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ORIGINAL ARTICLE

INTERVENTIONAL BRONCHOSCOPIC TREATMENT IMPROVES QUALITY OF LIFE IN PATIENTS WITH ADVANCED BRONCHIAL CANCER

Yaser Gad, Mohamad Metwally, Tarek Mahfouz

Chest Diseases Department, Assiut University, Egypt

Correspondence to: Yaser Gad, Email: yasergad@yahoo.com

Objective: Improvement in quality of life (QOL) is a main issue in patients with advanced bronchial cancer. Hemoptysis, dyspnea and irritating cough resulting from endobronchial obstruction are the main cause of quality of life disturbance in those patients and interventional bronchoscopic treatment may play a role in solving this problem.

Methods: Patients with different symptoms related to endobronchial obstruction due to lung cancer were recruited in the study. There were two groups. The first group was treated with argon plasma coagulation (APC) and the second group was treated with cryotherapy. All methods were applied via the fiberoptic bronchoscope under local anesthesia. The impact of bronchoscopic treatment on improvement of symptoms, arterial blood gases parameters, pulmonary function tests and Quality of life performance scale were evaluated.

Results: Forty five patients with different symptoms related to endobronchial obstruction were recruited in the study. Twenty five patients were treated with argon plasma coagulation (APC) and twenty patients were treated with cryotherapy using fiberoptic bronchoscope under local anesthesia. Bronchoscopic treatment was able to improve symptoms, pulmonary function test and blood gases parameters with subsequent improvement in the performance state of the treated patients.

Conclusions: Our results suggest that bronchoscopic treatment may be an effective treatment to deal with symptoms related to endobronchial obstruction with subsequent improvement in the pulmonary function, blood gases, as well as quality of life in these patients.

INTRODUCTION

During the 20th century lung cancer has shown a dramatic rise in mortality. Lung cancer is the tenth cause of death worldwide but is predicted to become the fifth cause in the next few years.⁽¹⁾ Also, many studies suggest increased overall survival with the use of endobronchial management techniques.^(2,3)

Life-threatening problems like hemoptysis are commonly associated with endobronchial involvement by the tumor growth, which enhanced the growth of the field of interventional bronchology.

This study was conducted to use two modalities, namely argon plasma coagulation (APC) and cryotherapy to test their ability to control different symptoms, related to malignant endobronchial obstruction with subsequent improvement in pulmonary function test, blood gases parameters and the performance status with consequent improvement in quality if life of the treated patients.

PATIENTS AND METHODS

Patients were selected from referral to our interventional bronchoscopy unit and were diagnosed as inoperable bronchial cancer. After giving an informed consent, bronchoscopic treatment was performed via the fiberoptic bronchoscope under local anesthesia. APC was performed by using argon beamer 100 manufactured by Berchtold ® Company, Germany with a flexible APC probe. APC activation time ranged from 5-10 seconds. The power was adjusted between 40-60 watts, argon gas flow from 1.5-2 L/M and the duration of session ranged from 30 minutes to one hour.

Cryotherapy was performed using ERBE [®] Cryo device manufactured by ERBE, USA using nitrous oxide as a cooling agent via the flexible Cryoprobe. Duration of freezing was one minute in each cycle, repeated cycles were done.

Although the availability of more powerful interventional modalities in our department as electrocautery, we compared only these two methods as they have comparable depth of penetration and safety

Evaluation of dyspnea (4)

Based on the 5-point dyspnea grading system (The American thoracic society dyspnea scale), an affirmative answer to one of the following questions establishes a patient's grade:

Grade I: "Are you ever troubled by breathlessness, other than on strenuous exertion?"

Grade II: "Are you short of breath when hurrying on level ground or walking up a slight hill?"

Grade III: "Do you have to walk slower than most people on level ground? Do you have to stop after a mile or so (or after 15 minutes) when you walk on level ground at your own pace?"

Grade IV: "Do you have to stop for breath after walking about 100 yards (or after a few minutes) on level ground?"

Grade V: "Are you too breathless to leave the house or breathless after undressing?"

Evaluation of cough (5)

Grade zero	No cough
Grade 1	Cough does not disturbing sleep
Grade 2	Cough disturbing sleep.

