INCIDENCE OF MALIGNANCY IN MEDIASTINAL LYMPHADENOPATHY IN INDIAN POPULATION USING CT-GUIDED BIOPSY AS AN EVALUATING TOOL

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ABSTRACT

Causes of mediastinal lymphadenopathy are many, ranging from reactive lymphadenopathy to malignancy. With the high incidence of tuberculosis in India, we aimed to determine the incidence of malignancy in mediastinal nodes with no primary lung lesion using computed tomography (CT)-guided biopsy as an evaluating tool and highlighting the superiority of this procedure over others described in the literature.

KEYWORDS: Mediastinal node biopsy, Malignancy, CT biopsy, Granulomatous diseases.

Introduction

Causes of mediastinal lymphadenopathy are many, ranging from reactive lymphadenopathy to malignancy. With the high incidence of tuberculosis in our country, we aimed to determine the prevalence of malignancy in mediastinal nodes with no primary lung lesion using computed tomography (CT)-guided biopsy as an evaluating tool and highlighting the superiority of this procedure over others described in the literature.

After the advent of various imaging modalities, biopsies are becoming less invasive with increased precision. Computed tomography (CT)-guided trans-thoracic needle biopsy can be used to access almost all mediastinal lymph node stations, avoiding more expensive and invasive procedures. CT-guided biopsy is also relatively a safe and effective method of obtaining tissue samples.

Materials and Methods

This was a prospective study done over a period of two years between October 2011-2013. Patients referred for CT-guided biopsy of mediastinal nodes were evaluated and included in our study with criteria of mediastinal node measuring larger than 1.5 cm (short axis diameter) and those with no evidence of neoplastic or infective lung pathology. Patients with nodes measuring less than 1.5cm, having emphysematous bullae along the path of the needle, uncorrectable bleeding diathesis and uncooperative patients were also excluded from our study.

A total of 100 patients fulfilled the criteria and were included for analysis. Before performing the procedure, routine workup including Bleeding parameters like bleeding time, clotting time, International Normalized Ratio (INR) and assessment of previous cross-sectional imaging was done. Informed consent was taken in all the patients.

All the CT guided biopsies were done under aseptic precautions using local anaesthesia (Xylocaine 2%). The procedure was performed in CT suite installed with 64 slice multidetector CT scanner. All the tru-cut biopsies were done using the coaxial system. The samples were taken in a sterile container and sent for histopathological analysis.

The target node is localized on the preprocedural CT, then the patient was positioned either supine or prone on the CT table depending on the location of the node, and a scan is taken. Also, preliminary thought was given on how to access the lesion. Once the site of entry was chosen and the trajectory to reach the node planned, the skin site was marked with a radio-opaque label at the appropriate table position.

After this, another axial CT slice was performed at the...
Figure 1: CT guided biopsy of subcarinal node.

Figure 2: CT guided biopsy of right paratracheal node.

marked site to confirm the entry point. Once the position is established, the depth of the skin entry point to the node was measured using standard CT software and trajectory of the needle was established in such a way as to avoid major blood vessels, emphysematous bullae, fissures, nerves and other critical vital structures. The planned trajectory of the needle with the required angulations is marked on a plain x-ray film which will help in visual guidance when the needle is being placed.

The entry point was then painted and draped in a sterile fashion. Then, the skin entry site and the needle tract are anesthetised using local anaesthesia.

After this step, by using the x-ray film marked with the planned trajectory as visual guidance, the quick core biopsy needle was inserted, and the direction of the needle was manipulated to reach the node.

Additional CT scans are taken as and when required so that the needle is adjusted, till it is placed at the target site.

Once the tip of the needle is within the node, a tru cut biopsy is done using the co-axial biopsy system (figure 1,2). Four to five tissue samples are taken by changing the direction of the tip of the needle within the node. These samples are taken in a sterile container with formalin solution and are sent for tissue analysis. After the procedure, a check CT scan is performed to look for complications if any.

Findings

Of the 100 mediastinal nodal biopsies that were done in our institute, 78 were of non-neoplastic nature, 20 were of malignant nature, and two were inconclusive for pathological analysis. An accurate diagnosis was made in 98% of the patients who underwent CT-guided biopsy of mediastinal nodes with no primary lung lesions. Of the non-neoplastic nodes, the most common pathology was tuberculosis which was seen in 40 cases (51.5%), 16 were non-caseating granulomas (20.5%), 13 were sarcoidosis (16.5%), and the remaining nine were reactive lymph nodes (11.5%).

Of the Twenty malignant nodes, Thirteen was Metastatic adenocarcinoma (65%), three were positive for tumour cells (15%), two were adenocarcinoma (10%), One was non-Hodgkin’s lymphoma (5%), and 1 (5%) was adenoid cystic carcinoma.

Sixteen out of the twenty malignant nodes was diagnosed in male patients (80%). We found that malignant nodes had a more significant preference for older age group (40 to 80 years).

