45. Results of biopsies are shown in table 1. Twenty five (49%) of the biopsies were diagnostic

Table 1 *Histological diagnosis in 47 trephine biopsies*

<i>Histological type</i>	<i>Radiographic lesion</i>		
	<i>Diffuse</i>	<i>Localised</i>	<i>Total</i>
<i>Diagnostic</i>			
Pulmonary fibrosis	9	—	9
Primary lung cancer	4	—	4
Acute inflammation (pneumonia)	—	2	2
Chronic inflammation	2	1	3
Tuberculosis	5	—	5
Secondary carcinoma	—	2	2
Total	20	5	25
<i>Non-diagnostic</i>			
Normal	8	—	8
Inadequate/no lung	9	1	10
Liver tissue only	4	—	4
Total	21	1	22

Pulmonary fibrosis was the most common histological diagnosis, followed by tuberculosis. There were two squamous carcinomas, one adenocarcinoma, and one bronchoalveolar carcinoma. The secondary carcinomas were hepatoma and fibrosarcoma. Eight (15%) of biopsies showed normal lung, although diffuse lung infiltrates were seen radiographically. Nine (17%) of biopsy specimens either were inadequate for interpretation or had no lung tissue. In five patients liver tissue was obtained inadvertently and in one of them lung tissue was obtained simultaneously. Histological examination of the liver specimens showed two normal, one fatty and one cirrhotic liver and one hepatoma.

Although several attempts at chest aspiration in three patients were unsuccessful in obtaining fluid, thick pus was obtained in two patients and clear fluid in another by means of the trephine. In one of the patients the fluid suggested a diagnosis of hydatid cyst, and this was subsequently confirmed at thoracotomy.

In the eight cases in which lung specimens were obtained postmortem the chest radiograph showed a localised lesion in five and diffuse disease in two. The remaining patient suffered from asthma and had a normal chest radiograph; histological appearances were normal, although the specimen contained no bronchi. Biopsy specimens from the localised lesions showed pneumonia in two, normal lung in two (one of them had liver tissue also), and cirrhosis of the liver in one. The specimens from two individuals with diffuse disease showed pulmonary fibrosis.

Most of the biopsy specimens obtained from patients with diffuse pulmonary shadows were small fragments of tissue. Biopsy of the inferior lung in the decubitus position, however, gave uniformly good samples in patients who could not sit up for the biopsy. Specimens from the solid localised lesions were also satisfactory.

After the biopsy, blood pressure and pulse were measured regularly for six hours and close observation for the development of shortness of breath was maintained for 24 hours. Although pneumothoraces were detected on physical examination in most patients immediately after biopsy, routine chest radiographs were not ordered so long as the patient's vital signs and general condition remained stable. Only one patient, who developed brisk haemoptysis immediately after biopsy, had a chest radiograph. She lost about 200 ml of clotted blood. Her chest radiograph showed no pneumothorax. Her clinical condition and her vital signs remained unchanged. The whole episode resolved without any therapeutic intervention. Her lung biopsy material showed pulmonary fibrosis. In retrospect, she showed features of chronic cor pulmonale and her chest radiograph showed diffuse pulmonary fibrosis with cardiomegaly and prominent pulmonary arteries. She had a packed cell volume of 0.65. Some patients complained of pleuritic pain but in only two was it severe enough to require analgesics. The five patients in whom tuberculosis was diagnosed unequivocally by histological examination had had at least two negative sputum smears each, and in one case sputum was negative on culture.

### Discussion

Table 2 compares the results of trephine biopsy in different studies. There were no deaths in any of the studies and all of the complications were managed easily; the most common complication was pneumothorax. The diagnostic yield ranged from 52% to 90%.

