Transbronchial Needle Aspiration of Mediastinal Lymph Node

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SUMMARY

In Malaysia, transbronchial needle aspiration (TBNA) is a relatively new procedure performed only in a handful of respiratory centres. We reviewed TBNA of mediastinal lymph node performed in Hospital Tengku Ampuan Afzan (HTAA) to determine the yield and its complications. Data was retrieved from endoscopy databases and patients' records, CT thorax images and all cytological and histological slides were reviewed. Twenty-five patients had TBNA performed. TBNA was positive in 15 patients (60%). Overall, 80% had confirmed malignancy after bronchoscopy. Only four patients had documented bleeding after TBNA and in two of them, bleeding stopped spontaneously and another two patients required diluted adrenaline to stop the bleed. No mortality was reported from this procedure. Hence, TBNA is a safe procedure.

KEY WORDS:
Transbronchial needle aspiration, Yield, Bronchoscopy, Lung cancer

INTRODUCTION

Transbronchial needle aspiration (TBNA) of mediastinal lymph node using flexible bronchoscope was first described in 1983[1]. Since then, it has gained popularity in Europe and America due to its less invasive fashion as compared to mediastinoscopy or open surgery. It is particularly useful to establish histological diagnosis in patients with peripheral lung lesion associated with mediastinal lymphadenopathy and staging of lung cancer. Other than sampling of the lymph node, transbronchial needle aspiration is also useful in diagnosis and/or drainage of mediastinal cyst or mediastinal abscesses.

In Malaysia, there are only a handful of centres performing this procedure. This is probably due to lack of training facilities and data on the usefulness and safety of this procedure in Malaysia (Personal communication with chest physicians in the country). Therefore, we reviewed all TBNA of mediastinal lymph node performed in Hospital Tengku Ampuan Afzan (HTAA) since 2003 to determine the yield and to find out if there were serious complications and mortality related to this procedure.

MATERIALS AND METHODS

All TBNA performed in HTAA from January 2003 to September 2007 were retrieved from endoscopy databases and patients' names and registration numbers were recorded. Then patients' records, CT thorax images and all cytological and histological slides were reviewed. The histological slides were reviewed by two pathologists in HTAA. CT thorax images were reviewed and the maximum sizes of mediastinal lymph nodes on which TBNA were performed were obtained.

All patients had CT thorax before the procedure. Preparation of patients was similar to bronchoscopy. Coagulation profile was not a routine unless patients had a history of bleeding diathesis. Consent was taken before the procedure and the patients were sedated with intravenous midazolam 2-10mg. Nostril, posterior pharynx, vocal cord, primary carina and left and right main bronchi were anaesthetised with 10-20 ml of 0.1% lignocaine. After visualizing all bronchi and performing bronchio-alveolar lavage (BAL), biospy, brushing or transbronchial lung biopsy (TBLB) if indicated, lignocaine 0.1% was used to anaesthetize the site of puncture. The TBNA needles used were the 22-gauge and 19-gauge needles. The TBNA needle was advanced to penetrate through the intercartilaginous space. Then suction was applied with a 20-ml syringe and the needle was moved in and out by 3 to 4 mm. The specimen was then directly placed onto a few slides, and immediately smeared and fixed with 95% alcohol. Occasionally, cytology technician was called to perform rapid on-site cytologic evaluation (ROSE) during TBNA if they were available.

Statistical Analysis

The data was analyzed using Statistical Package for the Social Sciences (SPSS) version 12 software package. Categorical variables were tested using Chi-square test. Significance was taken at 0.05.

