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EVALUATION OF CRYOPROBE BIOPSY IN DIAGNOSIS OF ENDOBRONCHIAL TUMORS

By

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ABSTRACT

Background: The cryoprobe is a closed system that can be re-sterilized and reused. It is well established as a safe procedure in taking endobronchial biopsies. Recent reports have risen as an alternative of the traditional forceps methods.

Objective: To assess the diagnostic yield and safety of cryoprobe in patients with endobronchial neoplasms.

Patients and Methods: Thirty patients who underwent bronchoscopy were included in this study at Chest diseases Departments (Endoscopic Unit) of Al -Azhar University Hospitals from August 2018 to August 2020 hospital. Endobronchial biopsies were taken by forceps biopsy and cryobiopsy with ERBE cryo probe from each subject.

Results: Twenty-five patients (83.33%) were diagnosed using cryoprobe biopsy, while 18 patients (60%) were diagnosed with forceps biopsy ($P<0.05$). Bleeding was the recorded complication in both procedures with no significant difference between them in the incidence of bleeding.

Conclusion: Cryoprobe biopsies were more successful than forceps biopsies in the diagnosis of lung cancer.

Key words: Cryoprobe Biopsies, Forceps Biopsies, Bronchoscopy, Endobronchial Tumor.

INTRODUCTION

Bronchoscopy is still the mainstay of approaching endobronchial lesion. The conventional methods to obtain specimen include forceps biopsy, brushing or washing the lesion under direct vision. However, the diagnostic yield of conventional forceps biopsy is limited because of the small size of tissue sample and crush artifacts *(Hetzel et al., 2011)*.

Cryobiopsy as a tool in bronchology has been introduced on a routine basis in recent years and has been found to be safe in routine diagnostic setting *(Schumann et al., 2010)*.

Introduction of a new sampling technique is another opportunity to increase the diagnostic yield. The flexible cryoprobe is primarily used for cryoextraction of malignant airway stenosis and was introduced as an alternative method for mechanical tumor debulking, which is immediately effective *(Schumann et al., 2010)*. Because of extraordinarily well-preserved tissue samples (larger in size with less mechanical damage and mostly vital tumor) from cryocanalization procedures, the technique has been transferred to the biopsy of endobronchial lesions. The

determination of histopathological cell type and stage of primary lung carcinoma is crucial to develop appropriate treatment approach that affects morbidity and mortality *(Rivera et al., 2013).*

Newly developed cryotechnology provide larger sample than that of conventional forceps biopsy and have better diagnostic yield *(Hetzel et al., 2012).*

The present study aimed at assessing the diagnostic yield and safety of cryoprobe in patients with endobronchial neoplasms.

PATIENTS AND METHODS

This study was done at Chest diseases Departments in the endoscopic unit of Al - Azhar University Hospitals from August 2018 to August 2020

This prospective study was for evaluation of efficacy as determined by the diagnostic yield and safety of cryobiopsy in comparison to endobronchial forceps biopsy. Thirty patients (22 males and 8 females) with suspected endobronchial neoplasm (clinically and radiologically) were included in this study.

Inclusion criteria: Patients with endobronchial tumor (endoscopically visible lesion) based on clinical and radiological data (chest X-ray and computed tomography), adult (age above 18 years or more) and signed informed consent and sufficient respiratory function (oxygen saturation > 90% without oxygen).

Exclusion criteria: Severe uncorrected hypoxemia despite the administration of supplemental oxygen, unstable cardiovascular or hemodynamic status, coagulation defects, the prothrombin concentration less than 70%, suspected connection of the lesion to large pulmonary blood vessels as seen on chest computed tomography scan and age less than 18 years.

Bronchoscope was indicated in patients who came with dyspnea and radiological chest mass suggested endobronchial tumor.

Statistical Analysis of data:

Data were analyzed using Statistical Package for the Social Sciences (SPSS) version 15.0. Quantitative data were expressed as mean± standard deviation (SD), while qualitative data were expressed as frequency and percentage.

Chi-square was used when comparing two means.

P-value ≤ 0.05 was considered significant.

RESULTS

This was a statistically significant difference (p-value < 0.05) between cryoprobe and forceps biopsies as regard diagnosis **(Table 1)**.

Table (1): Comparison between cryoprobe and forceps biopsy as regard diagnosis in studied patients

Biopsy / Diagnosis of malignancy	Cryoprobe (N = 30)		Forceps (N = 30)		p-value
Diagnostic	25	83.3%	18	60%	0.045
Non	5	16.7%	12	40%	

X2: Chi-square test;

This was no statistically significant difference (p-value > 0.05) between cryoprobe and forceps biopsies as regard post procedure complications. Post forceps complications in studied patients were bleeding (mild) in 10%, pneumothorax in 10% while there were no complications in 80%. Post cryoprobe complications were bleeding (mild) in 13.3% while there were no complications in 86.7% **(Table 2)**.

Table (2): Comparison between cryoprobe and forceps biopsy as regard complications in studied patients

Biopsy / Complications	Cryoprobe (N = 30)		Forceps (N = 30)		p-value
No	26	86.7%	24	80%	0.488
Yes	4	13.3%	6	20%	

X2: Chi-square test;

Cry biopsy is a safe technique with a diagnostic yield, which is comparable to that of conventional forceps biopsy **(Table 3)**.

