

# Transbronchial Needle Aspiration in the Diagnosis of Bronchogenic Carcinoma

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## Abstract

Transbronchial needle aspiration (TBNA) *via* a fiberoptic bronchoscope has been used for diagnosis of lung cancer by Wang since 1981. The technique uses a fiberoptic bronchoscope with a flexible needle that can penetrate the wall of the trachea and major bronchi. It is still underutilized and markedly depends on the physician's skill. We present our experience of TBNA for diagnosis of bronchogenic carcinoma. TBNA was performed on 47 consecutive patients with suspected lung cancer at the time of diagnosis bronchoscopy. Thirty six patients were diagnosed with bronchogenic carcinoma. TBNA demonstrated bronchogenic carcinoma in 61.1 per cent of the cases (22 of 36) and TBNA alone confirmed a malignant diagnosis in 33.3 per cent (12 of 36). The overall diagnostic yield of bronchoscope utilizing the conventional techniques of bronchial washing, brushings and biopsy was 50 per cent. With the addition of TBNA, bronchoscopy was diagnostic in 83.3 per cent of the patients. There were no serious complications. We concluded that TBNA is a safe technique that can significantly increase the diagnostic yield of conventional fiberoptic bronchoscopy in the diagnosis of bronchogenic carcinoma.

**Key word :** Diagnosis, Lung Cancer, Bronchogenic Carcinoma, Transbronchial Needle Aspiration, TBNA

Transbronchial needle aspiration (TBNA) is a technique for obtaining a specimen of the mediastinal lymph node *via* a fiberoptic bronchoscope for cytologic examination<sup>(1-3)</sup>. It was introduced by Wang et al in the early 1980s<sup>(2)</sup>. The utility of TBNA in assessing mediastinal adenopathy

and in staging lung cancer has been well documented<sup>(3-10)</sup>. It can also be a very effective method to diagnose bronchogenic carcinoma, especially in patients with lesions that are not readily accessible *via* conventional bronchoscopic technique<sup>(1-3,7)</sup> but its use varies wildly. At some centers, this pro-

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cedure is a primary means for mediastinal evaluation, whereas, at others it is performed infrequently. We describe our experience with TBNA as a diagnostic tool in patients with bronchogenic carcinoma.

## MATERIAL AND METHOD

Records of all patients who underwent transbronchial needle aspiration at Pramongkutkla Hospital, from September 1996 to October 1998, were retrospectively reviewed. TBNA was performed on 47 consecutive patients who were suspected of having bronchogenic carcinoma. Suspicion of bronchogenic carcinoma was based on an abnormal chest roentgenogram and symptoms suggestive of bronchogenic carcinoma. Thirty-six patients were ultimately proved to have bronchogenic carcinoma and comprised the study group. Most patients underwent prebronchoscopic chest CT in an attempt to localize mediastinal adenopathy which is defined as any lymph node greater than 1 cm in diameter in the short axis. TBNA was then directed by chest CT in the areas of mediastinal adenopathy. Usually TBNA were obtained from subcarinal, the right and left paratracheal or the right and left hilar lymph node. A sterile, 13 mm, Teflon tubing 21G needle (Olympus) was used as the aspirating needle (Fig. 1). The needle can be retracted into a sheath during passage through the channel of the bronchoscope and advanced to perform the aspiration. After informed consent, bronchoscopy and TBNA were performed by staff pulmonologists or pulmonary fellows under supervision. TBNA was performed

prior to brushing, washing and biopsy to avoid contaminating the trachea with cellular material from the more distal airway. Two or three aspirations were obtained. Considering the tumor location and accessibility, brushings, washings and biopsies were subsequently performed. Patients who underwent nondiagnostic bronchoscopy were subsequently diagnosed by percutaneous needle aspiration, thoracotomy, pleural biopsy or other means as indicated by tumor involvement. Cytologic analysis was performed by standard techniques and cytologic specimens reported as suspicion were considered negative.

## RESULTS

Forty - seven patients with mediastinal lesion which suggested bronchogenic carcinoma underwent transbronchial needle aspiration (Table 1). Thirty-three patients were diagnosed as having bronchogenic carcinoma by a positive histologic or cytologic specimen. Three patients, with nondiagnostic bronchoscopy and TBNA, refused aggressive mediastinoscopy or mediastinotomy. All these three patients had clinically suggested bronchogenic carcinoma. Two had an endobronchial lesion, mediastinal adenopathy and pleural effusion. One had multiple brain metastasis. All patients died in six months. Six patients with negative TBNA for malignancy were subsequently proved to have TB, melioidosis and sarcoidosis. Five patients had been proved to have other neoplasms including lymphoma (2), CA nasopharynx (1), CA esophagus (1), and malignant teratoma (1).

