

Blind Pleural Biopsy Using a Tru-Cut Needle in Moderate to Large Pleural Effusion – An Experience

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ABSTRACT

Background: Pleural biopsy is invaluable for the etiological diagnosis of pleural diseases in the presence of an exudative pleural effusion. Conventionally, pleural biopsy is either performed with the Cope's or the Abrams pleural biopsy needles. A few investigators have used the Tru-cut biopsy needle with or without ultrasound guidance. We report our experience in performing closed pleural biopsy using a Tru-cut needle without ultrasound guidance in moderate to large exudative pleural effusion. We used a perpendicular approach to biopsy the pleura instead of the tangential approach described earlier.

Methods: Closed Tru-cut biopsy was performed in 27 consecutive patients with exudative pleural effusion who volunteered to undergo the procedure. The biopsy specimen was sent for histopathology. Pleural fluid analysis and other relevant investigations required to obtain a specific diagnosis were carried out.

Results: A specific diagnosis of tuberculosis was obtained on histopathology of pleural tissue in 12 out of 16 patients (diagnostic yield 75%) and in 5 out of 7 patients with malignancy (diagnostic yield 71%). Among the other 4 patients, other causes of exudative pleural effusion were detected in 3 and in 1 patient, no specific diagnosis could be made, despite extensive investigation.

Conclusion: Closed pleural biopsy using a Tru-cut needle is effective for the specific diagnosis of exudative pleural effusion. The use of a perpendicular approach to biopsy the pleura does not seem to increase the complication in moderate to large pleural effusion.

Keywords: pleural biopsy, Abrams needle, Tru-cut needle, pleural effusion, exudative pleural effusion

INTRODUCTION

A variety of pleuro-pulmonary diseases present with pleural effusion. In Third World countries like India, where the prevalence of tuberculosis is high, the commonest cause of exudative pleural effusion is tuberculosis. The next most common cause being malignancy. This is in contrast to the situation in the Western countries where the converse is true. Percutaneous pleural biopsy is an invaluable procedure in the etiological diagnosis of exudative pleural effusion⁽¹⁻³⁾.

Success rates in arriving at a definitive histopathological diagnosis are variable in the published reports. Currently the most widely used needle is the Abrams pleural biopsy needle. The disadvantages reported with this needle include air leakage⁽⁴⁾ and needle breakage^(5,6). Furthermore, we have observed that obtaining satisfactory biopsy specimens can be a problem especially in those who do not have sufficient experience in using this needle. In an effort to obtain superior biopsy specimens, some researchers have attempted to device newer needles for this purpose like the Raja pleural biopsy needle⁽⁷⁾. The Tru-cut needle which has been used for the biopsy of a variety of tissues has also been tried and there are 3 published reports of its use. In one of these studies, the biopsy was performed with ultrasound guidance. The results with the Tru-cut needle in all these studies have been at least as good as with the Abrams needle.

In the pleural biopsy technique described by McLeod et al⁽⁸⁾, the Tru-cut needle was advanced tangentially towards the chest wall and away from the lung, presumably to improve the safety of the procedure. When we started to perform closed pleural biopsies, we were unaware that such a technique had been described and so we advanced the needle perpendicularly towards the pleura, much like the way this needle is used to biopsy solid organs like the kidney and the liver. We have found it safe and easy to perform and have continued to use this technique. We report the results in our first 29 patients on whom the safety and the outcomes were carefully studied.

METHODOLOGY

Twenty-seven hospitalised patients with moderate to large exudative pleural effusion undergoing diagnostic pleural biopsy, consented to participate in the study. The level of pleural fluid in all of them was above the level of the dome of the diaphragm and effusions less than this were considered to be mild and such patients were excluded. The patients were also excluded if they were suspected or known to have a haemorrhagic diathesis.

The biopsy was performed by one of the two investigators, using a Tru-cut needle, either the 6" (CT No.2N 2704T) or the smaller 4 1/2" (CT No.2N 2702T), marketed by Baxter Health Care Corporation. It was performed in the area of maximal dullness either in the scapular line or in the posterior axillary line.