RESULTS

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Table I: Diagnostic Yield of Various Bronchoscopy Procedures

Procedure	Total No. of procedure performed (N)	% of procedures performed in all patients	No of positive result (n)	Yield (n/NX100%)
TBNA	25	100	15	60
BAL	17	68	3	18
Brushing	16	64	9	56
Endobronchial biopsy	10	40	4	40
TBLB	9	36	4	44
Subcutaneous lymph node biopsy	4	16	3	75

TBNA: Transbronchial needle aspiration
BAL : Bronchio-alveolar lavage
TBLB : transbronchial lung biopsy

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DISCUSSION

Lung cancer was already the most prevalent malignant neoplasm three decades ago[2]. As medical practitioners, we encounter this sinister disease at different stages. Some of us detect the disease early, whereas others palliate the disease. Nevertheless, many physicians will agree that early diagnosis and staging play important roles in determining appropriate treatment and thus, influence the prognosis of this disease. Transbronchial needle aspiration, which was first developed by Schieppati [3], and later used with the fiberoptic bronchoscope [4], is now beginning to gain acceptance as an essential tool to stage the extent of mediastinal lymph nodes involvement in malignant disease.

The positive yield obtained in our study was 60%, whereas results from other studies have demonstrated a positive yield of 45% to 96% [1,5,6]. The varied positive yield obtained from different studies suggests that transbronchial needle aspiration was not only operator-dependent [7], but also depended on other factors to achieve high yield. These factors are likely to include the type of needle, technique, tomographic evaluation, tissue preparation, tissue interpretation, nodal site and size [8].

Dasgupta A *et al* [6] reported that when TBNA was used in combination with conventional diagnostic procedures, a significantly higher diagnostic yield was achieved as compared to conventional diagnostic procedures only. In the same study, TBNA alone achieved a diagnostic yield of 96% whereas conventional diagnostic procedures i.e. bronchial washing, bronchial brushing and endobronchial forceps biopsy, achieved diagnostic yields of 22%, 48% and 43% respectively. Two other studies [9,10] also showed an increased yield with TBNA when used in addition to conventional diagnostic techniques: Shure and Fedullo [9] demonstrated a yield of 97% when the combination of TBNA, endobronchial forceps biopsy, brushing and washing were used, and Caglayan B *et al* [10] obtained results with a yield of 91% using TBNA plus conventional diagnostic techniques. In our study, TBNA was positive in 50% of ten patients who had negative bronchial washing, bronchial brushing, endobronchial forceps biopsy and transbronchial lung biopsy, which meant that TBNA was exclusively diagnostic in 20% of the total 25 patients studied. This figure is comparable to results from the study by Dasgupta A *et al* [6], which showed that TBNA was exclusively diagnostic in 20% of patients. In a study of 228 patients, Kvale *et al* [11] found that bronchial washings did not add significant diagnostic yield when forceps biopsy and bronchial brushing were simultaneously performed. In our study, only three patients had positive BAL and all three of them had positive TBNA (including two of them who had positive brushing and one had positive biopsy). In view of these results, there appears to be no advantage in performing bronchial washing if TBNA or other sampling procedures i.e. bronchial brushing and endobronchial forceps biopsy, are conducted simultaneously. With the addition of TBNA to other sampling procedures, a high diagnostic yield can be achieved.

Schenk *et al*[5] reported that diagnostic yield varied with aspirates taken from different anatomical sites; parabronchial aspirates, 39%, carinal aspirates, 54% and paratracheal aspirates, 57%. Similarly, Ceron *et al* [12] reported that diagnostic aspirates from right paratracheal nodal station, anterior carina and aorto-pulmonary window were 74%, 63% and 64% respectively. We obtained transbronchial needle aspirates from subcarinal, paratracheal and hilar nodal stations, but did not separate the specimens according to different nodal stations. However, several studies [13-16] have

shown that disease involving subcarinal nodes and multiple areas of nodal involvement carry a poor prognosis. This suggests that separation of the transbronchial needle aspiration specimens according to different nodal stations may be helpful in staging lung cancer and determining appropriate subsequent treatment.