With a diagnostic yield of 49% therefore this study has produced the lowest reported yield with the trephine lung biopsy. The three trephines used were new and there was no wobble or premature detachment of the trephine during biopsy that could have accounted

Table 2 Results of trephine biopsy of the lung in different studies

Authors	Biopsy		Complications (No (%))		
	Total No	No (%) diagnostic	Pneumothorax	Haemoptysis	Comments
Steel and Winstanley (1969) <sup>1</sup>	119	101 (85)	31 (26)	14 (12)	2 pneumothoraces required tube; 1 haemoptysis of 50 ml; 1 intrapleural bleed of 150 ml. Total No of patients not given
Hendrick and Cowie (1976) <sup>4</sup>	(1) 27 (2) 20	14 (52) 18 (90)	— 7 (35)	—	(1) used original Steel trephine (2) used modified Steel trephine. 3 pneumothoraces needed tube. Total No of patients not given
Zavala <i>et al</i> (1972) <sup>2</sup>	50	42 (84)	16 (32)	4 (8)	7 pneumothoraces needed tube (total patients 47)
Cunningham <i>et al</i> (1977) <sup>11</sup>	17	14 (82)	10 (60)	3 (18)	No of patients not given; all immunosuppressed 2 haemoptysis required blood transfusion; some pneumothoraces needed tube
Current study	51	25 (49)	—	1 (2)	39 patients and 8 necropsies. No chest tubes needed. Haemoptysis resolved without treatment.

for the low yield, as has been suggested previously.<sup>4</sup> Conceivably, however, lack of fluoroscopic guidance during biopsy and unavailability of mycobacterial culture facilities account in part for the relatively low yield. In a developing country like Ethiopia detection of only five cases of tuberculosis is surprising. Roy and Mahorta<sup>3</sup> from India reported that almost a third of their patients examined by trephine biopsy had tuberculosis. They reported 60 patients with diffuse and 20 with localised disease with an equal rate of diagnosis of tuberculosis in the two groups. Although they mentioned that they sent half of the tissue for histological studies and the rest for mycobacterial culture, they did not mention how many of the cases were found to be positive for tuberculosis on bacteriological grounds only.

Biopsy specimens from solid masses were much larger than those obtained in diffuse lung diseases. In patients with diffuse pulmonary infiltrates it was discovered fortuitously that biopsy from the inferior lung while the patient was in the lateral decubitus position gave good sized samples. This may be because the inferior lung in the decubitus position is more compressed.

Routine chest radiography after biopsy adds unnecessary expense and exposes the patient to unnecessary radiation. In a country such as Ethiopia, where there is frequently a shortage of radiographic film, radiography after biopsy would be a luxury. Furthermore, the need to treat a pneumothorax by intubation is still controversial. Ruckley and McCormack<sup>12</sup> recommend chest tubes in pneumothoraces of 20% or more of cases, while Stradling and Prob<sup>13</sup> advocate a more conservative approach. At Tikur Anbessa Hospital, where the biopsies were performed, we have to improvise chest tubes and

drainage bottles from intravenous giving sets and empty intravenous fluid bags. This kind of practice increases the risk of infecting the pleural space. In these circumstances the only important indication for a chest tube is not the extent of the pneumothorax but clinical deterioration of the patient resulting from it.

Liver tissue was obtained in five biopsy attempts and in one case lung tissue was obtained simultaneously. This form of double biopsy has not been reported by others.<sup>2 10 11</sup> Although the approach has always been via the 8th or 9th intercostal space posteriorly, it is conceivable that the trephine went through lung tissue and then obtained a core of liver.

The only important complication encountered was serious haemoptysis in a woman with pulmonary fibrosis and chronic cor pulmonale. The usual contraindications reported include bullae, cysts, aneurysms, a bleeding diathesis, respiratory insufficiency, poor cooperation by the patient, severe asthma, a recent myocardial infarction, and serious arrhythmias.<sup>1 3 11</sup> From the current experience cor pulmonale would seem to be a risk factor for haemoptysis.

The biopsy result definitely altered management in six patients and possibly altered management in eight others. Two patients with negative smears and less common radiographic features of tuberculosis were proved to have tuberculosis by biopsy. Three patients who were having antituberculous treatment because of a clinical diagnosis of tuberculosis showed an unsatisfactory response. Two had bronchogenic carcinoma and one had an infected hydatid cyst diagnosed by biopsy. The sixth patient would have undergone thoracotomy if thick pus had not been obtained when biopsy was attempted. In this patient several needle aspirations of the localised mass had

failed to obtain fluid. The other eight patients could have been given a therapeutic trial for tuberculosis had the trephine biopsy not led to an alternative diagnosis.

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