Malignant nodes had an increased predilection for paratracheal (40%) and subcarinal (40%) group of lymph nodes. In this study, most of the malignant nodes were ranging from 3.5 to 4.4 cm (40%) and 2.5 to 3.4 cm (35%).

There was transient pneumothorax in 8 patients and self-limiting hemoptysis in 6 patients with none warranting interventions. There was no procedure-related mortality in our study.

Discussion

In the presence of enlarged mediastinal nodes, it is very essential to have a correct early diagnosis and to be able to differentiate between malignant and benign nodes, thereby ensuring proper, timely patient management.

There are numerous methods for obtaining tissue samples for cytologic or histologic diagnosis from mediastinal nodes. Some of the commonly used techniques include percutaneous image-guided trans-thoracic needle biopsy; surgical techniques like cervical mediastinoscopy, thoracoscopy, and anterior mediastinotomy and then the needle biopsy techniques such as endoscopic ultrasound-guided fine needle aspiration biopsy and trans-bronchial needle biopsy are also used. For the assessment of thoracic lesions, especially for mediastinal lesions, an image-guided percutaneous needle biopsy is a safe and reliable technique [1].

Compared to all these procedures, CT-guided trans-thoracic biopsies is considered less invasive which can be done under local anaesthesia and are also cost-effective [2]. CT guidance also allows precise localisation of the target lesion and access to almost all the mediastinal compartments is possible, which include even those that are inaccessible by other alternative methods, such as trans-bronchial biopsy, mediastinoscopy, and endoscopic ultrasound-guided biopsy. CT scan provides a safe and shortest route for Fine Needle Aspiration and biopsy needle to avoid vessels and critical vital structures, hence reducing complications and increasing diagnostic yield[3].

Various approaches for CT-guided mediastinal node biopsy have been advocated. The commonly used approach is the extrapleural route. Sometimes direct mediastinal approaches like paravertebral, parasternal, trans-sternal, subxiphoid and trans-pulmonary approach have also been used.
Our study had a diagnostic accuracy of 98% which is better than the diagnostic success rates of other studies [4]. Reported accuracy rates of CT guided percutaneous needle aspiration/biopsy ranges from 64%-97% with a small risk of complications, and these results were observed by B Morrissey et al. [1], Westcott JL et al. [3]. Our study produced a better diagnostic yield as compared to other similar study conducted by Kulkarni et al. who had reported a diagnostic yield of 96% [5].

The diagnostic yield was on par with other procedures like thoracoscopy which had a yield of 98.3% [6,10], mediastinoscopy - 83% to 89% [7], Anterior mediastinotomy – 90% [8] and 95.91% [9], trans-bronchial ultrasound-guided biopsy – 97% [10]. Male preponderance for malignant nodes (80%) was noted in our study similar to a study by D.K. Pandey et al. [11] where the Male dominance was found to be 85.7%.

There is greater predilection for older age group (40 to 80 years) for malignant nodes. This is by a study carried out by Powers et al., who also showed an increased prevalence of neoplasm after age 50 years, with an average age of 54 years; 71% of total cases were found to be malignant [12].

Malignant nodes had an increased predilection for paratracheal (40%) and subcarinal (40%) group of lymph nodes. Also, it was observed in our study that, 40% of the malignant nodes measured 3.5 to 4.4 cm and 35% of nodes were ranging from 2.5 to 3.4 cm. A similar observation was also made in another study by Feigin DS et al. [13].

Transient minimal pneumothorax was noted in 8 patients, none requiring ICT insertion. All these patients had a chest x-ray at 3 hrs and 8 hrs interval which showed complete resolution. Pneumothorax has been reported in 10 to 60% of procedures; however, chest tube placement may be required in only 5 to 25% of such cases. Risk of pneumothorax depends on multiple factors, which include depth and size of the node, number of needle passes and the presence of emphysema or blebs in the path of the needle. The incidence of minor complications was slightly on the higher side, but there were no significant complications.

Six patients had minor hemoptysis immediately after the procedure. However no active intervention was required.

Conclusion

The incidence of malignancy in mediastinal nodes was observed to be 20% in our tertiary healthcare institution. Hence, the need for definitive tissue diagnosis is warranted in patients with mediastinal adenopathy.

Our results have shown that percutaneous CT-guided biopsy of mediastinal nodes is an accurate and safe procedure. The advantages of CT guided biopsy of mediastinal nodes over other procedures is, this is minimally invasive procedures done under local anaesthesia, almost all mediastinal nodal stations can be accessed with high precision and low complications.

To conclude, CT-guided biopsy is the best diagnostic tool for evaluating mediastinal adenopathy as it is highly accurate, high yielding and gives a final histopathology.

Authors' Statements

Competing Interests

There were no financial support or relationships between the authors and any organization or professional bodies that could pose any conflict of interests.