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Original Research Article

Percutaneous Thoracic Cryoablation of Primary Lung and Pleural Tumors

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Abstract

Background: Lung and pleural tumors are leading causes of deaths due to cancer in the global level. The conventional treatments are surgery and radiation therapy, but because of this many candidate can no longer have those due to other medical conditions or the position of the tumor. Percutaneous cryoablation (PCA) has now been advocated as a minimal invasive option for management of inoperable tumors. The potential of percutaneous cryoablation as a safe and effective treatment method for primary lung and pleural tumors in the long term is discussed in this article.

Methods: This study involved 150 patients with primary lung tumors or pleural malignances who underwent percutaneous cryoablation at our center from 2015 to 2020. Data pertaining to tumor characteristics, technical success rate, complication rate and recurrence rate of the tumour were looked into. Three-month follow-ups were carried out six weeks after the surgery, three months later, after six months, after one year, and after two years.

Results: Cryoablation was performed with success in 98% of circumstances. Pneumothorax was the most frequently reported complication, which it occurred in 15% of the cases, hemoptysis being the second most frequent in 5%. Local recurrence was evident in 65/360 = 18% and the two-year survival rate was 60%. The advantages of using the above-described therapeutic approach are as follows: Symptom improvement reached 75 percent.

Conclusion: Thus, percutaneous cryoablation can be considered a suitable treatment in patients with primary lung and pleural tumors, especially in case when surgical treatment is impossible. Despite the problem of recurrence, cryoablation has considerable advantages for symptom relief and increased survival in specific populations of patients.

Keywords: Per CT guided percutaneous cryoablation, primary lung cancers, malignant pleura, interventional oncology, practicability, noncomplicatedness, and reoccurrence.

Introduction

Currently, lung cancer is recognized as the leading cause of cancer-related death globally [1]; 85% of these are a type of NSCLC [3]. Pleura, which is a membrane enclosing the lungs is a common site for metastatic process usually seen in malignant pleural mesothelioma and other malignancy of the same location [2]. The treatment of these tumours particularly in patients who are not suitable for surgery or radiotherapy is still a major clinical problem. Surgical resection is the definitive treatment; nevertheless, aggressive disease, suboptimal PS, and tumor site frequently preclude its use [3]. While radiotherapy can be curative in some situations, it may be impractical in central tumors or multiple lesion disease [4].

In this context, percutaneous cryoablation (PCA) has emerged for the management of early lung and pleural malignancies. Cryoablation entails of the use of a cryoprobe to freeze tumors in a patient and at the same time destroying the tissues. This method has several benefits which allow treating tumors that cannot be operated on or irradiated [5]. The technique follows image technology like CT or ultrasound that helps in placing the cryoprobe with accuracy and thus red ucing the possibility of complications [6]. Furthermore, PCA may be performed if there is a recurrence of tumor and is therefore a feasible intervention for patients with terminal malignancy [7].

Significantly, there still isn't much information on whether PCA is feasible in terms of the long term, recurrence rate, and survival map of primary lung and pleural malignancies [8]. Numerous studies done to date have reported good technical success rates and low complication rates; however, there is the problem of recurrence, particularly in large

PTLDs [9]. PCA is safe for the most part, and complications that affect this agent include pneumothorax, hemoptysis, and infection which were noted 10 percent of the time. The purpose of this article is to evaluate the efficiency of percutaneous cryoablation for primary lung and pleural tumors in terms of long term effectiveness, complications and reoccurrence of the process. In this study, we evaluate the effectiveness of cryoablation from a series of patients treated at our institution to better understand the usefulness of cryoablation in managing these aggressive tumors.

Aim and Objectives

Aim:

With respect to the percutaneous cryoablation, the objective is to assess its feasibility and safety, and the rate of recurrence of the primary lung and pleural tumours.

Objectives:

1. To evaluate the technical success rate of percutaneous cryoablation in regards Lung metastases and Primary lung/pleural tumors and complication rates.

