A COMPARATIVE STUDY OF THE CHIBA AND TURNER NEEDLES IN PERCUTANEOUS LUNG BIOPSY

J Yap, K P Tan

SYNOPSIS

This retrospective study compares the yield and complications of the Chiba and Turner needles in percutaneous lung biopsies. 60 cases were studied over a two-year period. Adequate aspirates which enabled the pathologist to arrive at a definite diagnosis was obtained in 14 out of 15 cases with the Chiba needle and 41 out of 45 cases with the Turner needle. This difference in the yield was not significant. ($p > 0.05$)

The complications were mainly pneumothorax and to a lesser extent haemoptysis. There were 16 out of 45 cases of pneumothorax with the Turner needle of which two required a chest tube compared to 1 out of 15 cases with the Chiba needle.

This study has shown that a good yield could be obtained with either the Chiba or Turner needle while only a low rate of major complication resulted with the Turner needle and none with the Chiba needle.

SING MED J. 1988; 29:14–16

INTRODUCTION

A large range of needles have been in use for percutaneous lung biopsies since its introduction in 1883 when Leyden reported the first aspiration biopsy. (1) The types of needles presently available are aspiration, cutting type, screw and trephine drill needles. (2) The choice of needle is largely dictated by the results obtained and the complications arising from its use. The aim of this study done retrospectively is to compare two fine aspiration needles, the 22F Chiba and the 22F Turner with regards to their yield and rate of complication.

METHODS

Over a two year period from 1984 to 1985, a total of 60 cases were studied. These were patients referred to our department for a diagnostic aspiration biopsy who had either a solitary or multiple pulmonary lesions. The patients were divided into those done in 1984 and those done in 1985. In 1984, the Chiba needle was used on 15 patients. In 1985, when the Turner needle became available in the department, it was used on 45 patients.

The patient was pre- medicated with atropine and pethidine. Prothrombin time and partial thromboplastin time were done to exclude any bleeding tendencies. The lung lesion was first localised on frontal and lateral chest x-rays. The shortest approach to the lesion was usually taken. The patient was placed on the fluoroscopic table either supine or prone depending on whether the lesion was more anterior or posterior respectively. The lung opacity was located with fluoroscopy and a radio-opaque skin marker positioned over it.

After cleaning the area, the skin and subcutaneous tissue was infiltrated with 1% lignocaine. The respective needle was inserted and guided to the lesion under fluoroscopy with respiration suspended. A difference in consistency could usually be felt when the lesion was entered by the needle. This was confirmed by noting if the excursion of the needle tip matched that of the lesion during respiration. The needle shaft outside the patient was marked about 1 cm from the skin with a sticky tape. The stillete of the needle was removed and a 10 cc syringe attached. The patient was asked to suspend respiration while suction was applied to the syringe. The needle was then advanced into the lesion in short stabbing and rotatory movements. Usually three stabs are carried out. After the needle tip had exited from the lesion, suction was released and the whole needle was taken out from the patient. The aspirate was then smeared on glass slides. Prior to 1985, the pathologist was not available to read the slides immediately. Subsequently, two slides were sent to the pathologist for immediate staining and examination. The rest were placed in absolute alcohol. Where an infective aetiology was suspected, some aspirate was also sent for culture. After the procedure, the patient had an immediate chest x-ray to look for pneumothorax. This was repeated after 4–5 hours. The patient was also monitored in the ward for any haemoptysis and pulse and respiratory rates were checked hourly for 12 hours.

RESULTS

The results of the 60 biopsies are shown in Table 1. A positive result was one in which the pathologist was

TABLE 1
COMPARISON OF ASPIRATE RESULTS BETWEEN THE CHIBA AND TURNER NEEDLES

Result of Aspirate	Chiba	Tumer
Positive	14	41
Equivocal	0	4
Negative	1	0
Total	15	45

Department of Diagnostic Radiology
Tan Tock Seng Hospital
Moulmein Road
Singapore 1130

J Yap, MBBS (S'pore), Medical Officer

K P Tan, MRCP (UK), FRCR (UK), Consultant Head

able to decide definitely whether the lesions were malignant or non-malignant. There were 14 positive results out of 15 patients using the Chiba needle and 41 out of 45 with the Turner. The diagnosis was equivocal when the pathologist was unable to arrive at a definite diagnosis. There were 4 cases with the Turner and none with the Chiba. A negative result was when no abnormal cells were seen in the aspirate although there is clinical evidence of disease with supporting bronchoscopy and sputum cytology findings. There was only one such case with the Chiba needle. More than 50% of the cases were read by the same pathologist and the rest of the cases by a sprinkling of others.