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The skin and the parietal pleura were anaesthetised with 2% lignocaine, following skin preparation. A short vertical skin incision was made with a scalpel blade to facilitate entrance of the needle. The depth at which the parietal pleural lay was roughly assessed by passing a syringe and an aspiration needle up to the point at which pleural fluid was obtained on aspiration. The Tru-cut needle was then introduced through the incision and passed perpendicularly forward and the tissue was cut from roughly 0.5 – 1 cm proximal to the point where parietal pleural was expected to lie. If there was doubt about the position of the pleura, the needle was cautiously advanced further towards the pleura till a give was felt, indicating entrance of the needle in to the pleural space. The needle was then withdrawn 0.5 – 1 cm and the biopsy was performed. The procedure was repeated till 3 – 6 satisfactory bits were obtained. The tissue was fixed in 10% formalin, conventionally processed and stained with hematoxylin-eosin. The patients were observed for any post-procedure complication. Cytological and microbiological studies of pleural fluid and tissue, fiberoptic bronchoscopy and other relevant investigations were performed as required in order to obtain the specific diagnosis.

RESULTS

The biopsy procedure was performed in a total of 27 patients with the Tru-cut needle. The results are shown in Table I. Pleural tissue was obtained in all the patients. A histopathologic diagnosis of tuberculosis was obtained in 12 out of 16 patients and malignancy in 5 out of 7 patients. Thus the diagnostic yield of this procedure was 75% for tuberculosis and 71% for malignancy.

A specific histological diagnosis could not be made in ten patients – five of these were reported as chronic inflammation and five as non-diagnostic. In two patients whose biopsies were reported as chronic inflammation and in two patients reported as non-diagnostic, a diagnosis of tuberculosis was made on the basis of suggestive clinical features, positive

Mantoux test and response to anti-TB chemotherapy. A diagnosis of malignancy was made in two patients, whose biopsies were reported as chronic inflammation on the basis of pleural fluid cytology in one and bronchoscopic biopsy in the other. A diagnosis of syn-pneumonic effusion was made in one patient, whose biopsy was reported as chronic inflammation; since the post-aspiration radiograph revealed the presence of underlying lobar pneumonia, which responded to appropriate antimicrobial therapy. Of the other three patients with a non-diagnostic pleural biopsy; one was diagnosed to have effusion secondary to pancreatitis and one Wegener's granulomatosis, on the basis of the overall clinical picture and consistent laboratory results. In one, no diagnosis could be obtained despite extensive investigation. None of our patients had post-procedure complications.

DISCUSSION

Our diagnostic yield with closed pleural biopsy was 75% for tuberculous effusions and 71% for malignant effusions. These results are comparable with the results obtained by the various investigators using the conventional Abrams and Cope's pleural biopsy needles. Diagnostic yields of pleural biopsies in tuberculosis have ranged from 20%⁽⁹⁾ to 93.5%⁽¹⁰⁾ and in malignancies from 44%⁽⁹⁾ to 86% (Escudero Buenco et al⁽¹¹⁾). A diagnostic yield of 86% in malignant effusions was obtained by Buenco et al⁽¹¹⁾ studying a large number of 414 patients. Whereas, Chang et al⁽⁹⁾ in their small group of 7 patients with tuberculous effusion and 10 patients with malignant effusion were able to obtain a diagnostic yield of only 20% and 44% respectively. In general, larger published series have reported higher success rates, suggesting perhaps that investigators with greater experience are able to get a better yield.

Another factor which seems to influence the outcome is the number of times the biopsy was repeated. Suri et al⁽¹⁰⁾, who reported the highest yield for the diagnosis of tuberculous effusion have repeated biopsies up to a maximum of 3 times, in the event of the first biopsy being inconclusive.

Table I – Histopathology results

Final diagnosis	Number	Histopathology results			
		Malignancy	Tuberculosis	Chronic inflammation	Non-diagnostic
Tuberculosis	16	-	12	2	2
Malignancy	7	5	-	2	-
Effusion associated with pancreatitis	1	-	-	-	1
Wegener's granulomatosis	1	-	-	-	1
Syn-pneumonic effusion	1	-	-	1	-
Undiagnosed	1	-	-	-	1

Table II – Published reports of pleural biopsy with Tru-cut needle

Authors	Numbers	Adequate	Tuberculosis	Malignancy	Complications
Present study	27	100%	75%	71%	Nil
Chang et al	25	-	86%	70%	Nil
McLeod et al #	37	84%	100%	66%	Nil
Walshe et al	11	73%	50% (Combined*)		4%

The yield for Tru-cut needle in this study has been calculated against the total histopathologic diagnosis obtained with this or the Abrams needle, with which it was compared. There is no mention in this study of the yields from the other methods available to make a specific diagnosis like cytology and mycobacterial studies of pleural fluid etc.