Table (3): Comparison between cryoprobe and forceps biopsy as regard complications and diagnosis in studied patients

Biopsy / parameters		Cryoprobe (N = 30)		Forceps (N = 30)		p-value
Diagnosis	**Diagnostic**	25	83.3%	18	60%	0.045
	Non	5	16.7%	12	40%	
Complications	**No**	26	86.7%	24	80%	0.488
	Yes	4	13.3%	6	20%	

DISCUSSION

The main age of studied patients was 56.6±13.01 which came in agreement with *El-Dahdouh et al. (2015)* who performed three bronchoscopic forceps biopsies and one cryobiopsy for each patient.

As regard gender, 73.3% of patients were males and 26.7% females, as males are more liable to lung cancer than females which came in agreement with *Jabari et al. (2012)* who reported a male

predominance among his studied 40 patients.

Among the study population, 36.7% of patients were nonsmokers, and 63.3% of patients were smokers, as smokers are more liable to lung cancer than nonsmokers which came in parallel with *El-Dahdouh et al. (2015).*

The lesion was right -sided in 53.3% of patients, while 46.7% of them had left-sided lesions with no statistically significant difference between both sides. This was correlated with *Schumann et al. (2010)* who compare between cryoprobe and forceps biopsy in diagnosis of endobronchial lung cancer.

In this study, for cryoprobe biopsy, one biopsy was taken in 73.3% and two biopsies were taken in 26.7%. For forceps biopsy, three biopsies were taken in 56.7%, and four biopsies were taken in 43.3%.

These results indicated that numbers of biopsies taken by cryoprobe were smaller in number and larger in size than those taken by forceps, which helped in increasing the yield of diagnosis by cryoprobe. This observation was matched with *Schumann et al. (2010).* Our results were convenient with *Hetzel et al. (2012)* who studied patients with final diagnosis of cancer. Also, our results came in agreement with *El-Dahdouh et al. (2015)* as regard the number of biopsies in each studied group.

As regard histopathological diagnosis by cryoprobe biopsy in studied patients, adenocarcinoma was revealed in 16.7%, adenocarcinoma (mucus- secreting variant) in 6.7%, atypical carcinoid in 13.3%, dense lymphocytic infiltrate in 3.3%, inflammatory process in 6.7%, inflammatory reaction with squamous metaplasia in 3.3%, moderate focal dysplasia in 3.3%, necrotic tissue in 3.3%, non-small cell lung carcinoma in 3.3%, small cell lung carcinoma in 10%, small round cell tumor in 3.3% and squamous cell carcinoma in 26.7%.

In the current study, the diagnosis was achieved in 83.3% of cryoprobe biopsies. This was compatible with *Schumann et al. (2010)* who achieved diagnosis in 89.1% of cases of cryoprobe biopsy. On the other hand, our study opposed that of *El-Dahdouh et al. (2015)* who achieved diagnosis in 100% of total cases of cryoprobe biopsy.

As regard histopathological diagnosis by forceps biopsy in studied patients, adenocarcinoma was revealed in 10%, adenocarcinoma (mucus- secreting variant) in 6.7%, atypical carcinoid in 6.7%, dense lymphocytic infiltrate in 3.3%, inflammatory process in 23.3%, inflammatory reaction with squamous metaplasia in 3.3%, necrotic tissue in 10%, non-small cell lung carcinoma in 3.3%, small cell lung carcinoma in 10%, small round cell tumor in 3.3% and squamous cell carcinoma in 20%.

The above results showed that the diagnosis was achieved in 60% of total cases of forceps biopsy. This was incompatible with *Schumann et al. (2010)* who achieved diagnosis in 65.5% of forceps biopsy. On the other hand, our study results mismatched with *El-Dahdouh et al. (2015)* who achieved diagnosis in 80% of cases of forceps biopsy.

As regard diagnosis, there was a statistically significant difference between

cryoprobe and forceps biopsies. The cryoprobe was diagnostic in 83.3% of patients and non-diagnostic in 16.7% of them, while forceps biopsy was diagnostic 60% of patients and non-diagnostic in 40% in the remainders. These corresponded with *Schumann et al. (2010)* who and revealed a significantly higher diagnostic yield for cryobiopsy compared with forceps biopsy. Also, this study was parallel to *Hetzel et al. (2012)* who achieved definitive diagnosis in 85.1% of patients by forceps biopsy, and 95.0% of patients who underwent cryobiopsy, irrespective his higher percentage of diagnosis by cryoprobe and forceps biopsy because of his large sample comparing to ours.

Our results disagreed with *Rubio et al. (2013)* who studied patients with endobronchial lung lesion underwent cryoprobe and forceps biopsies and achieved definitive diagnosis in 96.77% of patients by cryoprobe biopsy, and 95.45% by forceps biopsy without a statistically significant difference (p-value >0.05).