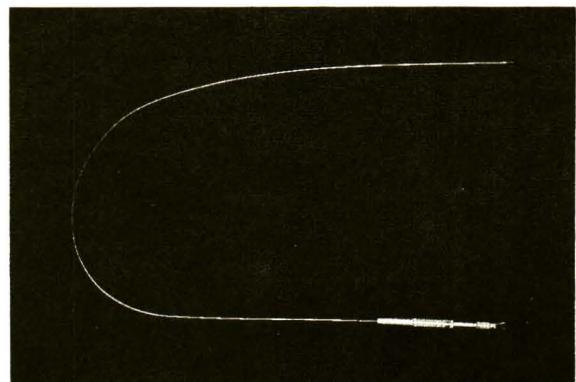
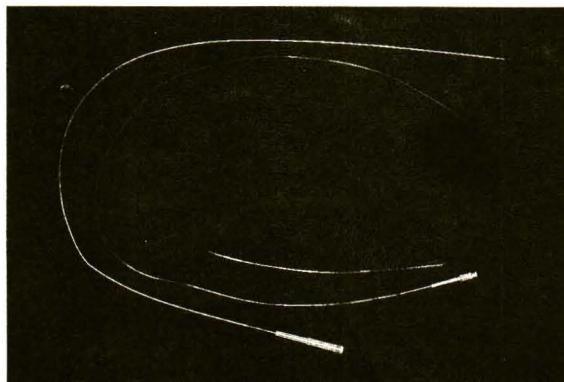


Fig. 1. Transbronchial aspiration needle NA-2C-1 and metal sheath. The needle can be retracted into a metal sheath and advanced to perform the aspiration.

**Table 1. Disease performed by TBNA.**

Disease	Number	%
bronchogenic carcinoma	33	70.2
benign (TB, melioidosis, sarcoidosis)	6	12.8
lymphoma	2	4.3
CA nasopharynx	1	2.1
CA esophagus	1	2.1
malignant teratoma	1	2.1
Nondiagnostic	3	6.4
Total	47	100

**Table 2. Results of initial TBNA in 36 bronchogenic carcinoma.**

	No	Percentage
TBNA positive	22	61.10
TBNA negative	14	38.90
TBNA positive as sole means of diagnosis	12 (36)	33.30
conventional bronchoscopic diagnosis	18 (36)	50
washing	6 (33)	18.20
biopsy	14 (26)	53.90
brushing	2 (3)	66.70
additional procedure		
transthoracic needle aspiration	2 (2)	100
pleural fluid cytology/biopsy	0 (2)	0
lymph node biopsy	1 (1)	100
Total positive for malignancy	33(36)	91.70

TBNA demonstrated bronchogenic carcinoma in 61.1 per cent of the cases. (Table 2) For brushings, washings, and transbronchial/endobronchial biopsy, the diagnostic yields were 66.7, 18.2 and 53.9 per cent, respectively. TBNA alone confirmed the malignant diagnosis in 12 patients (33.3%). The overall diagnostic yield of bronchoscopy utilizing the conventional techniques of washings, brushings and biopsy was 50 per cent (18 of 36). With the addition of TBNA, the overall diagnostic yield of bronchoscopy was 83.3 per cent (30 of 36). The histologic subsets of our patient population are reflected in Table 3. The majority of the tumors were adenocarcinoma (36.4 per cent) and squamous cell carcinoma (31.8 per cent) and the rest were small cell, adenosquamous or undifferentiated cell carcinoma.

There was no significant complication from this procedure. Bleeding occasionally appeared at the bronchial puncture site, usually in a small amount and stopped spontaneously.

**Table 3. Histologic subset of bronchogenic carcinoma from TBNA.**

Cell type	Patients	Percentage
Adenocarcinoma	8	36.4
Squamous cell	7	31.8
Small cell	3	13.6
Adenosquamous cell	2	9.1
Undifferentiated cell	2	9.1
Total	22	100

## DISCUSSION

Wang et al described the technique of bronchoscopic needle aspiration for paratracheal tumor in 1978 and then for hilar, paratracheal, and subcarinal node in 1981(1,2). A rigid bronchoscope was required and more widespread uses were therefore limited. Techniques for transbronchial needle aspiration using a flexible bronchoscope were then developed and have been used primarily for lymph node sampling in the diagnosis and staging of bronchogenic carcinoma(2-9). In a previous report by Wang et al(1), a specific diagnosis of carcinoma in paratracheal or parabronchial tissues was established in 18 of 20 patients (90 per cent). Our study described the application of this technique in the diagnosis of lung cancers and shows its value. This report demonstrated that the diagnosis of lung cancer by bronchial brushing, washing and transbronchial/endobronchial biopsy was 66.70, 18.20, and 53.90 per cent, respectively. Transbronchial needle aspiration demonstrated bronchogenic carcinoma in 61.1 per cent of the patients and TBNA alone confirmed the diagnosis of malignancy in 12 patients (33.2 per cent). The overall diagnostic yield of bronchoscopy utilizing the conventional techniques of bronchial washings, brushings, and biopsies was 50 per cent. With the addition of TBNA, the overall diagnostic yield of bronchoscopy increased to 83.3 per cent. Results previously reported by Schenk et al(3) reflected a diagnostic yield with brushings,

washings, biopsies and TBNA was 40, 29, 56 and 45 per cent, respectively. With the addition of TBNA, the overall diagnostic yield of bronchoscopy was 71 per cent(3). In 1985, Harrow *et al*(5) studied 70 patients with lung cancer and noted a malignant aspiration *via* TBNA in 32 (46 per cent). When compared with a previous reports, our diagnostic yield of TBNA was higher than that of Harrow and Schenk *et al*.

