Value of histological specimens obtained by fiberoptic bronchoscopy and CT-fluoroscopy correlated with surgical specimens in the diagnosis of primary lung cancer.

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Purpose

PURPOSE:
To determinate the histological diagnoses correlation between specimens obtained by fiberoptic bronchoscopy and CT-fluoroscopy compared with the surgical specimens in primary lung cancer.

INTRODUCTION:
Lung cancer is a leading cause of cancer deaths around the world, nearly 80% of these patients present an unresectable or advanced tumor at the time of diagnosis\textsuperscript{1}. For patients with a lung nodule or mass, the histological confirmation of malignancy is required before treatment.

The most common minimal-invasive forms to obtain histological specimens are the fiberoptic bronchoscopy (FOB) and the CT-fluoroscopy biopsy (CT-F). The FOB has high sensitivity for the diagnosis of central lesions but low sensitivity for peripheral ones\textsuperscript{2}, in which the CT-F has been proven to have high diagnostic accuracy, sensitivity, specificity, and negative predictive values\textsuperscript{3}, indicating a high reliability of this technique\textsuperscript{4}.

The treatment strategies are becoming more complex, with certain novel therapeutics being restricted to specific histologic or molecular subtypes of lung cancer\textsuperscript{5,6}, therefore it is require that tissues samples have a satisfactory correlation with tumor histology; because, as previously mentioned, most patients are not surgical candidates.
Methods and Materials

From June 2006 to December 2011, 175 patients underwent to lung cancer surgery at our institution. Among them, 124 had a previous histological diagnosis obtained by CT-F biopsy (51) and FOB (73). The study population consisted in 125 men and 50 women, with a mean age of 66 years old (range 43 - 85 years).

The CT-F biopsy was performed with an 18-gauge trucut needle in a one-single pass. All the patients underwent a focal low-dose CT to evaluate the possible complications and a chest x-ray was performed 2 hours after the procedure for pneumothorax evaluation.

The FOB specimens evaluated were obtained by bronchial washing, bronchial brushing, bronchoalveolar lavage, fine needle aspiration or biopsy.

All the procedures were performed after the evaluation of coagulation status and upon written informed consent.

The histologic specimens obtained either by CT-F, FOB or surgery, were categorized according to the different WHO histological types of lung cancer or correlated them with each other. Also the complications rates of CT-F biopsy were evaluated in these patients.
Results

There were performed 66 CT-F biopsies and 156 FOB, obtaining satisfactory or enough material to make a malignancy diagnosis in 51 and 73 patients respectively. The mean size of the tumors was 3.29 cm (range 0.4-12 cm).

The 75% of diagnostic CT-F biopsies (38/51) showed histology matched with the surgical specimen histology. On the other hand, 74% of the diagnostic FOB histologies matched (54/73). Both techniques showed well correlation with the surgical specimen histology and together obtained the pre-surgical diagnosis in 53% of cases (92/175).

In the 80% of discordance cases between CT-F diagnoses and surgery specimens, a larger group was classified as poorly differentiated carcinoma (8/13), while the surgical histology showed in this group: 5 adenocarcinomas, 2 squamous cell carcinomas (Fig. 1) and 1 large cell carcinoma. (Table 1)

Otherwise in the 68% of discordance cases between FOB diagnoses and surgery specimens, a larger group was classified as poorly differentiated carcinoma (13/19), instead of 6 adenocarcinomas, 5 squamous cell carcinomas and 2 large cell carcinomas. (Table 2)

The development and increased use of immunohistological techniques and molecular analysis have become more precise the histological of pre-surgical samples\(^7\). In our study from June 2009, of 80 cases only the 5% (4) were diagnosed as poorly differentiated carcinomas (3 samples obtained by FOB and 1 by CT-F).

From a total of 66 CT-F biopsies performed, 53% were complicated (35): 27% focal parenchymal hemorrhage (18), 5% hemoptysis (3), and 35% pneumothoraces (23), in the former only 3 patients (5%) required a drainage tube. Most of our complications were small asymptomatic pneumothoraces (Fig. 2) and minor pulmonary bleeding (Fig. 3) that remained mainly subclinical and was detected only on the immediate post-procedure scans. The rate of pneumothoraces that required treatment is in the usual range reported\(^8\).
Fig. 1: Discordance between CT-F diagnoses and surgical histology, both are hematoxylin-eosin stains. A) shows a poorly differentiated carcinoma and B) shows a majority of squamous cell proliferation.

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<table>
<thead>
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<th>Table 1.- Diagnostic correlation between CT-F and Surgical specimens.</th>
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<td><strong>Surgical specimens</strong></td>
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<td>Squamous</td>
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<td>Adenocarcinoma</td>
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<td>Large cell Carcinoma</td>
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<td>Neuroendocrine carcinoma</td>
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<td>Carcinoid</td>
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<td><strong>Total</strong></td>
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Table 1: Diagnostic correlation between CT-F and Surgical specimens.

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### Table 2: Diagnostic correlation between FOB and Surgical specimens.

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<th>Surgical specimens</th>
<th>FOB specimens</th>
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**Fig. 2:** Axial CTMD image shows a minimum post-biopsy right pneumothorax (arrow), which remained subclinical, hence no treatment was performed.

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Fig. 3: Axial CTMD images of a biopsy (A) and immediate post-procedure (B), notice the mild parenchymal hemorrhage around along the needle tract (arrow). There was no evidence of pneumothorax in this case.

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Conclusion

The histological diagnoses of the specimens obtained by CT-F and FOB have well correlation with the surgery specimen histology.

The study of the surgical specimens has more histological accuracy in the cases of poorly differentiated carcinoma. Despite this, in the recent years, the use of new histological techniques has increased the diagnostic accuracy of the pre-surgery samples.
References


The authors appreciate that you have read the poster.

You can contact us by mailing to Fernando Bazan (fer_bazan@hotmail.com), in case you want to realize any questions or comments.