As regard complications, there were no statistically significant differences between cryoprobe and forceps biopsy. The only post cryoprobe biopsy complication was bleeding which occurred in 13.3% while 86.7% showed no complications. On the other hand, post forceps biopsy complications were bleeding occurred in 10%, and pneumothorax in 10% with no recorded complications in 80%. These were balanced with *Schumann et al. (2010)* who reported that there was no statically significant difference between complications between cryoprobe and forceps biopsy.

As regard post cryoprobe bleeding, *Schumann et al. (2010)* reported bleeding in about 27% of cases. These were regarded as mild bleeding in 20% cases, moderate bleeding in 5%, and severe bleeding in only one case, while in this study post cryoprobe bleeding complications were in 13%. Also, this study agreed with *El-Dahdouh et al. (2015)* who reported that hemorrhage was the only complication in both procedures, with no significant difference between these two procedures in the incidence of hemorrhage. *Hetzel et al. (2012)* results were convenient with this study. They reported a close rate of severe bleeding of 17.8% and 18.2% for forceps and cryoprobe. *Rubio et al. (2013)* reported one minor bleeding of total 22 cases underwent cryoprobe biopsy of endobronchial lung lesion. *Oormila et al. (2016)* reported that the bleeding incidence in CB/CTBB was 23.76%, and that of FB/FTBB was 20.83% with no significant difference in bleeding severity.

CONCLUSION

Cryoprobe biopsy is a safe and feasible method for endobronchial lesions with a comparable bleeding rate to that of forceps biopsy. Cryoprobe has a significantly higher diagnostic yield than forceps biopsy.

REFERENCES

1. **El-Dahdouh S, Abd Elaal GA and El-kady N (2015):** Comparison between endobronchial forceps-biopsy and cryo-biopsy by flexible bronchoscopy. Egyptian Society of Chest Diseases and Tuberculosis, 65: 325-329.
2. **Hetzel J, Eberhardt R, Herth FJ, Petermann C, Reichle G, Freitag L, Dobbertin I, Franke KJ, Stanzel F and Beyer T (2012):** Cryobiopsy increases the

diagnostic yield of endobronchial biopsy: a multi centretrial. Eur Respir J, 39:685–690.

3. **Hetzel J, Hetzel M and Hasel C (2011):** Old meets modern: the use of traditional cryoprobes in the age of molecular biology. Respiration, 76:193-7.

4. **Jabari H, Sami R, Fakhri M and Kiani A (2012):** Different protocols for cryobiopsy versus forceps biopsy in diagnosis of patients with endobronchial tumors, Pneumologia, 61 (4): 230–233.

5. **Oormila G, Shu LG, Manu C and Yi SL (2016):** Efficacy and safety of cryobiopsy versus forceps biopsy for interstitial lung diseases and lung tumours: A systematic review and meta-analysis Respirology, 21: 834–841.

6. **Rivera MP, Detterbeck F, Mehta AC (2013):** Diagnosis of lung cancer: The guidelines. Chest, 123:129–36.

7. **Rubio ER, Whatley RE and Boyd MB (2013):** Cryobiopsy: should this be used in place of endobronchial forceps biopsies? BioMed research international. Respirology, 16:552-557.

8. **Schumann C, Hetzel J, Babiak AJ, Merk T, Wibmer T, M¨oller P, LepperPM and Hetzel M (2010):** Cryoprobe biopsy increases the diagnostic yield in endobronchial tumor lesions. J Thorac Cardiovasc Surg, 140:417–421.

تقييم دور الخزعة بواسطة مسبار التبريد في تشخيص اورام الشعب الهوائية

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خلفية البحث: تقنية الخزعة بواسطة مسبار التبريد نظام مغلق يمكن تعقيمه واستخدامه مرة أخرى.

الهدف من البحث: تقييم دور الخزعة بواسطة مسبار التبريد في تشخيص اورام الشعب الهوائية.

المرضي وطرق البحث: أجريت هذه الدراسة على مرضى قسم الصدر فى وحدة مناظير الصدر بمستشفى الحسين الجامعى بجامعة الازهر فى الفترة من أغسطس 2018 وحتى أغسطس 2020 وقد تم عمل منظار شعبى ثم أخذ عينة أو أكثر من أورام الشعب الهوائية عن طريق الملقط الليفى ومسبار التبريد من نفس المريض.

نتائج البحث: حدثت فروق ذات دلالة إحصائية بين التشخيص عن طريقة الخزعة بمسبار التبريد والخزعة عن طريق الملقط الليفى حيث تم تشخيص 25 حالة من أصل 30عن طريق الخزعة بمسبار التبريد. على الناحية الأخرى تم تشخيص 18 حالة عن طريق الخزعة بالملقط الليفى من أصل 30 حالة، كما أنه لم يوجد فروق ذات دلالة إحصائية من حيث المضاعفات بين الخزعة بمسبار التبريد والخزعة بالملقط الليفى.

الاستنتاج: هناك أفضلية للخزعة بمسبار التبريد مقارنة بالخزعة عن طريق الملقط الليفى من حيث التشخيص ووسائل الأمان.

الكلمات الدالة: الخزعة بمسبار التبريد، الخزعة بالملقط الليفى، منظار الشعب الهوائية، أورام الشعب الهوائية.