2. In order to compare the recurrence rate and the efficacy of PCA for patients with lung and pleural malignancy.

Materials and Methods

This was a single institution study done in a tertiary referral institution involving fifty –five patients who had primary lung and pleural malignancies treated outpatient percutaneous cryoablation between 2015 and 2020. Each of the subjects was deemed to be a surgical candidate with medically inoperable or marginally resectable cancers, significant comorbidities, incurable diseases, or tumors located at inconvenient sites.• Bronchogenic carcinoma (squamous, adeno, bronchoalveolar, large cell carcinoma) or primary malignant pleural tumors (mesothelioma or metastatic cancer).• Refusal to operate due to complications or both severe diseases in the patient.• ECOG performance status of 0-2.• ECOG performance status is more than 2.• Conditions that make a procedure under anesthesia or through an imaging technique inadvisable.comes of percutaneous cryoablation in primary lung and pleural tumors, focusing on the long-term feasibility, safety, and recurrence of the procedure. By reviewing the results from a series of patients treated at our institution, we aim to provide valuable insights into the efficacy of cryoablation as a treatment modality for these challenging malignancies.

Aim and Objectives

Aim:

To evaluate the feasibility, safety, and recurrence rates of percutaneous cryoablation in treating primary lung and pleural tumors.

Objectives:

1. To assess the technical success rate and complication rates of percutaneous cryoablation for primary lung and pleural tumors.

2. To analyze the recurrence rates and symptom relief in patients undergoing PCA for lung and pleural malignancies.

Materials and Methods

This was a retrospective study conducted at a tertiary referral center, including 150 patients who underwent percutaneous cryoablation for primary lung and pleural tumors from 2015 to 2020. All patients were considered medically inoperable or unsuitable for traditional surgery due to comorbidities, advanced disease, or tumor location.

Inclusion Criteria:

• Primary lung tumors (NSCLC, SCLC) or pleural malignancies (mesothelioma, metastatic tumors).

• Tumor size ≤ 5 cm.

• Inoperable due to comorbidities or advanced disease stage.

• ECOG performance status 0-2.

Exclusion Criteria:

• Tumor size > 5 cm.

• Distant metastases.

• ECOG performance status > 2.

• Contraindications to anesthesia or imaging.

The procedure was done under CT guided or under ultrasound guided imaging. A cryoprobe was percutaneously placed in the tumor and an ‘ice ball’ was created cryoablation of tumor. All the procedures were succeeded by post-procedure imaging to ensure that the ablation was adequate.

Subsequent visits to evaluate complications, re-emergence of malignancy, and improvement of symptoms occurred after 1, 3, 6, and 12 months and then yearly up to 24 months. Global survival was also determined having a two-year span.

Results

The study included 150 patients (mean age 68 years). The tumors treated were primarily **NSCLC** (55%), **mesothelioma** (25%), and **metastatic pleural tumors** (20%). The **technical success rate** was **98%** (147/150 patients), with **3%** requiring a second attempt due to **misplacement** of the cryoprob

Table 1:

Parameter	Result
Technical Success Rate	98% (147/150 patients)
Mean Tumor Size	3.2 cm (range 1.0–5.0 cm)
Pneumothorax	15% (22 patients)
Hemoptysis	5% (7 patients)
Pain Post-Procedure	12% (mild to moderate)
Recurrence Rate	18% (median time to recurrence 12 months)
Symptom Palliation	75% (pain, dyspnea, hemoptysis relief)
Overall Survival (2 years)	60%

Complications:

- **Pneumothorax** was the most common complication, observed in 15% (22/150) of patients. Only 4 patients required chest tube placement for pneumothorax management.
- **Hemoptysis** occurred in 5% (7/150) of patients, all of whom were treated conservatively without requiring further intervention.

Recurrence:

- **Local recurrence** was seen in 18% of patients, typically in those with larger (≥4 cm) and centrally located tumors.
- The **median time to recurrence** was 12 months, and **repeat cryoablation** was performed in 60% of cases.

Discussion

Based on the findings of this study it can be concluded Percutaneous cryoablation is a safe and effective least invasive method of treating primary lung and pleural tumors. The results indicate that PCA can be undertaken with a high technical success rate (98%) and a relatively low complication rate (15% pneumothorax expects for only three patients) overall indicating good outcomes even when undertaking the procedure in relation to a difficult to access tumor. This has been consistent with other studies done which have evidenced the possibility of cryoablation for lung and pleural malignancies (11, 12).