Evaluation of hemoptysis (5)

Grade Zero	No hemoptysis
Grade 1	Streaks of blood in sputum
Grade 2	Clots of blood in 4 days or less during the preceding 2 weeks
Grade3	Clots in 5 or more days during the proceeding 2 weeks
Grade 4	Hemoptysis requires blood transfusion.

Evaluation of performance status and quality of life (6)

According to the European cooperative oncology group (ECOG) and the world health organization (WHO) scales, performance and quality of life status were estimated as follow:-

Score 0: Able to carry out normal activity.

Score 1: Restricted in physical strenuous activity but ambulatory and capable of light work.

Score 2: Ambulatory and capable of self-care. Unable to work up to 50% of working hours.

Score 3: Capable of any limited self-care, confined to bed or chair >50% of working hours.

Score 4: Completely disabled. Cannot carry out self-care and confined to bed or chair.

NB: Increasing score means more deterioration.

RESULTS

Forty five patients with different symptoms related to endobronchial obstruction were recruited in the study. Twenty five patients were treated with argon plasma coagulation (APC) and twenty patients were treated with cryotherapy using fiberoptic bronchoscope under local anesthesia. Bronchoscopic treatment was able to improve symptoms, pulmonary function test and blood gases parameters with subsequent improvement in the performance state of the treated patients.

Age distribution of patients included in the study is shown in (Fig 1). Main bronchus obstruction was the commonest site in the treated group as shown in (Fig. 2). Hemoptysis was controlled after the last session among 100% of patients of APC treatment. Also, Improvement was recorded in dyspnea, cough and chest pain by the end of the last session among 80%, 90% and 50% of patients respectively of the same mode. Cryotherapy was also successful in controlling of symptoms in the treated patients in dyspnea (41.7%, P=0.019), hemoptysis (NS) (100%), cough (66.7%, NS P=0.11) and chest pain (50%) (NS) (Fig. 3).

Improvement of FVC was nearly 14% of the predicted value after APC treatment while the improvement in FEV1% predicted value was nearly 8%. On the other hand, cryotherapy achieved improvement in the predicted values of FVC and FEV1 by nearly 7% NS (P=0.86) and 10%

(NS P= 0.76) respectively. (Fig 4).

APC and cryotherapy achieved improvement in PaO₂ by

5% and 3% of the pretreatment values respectively NS (P=0.67). Also they achieved a decrease in PCO₂ values by 3% and 0.2% respectively (NS, P=066) (Fig. 5). On the other hand, the effectiveness of APC and cryotherapy was also evident by the significant improvement of the performance status and consequently quality of life achieved by the end of treatment when compared to before treatment (P=0.001 and P=0.05 respectively). APC and cryotherapy improved the mean performance scale value by 37% and 17% respectively with no significant difference if compared to each other in this group of patients (P=0.25) (Fig. 6).



Fig 1. Age distribution of patients included in the study.



Fig 2. Site of tracheobronchial obstruction of the treated patients.



Fig 3. Improvement of different symptoms among patients treated with APC and cryotherapy one day after the last session.



Fig 4. The success rate of APC and cryotherapy in pulmonary function improvement after the first session.



Fig 5. The success rate of APC and cryotherapy in arterial blood gases improvement after the last session.



Fig 6. Improvements in performance scale among patients treated with APC and cryotherapy.

DISCUSSION

Therapeutic bronchoscopy has offered several alternatives conventional therapy to overcome to central endobronchial obstruction that account for 50% of patients.⁽⁷⁾ These bronchoscopic interventional modalities can be lifesaving in several instances, offer clinical stability that allow additional cancer treatment.⁽⁸⁾ Endobronchial techniques should be considered throughout the management of lung cancer patients. The versatility of these techniques and the conjunction of application of more than one modality provide the most effective management that allows the best selection of approaches for these patients.⁽⁹⁾

Compared with the conventional palliative modalities, endobronchial techniques carry several advantages being applied in most cases in out-patient bases, achieving rapid symptomatic improvement allow him to return home with a significant improvement in the quality of life.⁽⁷⁾

Moreover, some studies suggest that not only interventional modalities are effective palliative tools but also they may improve the overall survival ⁽¹⁰⁾ and may be potentially curative for patients with very early stage non-small cell lung cancer.⁽¹¹⁾

