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## Cryoablation for intrapulmonary bronchial cyst: A case report

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### Abstract

#### BACKGROUND

Bronchial cysts are congenital malformations usually located in the mediastinum, and intrapulmonary localization is very rare. Cryoablation is a novel therapeutic approach that promotes tumor necrosis and stimulates anti-tumor immune responses.

#### CASE SUMMARY

This article reports a case of a 68-year-old male patient who was diagnosed with an intrapulmonary bronchogenic cyst by computed tomography examination and pathology, and the patient subsequently underwent cryoablation therapy and achieved complete response with after 3 months of follow-up.

#### CONCLUSION

Intrapulmonary bronchogenic cysts are very rare, cryoablation therapy is feasible, safe, and effective for intrapulmonary bronchial cysts.

**Key Words:** Intrapulmonary bronchial cyst; Cryoablation; Complete response; Case report

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**Core Tip:** Cryoablation, effective for intrapulmonary bronchogenic cysts, offers a safe therapeutic option. A 68-year-old male achieved complete response post-treatment, highlighting its feasibility and efficacy in managing these rare cysts.

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## INTRODUCTION

Intrapulmonary bronchial cyst is a congenital anomalous cystic mass usually located in the mediastinum and lungs[1,2]. These cysts may cause a variety of symptoms including chest pain, dyspnea or coughing[3,4]. Surgical resection is the first choice for intrapulmonary bronchial cysts, preventing serious adverse events and establishing the diagnosis[4].

Cryoablation has become a widely used minimally invasive treatment in recent years, with proven effectiveness and safety[4,5]. Cryoablation has become a widely used minimally invasive treatment in recent years, with proven effectiveness and safety[6]. Consequently, cryoablation has been widely adopted for tumor treatment[6]. Recent studies indicate that cryoablation effectively destroys tumor tissue while also stimulating the body's immune response. Cryoablation not only destroys the tumor but also stimulates the immune response[7].

Here, our patient received cryoablation treatment. To our surprise, a 3-month follow-up showed she achieved complete response and experienced no serious adverse events.

## CASE PRESENTATION

### Chief complaints

A male, 68 years old, the patient's physical examination at the local hospital revealed an occupancy in the right lung, which was considered as a possible lung cancer. In order to seek further diagnosis and treatment, he was admitted to our hospital with general mental status and good nutritional status.

### History of present illness

Nothing to declare.

### History of past illness

The patient had no history of hypertension, cardiovascular disease, type 2 diabetes mellitus, or coronary heart disease.

### Personal and family history

The patient denies a history of familial genetic diseases, tumors, infectious diseases, and psychiatric disorders.

### Physical examination

Nothing to declare.

### Laboratory examinations

CA19-9 (7.36 U/mL), carcinoembryonic antigen (1.01 ng/mL), SCC (0.801 ng/mL), neuron-specific enolase (10.41 ng/mL). Based on HE staining results, the patient was diagnosed with an intrapulmonary bronchial cyst.