Although, the overall recurrence rate of 18% is fairly high, similar to other studies of cryoablation of lung tumors (13). Locally advanced tumors are more likely to recur, because their ablation may be suboptimal or they are situated near critical structures (14). In this study, repeat cryoablation was done in 60% of the recurrent cases thus suggests that cryoablation can be used as palliative treatment for patients with recurrent disease (15).

The patients' symptom control was obtained in 75% of cases it proved to be effective in patients with pleural malignancies in which cryoablation can improve pain and dyspnea significantly (14, 15).

Because of its low invasiveness, cryoablation should be reserved for patients who cannot undergo surgery or who have poor prognosis owing to their disease state. However, additional investigation synthesized from patient sample populations with increased sample sizes and long-term follow up is imperative to elucidate cryoablation's role in treating primary lung and pleural tumors.

Conclusion

Thus, percutaneous cryoablation appears to be a safe and efficient nonsurgical technique for treating primary lung and pleural tumors in patients who are not surgical candidates. FSH is appreciably helpful in the amelioration of the symptoms and yields substantial relief as a mixture cancer palliation. However, patient selection has to be excellent and long term follow up necessary because of loco regional relapse. It is recommended that subsequent research would explore ways to enhance the management strategies, the rates of relapse in such patients, and the overall survival rates on such patients.

References

1. Vogl TJ, Nour-Eldin NEA, Albrecht MH, et al. Percutaneous cryoablation of primary lung cancer: Clinical outcomes and feasibility. *Eur Radiol*. 2017;27(2):503-512.
2. Lee YJ, Choi Y, Kim HC, et al. Cryoablation in the management of primary lung malignancies. *J Thorac Imaging*. 2018;33(2):99-107.
3. Gangi A, Remy-Jardin M, Wihlm JM, et al. Image-guided interventions in thoracic oncology. *J Thorac Imaging*. 2015;30(2):111-119.
4. Vogl TJ, Nouri M, et al. Percutaneous cryoablation for lung cancer: Feasibility and preliminary results. *J Vasc Interv Radiol*. 2018;29 (5):691-697.
5. Cho YK, Lee YH, Kim YJ, et al. Comparison of cryoablation and radiofrequency ablation in the treatment of lung metastases. *J Vasc Interv Radiol*. 2017;28(7):972-979.
6. Lee J, Park BK, Kim Y, et al. Cryoablation for thoracic malignancies: The role of imaging guidance. *Interv Radiol*. 2019;24(5):189-196.
7. Sung Y, Lee K, Kim J, et al. Percutaneous cryoablation for lung cancer: Feasibility, safety,

and preliminary outcomes. *Cancer*. 2018; 124(10):2033-2040.
8. McWilliams S, Tammemagi M, Mayo JR, et al. Targeting CT screening for lung cancer: Achieving high sensitivity and low false-positive rates. *Radiology*. 2021;299(3):478-486.
9. Bae H, Lee K, Song I, et al. Pain management following cryoablation in thoracic oncology. *Chest*. 2018;154(6):1305-1312.
10. Leung AN, Müller NL, Poon C, et al. Pulmonary cryosurgery: An alternative method for lung cancer treatment. *AJR Am J Roentgenol*. 2017;208(2):268-275.
11. Fiori G, Bindi A, Maggi A, et al. Percutaneous cryoablation of primary lung malignancies in elderly patients. *J Thorac Oncol*. 2016;11 (7): 1083-1091.
12. Finley C, Faris G, Alberts W, et al. Cryoablation for primary lung cancer: A systematic review. *Chest*. 2021;159(4):1456-1466.
13. Popescu I, Tabanelli S, Truglio V, et al. Percutaneous cryoablation of metastatic lung tumors: A retrospective review. *J Thorac Oncol*. 2019;14(8):1256-1264.
14. Smith RA, Andrews KS, Brooks D, et al. Cancer screening in the United States, 2020: A review of current guidelines and recommendations. *JAMA*. 2020;324(4):394-409.
15. Mehta K, Jain G, Bhat S. Pneumothorax as a complication after cryoablation of lung tumors. *J Interv Radiol*. 2019;26(4):116-120.