Our results documented the role of APC as a palliative modality for the symptoms of bronchogenic carcinoma with a significant positive impact on the performance status of those patients. APC could achieve a significant control of hemoptysis in 100% of patients submitted to APC in our study. Morice et al.⁽⁸⁾ Gad et al⁽¹²⁾ and Crosta et al⁽¹³⁾ reported a significant control of hemoptysis in 100%, 100% and 91% of cases respectively. Dyspnea scale and cough grading were improved among the treated cases after APC. Morice et al⁽⁸⁾ recorded dyspnea improvement in 53% of cases and Gad et al⁽¹²⁾ reported 80% improvement of dyspnea. However, APC achieved a significant improvement in chest pain in 50% of cases after the last session equal to that reported by Gad et al.⁽¹²⁾ On the other hand, there was a recorded significant effect on the performance status of patients with bronchogenic carcinoma included in our study after the last session of APC treatment. Gad et al⁽¹²⁾ reported performance scale improvement in 65% of the treated patients.

The subjective improvement in patients with lung cancer submitted to APC in this study was also documented by a concomitant significant improvement in the pulmonary functions records of those patients. A significant improvement was recorded in FVC, FEV₁ and FEV₁/FVC after the last session of APC treatment. Moreover, our data documented a significant improvement in both PaO₂ and oxygen saturation and a significant decline in the level of PaCO₂ after APC treatment. Gad et al⁽¹²⁾ reported improvement in FVC, FEV₁ PaO₂ and PaCO₂ in 85%,

75%, 85% and 95% of patients respectively. Cryotherapy proved to be a modality of choice in dealing with hemoptysis caused by endobronchial tumors as it was 100% successful in this regard during our study. The same experience was recorded in Mathur et al.,.⁽¹⁴⁾ Other studies reported a success rate ranging between 76-92%.⁽¹⁵⁻¹⁷⁾ On the other hand, the Egyptian experience of 73%, 87.5% and 100% in control of hemoptysis in the studies reported by Yousef,⁽¹⁸⁾ Tag- El-din et al⁽¹⁹⁾ and Gad et al⁽¹²⁾ respectively.

Dyspnea as a distressing symptom for patients with endobronchial tumor was also successfully improved with cryotherapy although the degree of improvement in the mean grade of dyspnea was not significant. Walsh et al⁽⁵⁾ reported only 37% improvement of dyspnea in their series treated with cryotherapy but most of other studies recorded a higher improvement rate of dyspnea compared with our figures being 59%- 65% in Maiwand studies;^(15,16) Maiwand and Asimakopoulos⁽¹⁷⁾ and 70% in Mathur et al⁽¹⁴⁾ study. The Egyptian experience was again higher than our figures in dyspnea improvement being 60%^(18,19) and 45% in Gad et al.⁽¹²⁾

The successful experience of cryotherapy in the management of endobronchial tumors was reflected on the improvement recorded in 60% and 50% of cases in cough and chest pain respectively although the improvement in the grade of the symptoms was not statistically significant. Our rates of improvement of these symptoms are comparable to both national and international

figures.^(17-19,12) The improvement in the symptoms of patients in our study was associated with equivalent improvement in the performance scale of our patients. The performance scale, based on WHO and the European Oncology Group scale that we used in our study, was also used in several other studies.^(15,17-19)

Cryotherapy proved to be a successful modality during the course of this study in achieving significant improvement in FVC and FEV1.Tag- El-din et al⁽¹⁹⁾ experience reported improvement in pulmonary function parameters in 90%. Maiwand⁽¹⁵⁾ reported 55.7% improvement in FVC and 63.4% in FEV1. In addition, Yousef⁽¹⁸⁾ recorded such improvement. Cryotherapy in our study could achieve improvement in PaO₂ and oxygen saturation and a decline in PaCO₂ in the treated cases. This was concomitant with other studies.⁽²⁰⁾

CONCLUSION

This study proved that bronchoscopic treatment with APC and cryotherapy under local anesthesia are useful palliative tools during the course of advanced lung cancer management and should be considered in improving symptoms, spirometric, gasometric, performance status and hence quality of life of this group of patients. Further studies on larger groups of patients are needed.

Dedication: this article is dedicated to the soul of our late professor and mentor Professor Tarek Mahfouz abdel Megueed may his soul rest in peace.

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