

# Percutaneous Bronchial Embolization to Treat Intractable Bronchobiliary Fistula

Seowoo Lee<sup>1</sup> · Jae Hwan Lee<sup>2</sup>  · Hyun Beom Kim<sup>2</sup> · In Joon Lee<sup>2</sup>

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**Abstract** Sixty-four-year-old female who underwent hemi-hepatectomy for intrahepatic cholangiocarcinoma a year ago presented with biliary sputum, cough and fever. Cross-sectional imaging showed a recurred tumor involving right diaphragmatic area and an abscess formation in liver dome with adjacent right lower lobe of lung. Percutaneous transhepatic biliary drainage and percutaneous drainage of lung abscess were performed. Tubogram showed connections between the lung abscess cavity and multiple distal bronchi, suggesting bronchobiliary fistulas. Two weeks of drainage treatment did not relieve symptoms. We successfully treated intractable bronchobiliary fistula via image-guided percutaneous access to closest distal bronchi near abscess with subsequent tandem placement of vascular plugs.

**Keywords** Bronchobiliary fistula · Bronchial embolization · Vascular plug

## Introduction

Bronchobiliary fistula is a rare complication of hepatic abscess or malignancy. Biliary sputum, fever, right upper abdominal pain and right chest pain are main symptoms of bronchobiliary fistula [1–3]. Following conservative therapy, endoscopic or percutaneous drainage is the most common treatment for bronchobiliary fistula, as expecting spontaneous closure of fistula tract [4]. Whereas surgical correction is the last treatment option, not all patients are suitable for operation due to its invasiveness and perioperative morbidity and mortality is considerable. We report the novel method for treating intractable bronchobiliary fistula with interventional procedure.

## Case Report

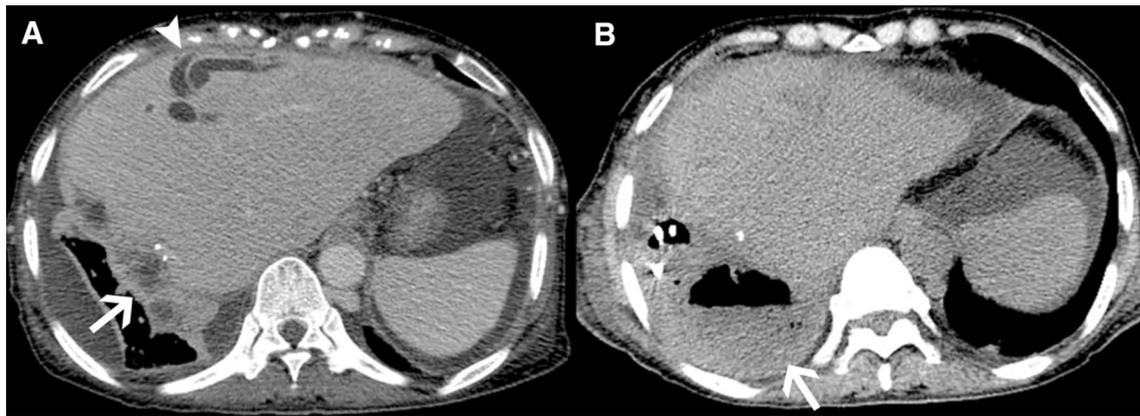
The patient is 64-year-old woman with a diagnosis of intrahepatic cholangiocarcinoma. The patient underwent right hemi-hepatectomy and caudate lobectomy a year ago. The patient came to hospital with jaundice, fever, biliary sputum and cough. Computed tomography (CT) scan showed tumor recurrence at resection margin and hepaticojejunal anastomosis. Recurred tumor invaded right diaphragm causing right liver dome abscess and right lower lobar lung abscess (Fig. 1A, B). Percutaneous transhepatic biliary drainage was performed, and we started intravenous antibiotics treatment. After 3 days of treatment, fever relieved but biliary sputum and cough progressed causing severe dyspnea. To manage abscess, we inserted 12-French drainage catheter via transthoracic approach. During 2 weeks after drainage, biliary sputum was slightly