* Specific diagnosis of tuberculosis or malignancy obtained

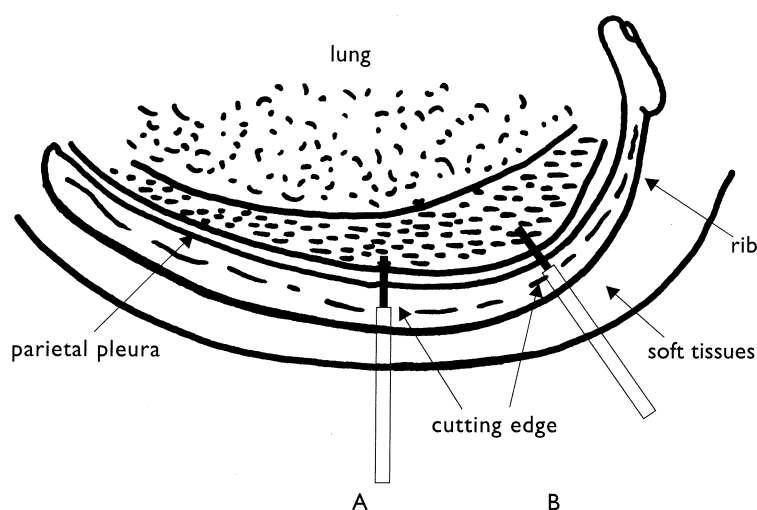


Fig 1 – Cut section through an intercostal space, with the needle in position to cut the pleura by A: The perpendicular approach used by us & B: The tangential approach described by McLeod et al

Table II summarises the results of all the studies in which the biopsy had been performed with the Tru-cut needle. Chang et al⁽⁹⁾ have demonstrated the usefulness of an ultrasound guided biopsy of the pleura, selecting diseased pleura which is generally thicker than the normal pleura. Walshe et al⁽¹²⁾ published their audit of the investigations performed for the diagnosis of pleural effusion in a teaching hospital. Among the patients on whom pleural biopsy was done, satisfactory biopsy specimens were obtained in a similar number of patients - 7 out of 11 (67%) with the Tru-cut needle and 19 out of 25 (76%) with the Abrams needle. Pleural biopsy was diagnostic in 50% of the patients in both groups.

McLeod et al⁽⁸⁾, the only group to perform a comparative trial using the Abrams and the Tru-cut needles, have used a tangential approach to biopsy the pleura with the Tru-cut needle, angling it towards the chest wall to prevent damage to the lung. We were unaware of this technique when we started to perform blind pleural with this needle in moderate to large pleural effusion. Therefore, we used a perpendicular approach to biopsy the

pleura. We initially performed it under ultrasound guidance and subsequently, since we found that the fluid provided a reasonable margin of safety in these patients, we performed the procedure blind. We have continued to perform it this way as we found this approach both easy and safe and have performed over a hundred closed pleural biopsies with this needle, without significant complication. More recently, we have used the tangential approach described by McLeod et al⁽⁸⁾, which we found equally easy to perform. However, we feel that there may also be a higher chance of losing the orientation within the obliquely shaped intercostal space and therefore hitting the rib or injuring the neurovascular bundle, especially in obese patients, while using this method. A prospective trial comparing the perpendicular approach to perform pleural biopsies using the Tru-cut with the Abrams needle in the same group of patients is currently underway.

Scerbo et al⁽¹³⁾ have used the Abrams needle to perform pleural biopsies in the absence of pleural effusion. The safety of blind Tru-cut biopsy in the presence of minimal or no pleural fluid should await further studies. If performed, perhaps it is safer to use the tangential approach.

All published reports seem to suggest that pleural biopsy using the Tru-cut needle is safe. Walshe et al reported a 4% complication rate when pleural biopsy was performed. Chang et al⁽⁹⁾ did not encounter any complication in any of their patients on whom Tru-cut needle was used, although in those on whom Abrams needle was used, there was a 4% complication rate. McLeod et al⁽⁸⁾ also did not report any complication with the Tru-cut needle. The absence of significant complication in our patients suggests perhaps that the perpendicular approach to perform Tru-cut pleural biopsies is equally safe.

CONCLUSION

In conclusion, closed pleural biopsy can be performed safely using the Tru-cut needle with good results. A perpendicular approach to perform the biopsy does not increase the complication rate.

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