There was no serious complication, although aspiration of blood was not uncommon. In this case the needle was removed and repositioned several millimeters from the site, where blood had been aspirated, and the procedure was repeated. Accordingly, we have not routinely performed chest radiographs postoperatively and considered that rigid bronchoscopy needed to be immediately available.

Recent studies have shown that TBNA is a valuable, minimally invasive component of bronchoscopic diagnosis and staging of patients with lung cancer(1-10). Additionally, TBNA has been shown to increase diagnostic yield in patients with submucosal, peribronchial and endobronchial tumors(11, 12). It can be used to sample peripheral mass with the help of fluoroscopy(13,14). Although TBNA has become a valuable adjunct in evaluation of patients with lung cancer, its use varies widely. At some centers, this procedure is a primary means for mediastinal evaluation, whereas, at others it is performed infrequently. One survey noted that only 11.8 per cent of experienced clinicians routinely used TBNA to diagnose malignant diseases; about half of respondents rarely performed it(15). Inexpe-

rience with the technique, nonacceptance of specimens by pathologists, and potential damage to the bronchoscope were cited as reasons for its low use despite the remarkably high yields and safety.

In our series, the diagnosis of lung cancer by TBNA was 61.1 per cent, and in several patients, only TBNA provided the histologic evidence of malignant disease. the overall diagnostic yield of bronchoscopy utilizing the conventional techniques and TBNA was 83.3 per cent. No serious complication occurred. Therefore, we conclude that transbronchial needle aspiration (TBNA) is a safe technique that can significantly increase the diagnostic yield of conventional fiberoptic bronchoscopy in the diagnosis of bronchogenic carcinoma.

## SUMMARY

TBNA was performed in 47 consecutive patients who were suspected of having lung cancer at the time of diagnostic bronchoscopy. Thirty-six patients were diagnosed with bronchogenic carcinoma. TBNA demonstrated bronchogenic carcinoma in 61.1 per cent of the cases (22 of 36) and TBNA alone confirmed a malignant diagnosis in 33.3 per cent (12 of 36). The overall diagnostic yield of bronchoscope utilizing the conventional techniques of bronchial washing, brushings and biopsy was 50 per cent. With the addition of TBNA, the overall diagnostic yield of bronchoscopy increased to 83.3 per cent. There was no serious complication. We conclude that TBNA is a safe technique that can significantly increase the diagnostic yield of conventional fiberoptic bronchoscopy in the diagnosis of bronchogenic carcinoma.

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## การวินิจฉัยมะเร็งปอดโดยการใช้เข็มเจาะคุณผ่านหลอดลม

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ผู้รายงานได้ทำการศึกษาผลของการใช้เข็มเจาะคุณผ่านหลอดลม (TBNA) เพื่อใช้ในการวินิจฉัยมะเร็งปอด พนบว่า การใช้เข็มเจาะคุณผ่านหลอดลม ในผู้ป่วยที่มีต่อมน้ำเหลืองบริเวณ mediastinum ได และสังสัยว่าจะเป็นมะเร็งปอด จำนวน 47 ราย ซึ่งต่อมาพิสูจน์ได้ว่ามี 36 รายป่วยเป็นมะเร็งปอด การใช้เข็มเจาะคุณผ่านหลอดลมให้การวินิจฉัยมะเร็งปอดได้ 61.10 เปอร์เซ็นต์ (22 ใน 36 ราย) 12 ใน 36 รายสามารถให้การวินิจฉัยว่าเป็นมะเร็งปอด โดยการใช้เข็มเจาะคุณผ่านหลอดลมโดยวิธีเดียว ส่วนการวินิจฉัยมะเร็งปอดโดยวิธีการส่องกล้องและใช้เทคโนโลยีการรุกราน (ตัดชิ้นเนื้อ, ล้างและ brushing) ให้การวินิจฉัยได้ 50 เปอร์เซ็นต์ แต่เมื่อรวมการใช้เข็มเจาะคุณผ่านหลอดลมด้วยแล้ว จะสามารถให้การวินิจฉัยมะเร็งปอดได้สูงถึง 83.30 เปอร์เซ็นต์ ขณะทำการวินิจฉัยไม่พบอาการแทรกซ้อนรุนแรงจากการใช้เข็มเจาะคุณผ่านหลอดลม สูงไปกว่าการใช้เข็มเจาะคุณผ่านหลอดลม (TBNA) โดยผ่านทางกล้องส่องหลอดลมชนิดโค้งงอ (fiberoptic bronchoscope) เป็นเทคนิคที่ปลอดภัย และสามารถช่วยวินิจฉัยมะเร็งปอดที่มีต่อมน้ำเหลืองบริเวณ mediastinum ได้อย่างมีประสิทธิภาพ

คำสำคัญ : การวินิจฉัย, มะเร็งปอด, เข็มเจาะคุณผ่านหลอดลม

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