### Imaging examinations

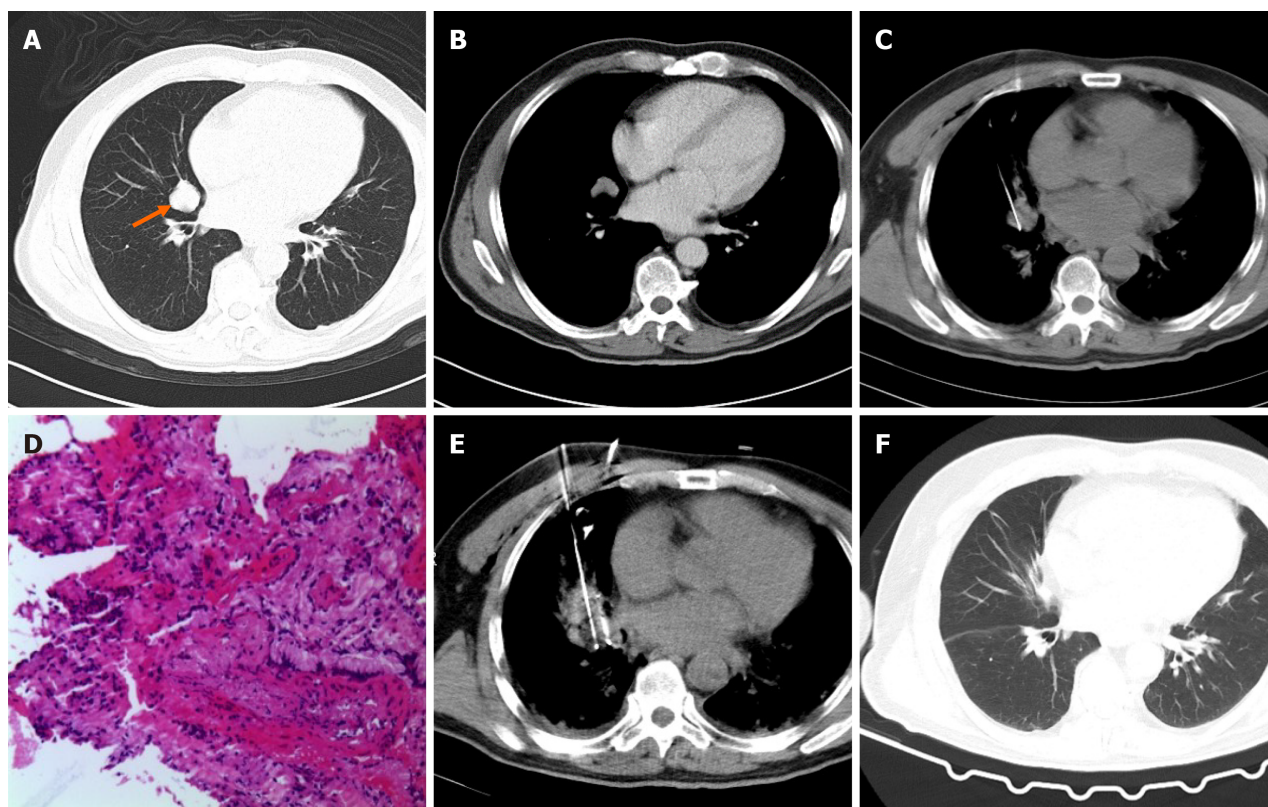
Computed tomography (CT) scan and puncture biopsy found a cyst about 2.7 cm× 2.4 cm in size in the medial segment of the right middle lobe of the lung (Figure 1A-D).

## FINAL DIAGNOSIS

Intrapulmonary bronchial cyst.

## TREATMENT

Cryoablation was performed under general anesthesia. The patient was positioned supine, and a CT scan was conducted



**Figure 1** Intrapulmonary bronchial cysts treated with cryoablation and follow-up computed tomography images. A: lung window computed tomography (CT) image, medial segment of the middle lobe of the right lung with a cyst of about 2.7 cm × 2.4 cm in size (arrow); B: Mediastinal window-enhanced CT image; C: Biopsy image; D: Pathological examination (HE stain); E: During cryoablation; F: Complete response was achieved at 3 months after cryoablation.

to identify the intercostal skin on the right side of the chest as the puncture point. Before the procedure, we determined the puncture site and path. We also planned the depth, angle, and level of the needle insertion into the tumor. The right lung tumor was designated as the target area. After routine disinfection and draping, the puncture point was anesthetized with local infiltration of 5 mL of 2% lidocaine and 5 mL of 0.75% bupivacaine. Guided by CT (**Figure 1E**), the cryoprobe was inserted into the tumor's target area. Treatment commenced with argon rapid freezing for 10 to 20 minutes, followed by helium rapid rewarming for 2 to 5 minutes, and this cycle of freezing and rewarming was repeated. Throughout the freezing process, a CT scan monitored the ice ball around the lesion. When the edge of the ice ball extended more than 1 cm beyond the lesion, we heated it to melt the ice crystals around the probe before withdrawing the cryoprobe. The puncture point was bandaged, and the operation was completed with only 2 mL of intraoperative bleeding. The patient reported no discomfort and maintained stable vital signs. They were transferred to the ICU for continuous monitoring, which included vital signs, electrocardiographic monitoring, oxygen administration, enhanced anti-infective treatment, haemostasis, rehydration, and symptomatic support. The patient made a good recovery after the operation.