Although the result was not statistical significant, TBNA from a lymph node with a size of 2 cm or more had a diagnostic yield of 75%, compared to 50% when a lymph node with a size of less than 2 cm was aspirated. However, Ceron *et al* [12] from their study of 827 transbronchial needle aspirations in 732 patients proved that diagnostic yield had a linear relation to lymph node size: 62%, 75% and 79% where the short axis was <1cm, 1 to 2cm and >2cm respectively. The small sample size in our study was the likely cause of negative correlation. One other factor that could have influenced the diagnostic yield of our study was the type of needle used. We have used the 22-gauge needle in all except two patients, in whom the 19-gauge needle was used. Although transbronchial needle aspiration using the 19-gauge needle was shown by Ceron *et al* [12] to improve diagnostic yield, achieving 80% compared to 66% when the 22-gauge needle was used, the study did not employ 19-gauge needle on small targets (<1 cm in diameter). In the subset of patients with nodal targets >2 cm, they reported similar diagnostic yield of the two needles. This suggests that in patients with smaller lymph node size (<2 cm), the 19-gauge needle should be employed, whereas in patients with larger lymph node size (>2 cm), either the 19-gauge or the 22-gauge needle can be used.

Tissue preparation and interpretation are important factors to consider for achieving a high TBNA diagnostic yield. Oki M *et al* [17] reported that by using the 19-gauge needle, a greater frequency of TBNA specimens with non-specific diagnoses were small in size (>0 and <1 mm^2), fewer specimens with non-specific diagnoses were large in size (>2 mm^2). In other words, the specimen of larger size appears to increase diagnostic yield. With regards to sample preparation, two widely practiced methods were compared prospectively by Diacon AH *et al* [18] to determine which has a higher yield. In the first method, the specimens were flushed into a container and transported as a fluid suspension to the laboratory, where they were processed further (called the fluid technique), while in the second method, the specimen was directly placed onto a slide, and immediately smeared and spray-fixed (called the direct technique). They reported that the direct technique had a better yield overall than the fluid technique ($p<0.01$). The study used the patients as their own control subjects, which virtually eliminated all other variables except preparation method. The direct technique is superior because the fluid technique may have resulted in cell loss during transportation and laboratory preparation. By obtaining multiple TBNA samples, diagnostic yield can be increased. However, this practice may also increase cost, duration and risk of bronchoscopy. Rapid on-site cytologic evaluation (ROSE) during TBNA was reported by Baram D *et al* [19] to be accurate and allows deferral of additional biopsy without compromising yield. They reported that ROSE has a sensitivity of 88% and specificity of 94% in predicting final TBNA diagnosis of malignancy. Although we had a cytologist available to evaluate our TBNA samples during bronchoscopy, this data was not collected during the course of our study for analysis. Based on these reports [17-19], TBNA during bronchoscopy should ideally be carried out with ROSE, the specimen should be taken using the 19-gauge needle to obtain a larger specimen, and the direct technique should be used to prepare the specimen for further examination.

TBNA is a safe procedure. Although bleeding, bacteraemia, pneumothorax and pneumomediastinum are known complications, Dasgupta *et al* [6] reported only one out of 55 patients who had minor bleeding following TBNA, whereas other studies [5,7,12] reported that no complications of significance were encountered. In our study, only four of the 25 patients had bleeding following TBNA and in two of them, bleeding arrested spontaneously. Two other patients required diluted adrenaline to stop the bleeding. Therefore, bronchoscopists should consider TBNA as one of the routine sampling procedures besides bronchial brushing and endobronchial forceps biopsy, as serious complications following TBNA are rare.

Since it was adapted for use with flexible bronchoscopy, transbronchial needle aspiration is a procedure that continues to undergo improvisation to achieve higher diagnostic yield. These include guidance techniques, such as CT-fluoroscopy guided TBNA [20] and endobronchial ultrasound-guided TBNA [21]. As the trend moves towards minimally invasive techniques, TBNA is a valuable tool to diagnose lesions in the mediastinum and lung; without subjecting the patient to surgery. As techniques advance with time, so must our skills for surely, the tool is only as good as its operator.

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