The positive results are further evaluated in Table 2. Of the 14 positive results with the Chiba needle, there was one non-malignant aspirate which was proven to be chronic inflammatory lung disease on lobectomy. The 10 cases of non-malignant aspirates with the Turner needle were one case of pneumonia (Strept. Gp. D), four tuberculoses, two lung abscesses and three non-specific inflammatory conditions.

The results of the complications are listed in Table 3. There were 16 cases of pneumothorax with the Turner needle of which 2 were severe enough to warrant a chest tube. Only one case of asymptomatic pneumothorax resulted with the Chiba needle. No deaths from the procedure were encountered. Case notes could not be traced to see if haemoptysis occured in 5 cases using the Chiba needle and 12 cases with the Turner needle.

TABLE 2
COMPARISON OF THE RESULTS OF POSITIVE ASPIRATES BETWEEN THE CHIBA AND TURNER NEEDLES

Results of Positive Aspirates	Chiba	Turner
Malignant	13	31
Non-Malignant	1	10
Total	14	41

TABLE 3
COMPARISON OF THE RESULTS OF THE TYPE OF COMPLICATION BETWEEN THE CHIBA AND TURNER NEEDLES

Type of Complication		Chiba	Tumer
Haemoptysis		1 (10)	3 (33)
	Chest Tube Required	0	2 (45)
Pneumothorax	Chest Tube not Required	1 (15)	14 (45)
	Total	2	19

DISCUSSION

Historically, small needle aspiration was not a popular procedure due to the difficulty in obtaining sufficient material for a definitive diagnosis. (3) Although large-bore core and trephine biopsy procedures produce more tissue samples for histological interpretation, the potential morbidity and mortality have been considered unacceptable. With the development of high quality image intensification, specialised needles and advanced cytological techniques, percutaneous lung biopsies have become increasingly important in making disease specific diagnosis of pulmonary lesions.

The Chiba needle was originally designed for use in percutaneous transhepatic cholangiogram. (5) It has since been adopted for use in percutaneous lung biopsies and good results with this needle have been reported in some studies. (6,7,8) This is a simple thin-walled flexible needle of stainless steel. The cannula and stillete are flush at its tip and bevelled at an angle of 30°. The Turner needle has a cannula that is bevelled at 45° and a stillete which protrudes from the tip of the cannula which is circumferentially sharpened. This is unlike the Chiba needle which does not have this feature. The combination of aspiration and cutting action in the Turner needle is an attempt to increase tissue sample size. Both needles used in this study were 22F in size.

Adequate aspirates which enabled the pathologist to come to a definite diagnosis was obtained in 14 out of 15 patients with the Chiba needle and 41 out of 45 with the Turner needle. These results are comparable with other studies on fine aspiration needles. (6,7,8) It was postulated that the Chiba needle has a greater propensity to deviate from its intended course when it is tracked through the lung tissue. As a result, small lesions may be missed. The Turner, with its circumferentially sharpened tip and stillete protruding beyond the bevel tend to pursue a truer course. However, the difference in the yield from both needles in this study was not significant ($p > 0.05$). There was however one negative result with the Chiba needle. This was a patient with a 11 × 5 cm, ill-defined mass in the left lower lobe posteriorly. Sputum cytology yielded adenocarcinomatous cells and a tumour was sighted on bronchoscopy. The percutaneous aspirate only yielded red blood cells, lymphocytes and macrophages. Two reasons could have accounted for this. One is that the pathologist was not immediately available to read the slides during the year 1984. Hence, a second pass was not attempted as the first aspirate may have been deemed adequate. Secondly, the needle could have entered the necrotic part of the tumour which may explain the type of cells obtained.

The complications were mainly pneumothorax and to a lesser extent haemoptysis. The use of fine needles has practically eliminated the risk of major haemorrhage as reported in some studies. (9,3,10) The number of haemoptysis in this study was small and no major haemorrhage was encountered in the cases that were followed-up. Pneumothoraces were found to occur more frequently with the Turner needle. The majority of these were localised and no active treatment was necessary. The more traumatic nature of the Turner needle could account for this observation. There were also more central lesions biopsied with the Turner needle in 1985 as the clinicians' confidence in the procedure rose. However, another study reported that more pneumothoraces occured after biopsy of peripheral lesions compared to central lesions but their severity was approximately the same. (11)

CONCLUSION

Numerous reports have shown the aspiration needle biopsy of chest lesions to be a reasonably safe and simple procedure. (12,13,14) Our study also supports this and has shown that adequate aspirates could be obtained with either the Chiba or Turner needle while only a low rate of major complication resulted with the Turner and none with the Chiba needle.

ACKNOWLEDGEMENTS

We thank the radiologists of the Department of Diagnostic Radiology, Tan Tock Seng Hospital, the pathologists especially Dr. Anjula Thomas of the Department of Pathology, Singapore General Hospital for their assistance in this study.

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