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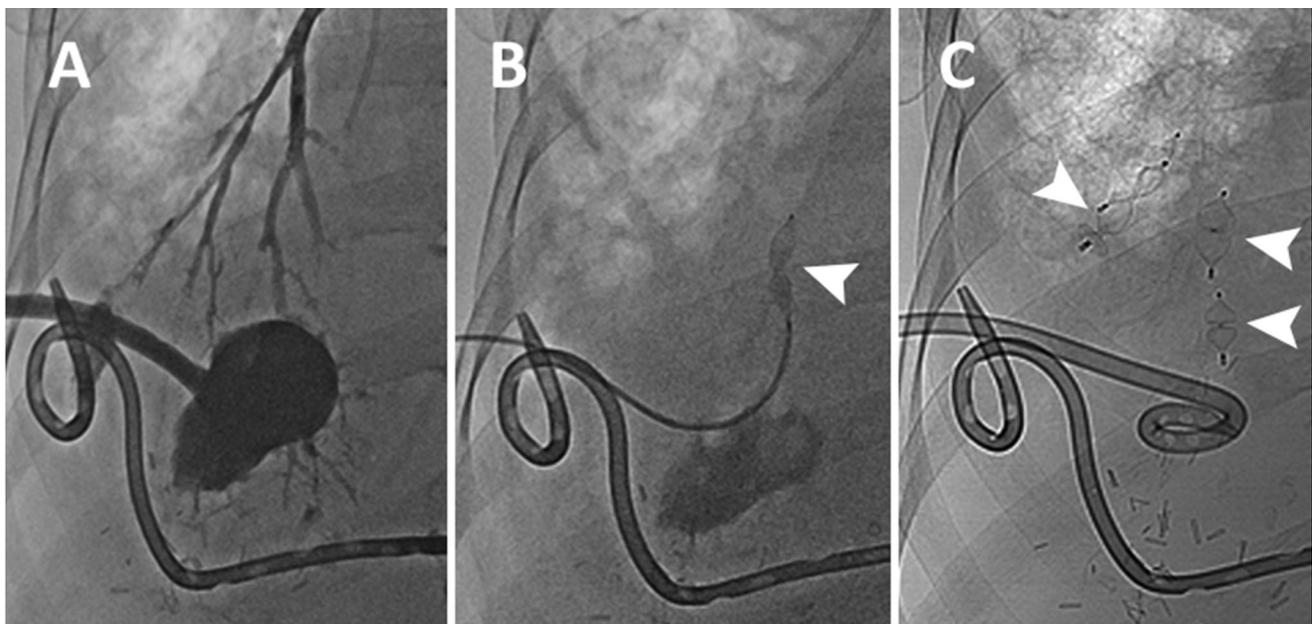
✉ Jae Hwan Lee  
lzhwanmd@gmail.com

<sup>1</sup> Department of Radiology, Seoul National University Hospital, Seoul, Republic of Korea

<sup>2</sup> Department of Radiology, Center for Liver Cancer, National Cancer Center, 323 Ilsan-ro, Ilsandong-gu, Gyeonggi-do, Gyeonggi-do 10408, Republic of Korea



**Fig. 1** A 64-year-old woman with fever, biliary sputum and dyspnea. **A** An enhanced axial CT scan shows recurrent tumor along right dome of liver (arrow) and dilated bile ducts (arrowhead). **B** Also, there was lung abscess in right lower lobe (arrow)



**Fig. 2** **A** A radiographic image after injection of contrast via PCD tube to lung abscess and shows direct communication to bronchus of right lower lobe. **B** Embolization of communicated bronchus was

performed using vascular plug (arrowhead). **C** Image obtained after completion of bronchus embolization using multiple vascular plugs (arrowhead)

decreased, but bile-tinged cough persistently existed, and her general condition got worsened.

Interventional radiology was consulted for consideration of possible minimally invasive management for bronchobiliary fistula, given her general status. When contrast was injected through drainage tube under fluoroscopy, there was a fistula between abscess cavity and two distal bronchi of right lower lobe (Fig. 2A). Percutaneous access via drainage catheter was made. Using microcatheter (Progreat  $\alpha$ , Terumo, Tokyo, Japan) and 0.018-inch microwire (Meister, Asahi, Nagoya, Japan), we successfully cannulated adjacent bronchi via fistula. We changed microcatheter to 5-French catheter (Davis, Merit Medical Inc., USA) and placed two type 4 vascular plugs (8 mm &

7 mm, Amplatzer vascular plug, St. Jude Medical, St. Paul, USA) per each distal bronchus in tandem fashion (Fig. 2B, C). Two days after embolization, percutaneous drainage catheter was removed. After the procedure, biliary sputum, cough, dyspnea disappeared completely and did not recur until the patient died after six months at the hospice care center of our hospital.

## Discussion

Bronchobiliary fistula is a rare, but potentially fatal complication of hepatic or lung abscess. Previous literature reported that endoscopic drainage is mainstay of treatment

including endoscopic retrograde biliary drainage, sphincterotomy and endoscopic nasobiliary drainage [1, 2]. Intractable cases despite several weeks of treatment, surgical options such as fistula tract closure, hepatectomy or lung lobectomy should be considered. It is reported that about 41.7% patients eventually underwent surgical options [1]. However, patients with bronchobiliary fistula often have poor general condition, and considerable perioperative morbidity and mortality make it difficult to manage intractable cases.

In this case, abscess cavity and its communication with right lower lobar bronchi were well visualized, so we planned to select fistula tracts and ultimately closest distal bronchi to embolize them. The vascular plugs were tandemly placed in distal bronchi for occlusion. Several reports demonstrated that bronchopleural fistula could be treated using various embolic materials, such as vascular plugs, glue, coils and stent grafts by accessing endobronchial route [5–8]. We expected viscous biliary fluid will not easily pass through multiple struts of vascular plugs. Radial force of vascular plug placed in bronchi was expected to withstand significant pressure change and movement during respiration. In our case, we did not use liquid embolic material such as glue. We postulated that complete occlusion of fistula tract by adding glue might cause migration or expectoration of vascular plug when patient coughs, due to relatively high-pressure gradient generated during coughing or rapid breathing.

We described the use of percutaneous bronchi embolization using vascular plugs provides novel and safe means to treat intractable bronchobiliary fistula. However, long-term results are unknown and all available treatment options should be considered, because having the

appropriate multimodality equipment is mandatory to provide the safety to patients.

#### Compliance with Ethical Standards

**Conflict of Interest** The authors have no conflict of interests or financial disclosures.

**Informed Consent** Consent for publication was obtained for patient data included in the study.

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