## OUTCOME AND FOLLOW-UP

The patient's chest CT was reviewed 3 months later (**Figure 1F**), and the original bronchiolar cystic lesion in the middle lobe of the right lung showed complete disappeared.

## DISCUSSION

A bronchial cysts is a cystic swelling caused by a congenital abnormality in the development of the respiratory system[8]. Bronchial cysts occurring in the lungs are much rarer, and bronchial cysts occurring in the lungs are also known as pulmonary cysts, which represent about 15%–20% of all the bronchial cyst[9]. Clinically, intrapulmonary bronchial cysts may lead to compression, haemorrhage, and infection and thus be life-threatening. The diagnostic process for intrapulmonary bronchial cysts typically involves radiological evaluations, including chest X-rays, computed tomography scans and magnetic resonance imaging may also be utilized for further characterization of the cystic structure. Definitive diagnosis is often confirmed through histopathological examination following surgical resection.

Surgical resection is currently the main treatment for bronchial cysts, but surgical resection is traumatic, has many complications, is costly, and has a long recovery time[10]. Additionally, the extent of resection necessary to ensure complete removal may lead to unnecessary lung tissue loss, which is especially concerning in younger patients or those with limited lung function. These challenges necessitate the exploration of less invasive alternatives that can provide effective symptom management while minimizing associated risks.

Cryoablation, a procedure that utilizes extreme cold to induce cellular destruction, presents a potential adjunct or alternative to surgical interventions for intrapulmonary bronchial cysts. This technique operates by freezing the cystic tissue, causing apoptosis and subsequent necrosis of the cells, which may help to mitigate the risk of recurrence. Furthermore, this approach can potentially reduce postoperative pain and complications associated with traditional surgery. Additionally, its minimally invasive nature results in shorter recovery times and lower associated risks. One of the compelling advantages of cryoablation is its ability to activate local immune responses, stimulating the body's immune system and improving the patient's autoimmune autoimmunity[11-13]. Given these benefits, cryoablation presents a rational alternative for the treatment of intrapulmonary bronchial cysts[14].

Despite the promising results highlighted in this case report, several limitations must be considered. Firstly, the most concerning complications during the procedure is the risk of pneumothorax and bleeding. Pneumothorax and bleeding can occur due to the inadvertent injury to surrounding lung tissue during cryoablation. All adverse events were relieved or improved after symptomatic treatment. Moreover, the follow-up duration in our case report was limited to only 3 months, which may not provide sufficient insight into the long-term effectiveness and safety of cryoablation for intrapulmonary bronchial cysts. It is essential for future studies to implement extended follow-up durations, allowing for a more comprehensive evaluation of patient outcomes. Thereby, further investigations should be conducted to explore the long-term implications of cryoablation on intrapulmonary bronchial cysts, including the possibility of late-onset complications and the overall impact on patients' quality of life. Understanding these long-term outcomes will be vital for advancing the treatment protocols and establishing cryoablation as a standard care option in this context.

Here, we report for the first time the use of cryoablation for intrapulmonary bronchial cysts, the patient has achieved a complete response at 3-month follow-up after argon-helium cryoablation.

## CONCLUSION

This case demonstrates that cryoablation can be a safe and effective treatment for intrapulmonary bronchial cysts.

## FOOTNOTES

**Author contributions:** Li ZH acquired clinical data; Ma YY wrote the paper; Li ZH was responsible for collecting clinical data; Ma YY proposed, designed and performed patient follow up; all the authors have read and approved the final manuscript. Both authors have made crucial and indispensable contributions towards the completion of the project and thus qualified as the co-first authors of the paper. Both Niu LZ and Xu KC have played important and indispensable roles in the innovation of case reporting, data interpretation and manuscript preparation as the co-corresponding authors. Niu LZ conceptualized, designed, and supervised the whole process of the project. He revised and submitted the early version of the manuscript. Xu KC was responsible for data re-analysis and re-interpretation, comprehensive literature search. This collaboration between Niu LZ and Xu KC is crucial for the publication of this manuscript and other manuscripts still in preparation.

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