



# Percutaneous Transhepatic Removal of Migrated Biliary Stent from a Chronic Biloma Cavity

만성 담즙종 공동 내로 이동한 담도 스텐트의 경피경간적 제거

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Iatrogenic foreign bodies are a challenging complication to both the interventional radiologist and patient, resulting in impaired quality of life and substantial financial cost. The case report describes a successful percutaneous transhepatic removal of an intra-abdominal foreign body. A 72-year-old man underwent surgery for placement of a retrievable covered stent for refractory bile leakage after left hemihepatectomy. Three days after placement, stent folding and migration into a chronic biloma cavity occurred via the bile leakage site. By using a balloon catheter technique, the folded stent could be straightened and repositioned into the bile duct to minimize stent-strut injury during retrieval. The interventional approach could be a valid treatment option for intra-abdominal foreign bodies, as well as intravascular foreign bodies. A thorough understanding of devices and techniques can provide the interventional radiologist with valuable information regarding procedural planning and the management of iatrogenic foreign bodies.

**Index terms** Device Removal; Catheters; Iatrogenic Disease; Foreign Bodies; Stents

## INTRODUCTION

The iatrogenic foreign bodies (IFB) are infrequently encountered condition; however, rapid and effective treatment is mandatory for the prevention of subsequent significant morbidity or mortality. The first description of IFB occurred in 1954, which report intravascular catheter found within right atrium at autopsy. It migrated from cubital vein and cause patient's death by perforating heart (1). In 1964, first percutaneous removal of broken guidewire from right atrium with rigid bronchoscopic forceps was reported (2). In the last two decades, the percutaneous removal technique of intravascular for-

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eign body is widely perceived as first line treatment, which could achieve minimally invasive technique with high success rate and low complication risk (3, 4). On the other hand, there have been only a limited number of studies regarding percutaneous removal of intra-abdominal foreign body without surgical assistance (5). Herein, we present a rare case, which demonstrate successful percutaneous transhepatic removal of migrated biliary stent from chronic biloma cavity.

## CASE REPORT

A 72-year-old man underwent anterior resection and left hemihepatectomy due to metastatic colon cancer. On postoperative day 7, abdomen CT scan revealed large amount of loculated fluid collection in the upper abdominal cavity including perihepatic space, suggesting biloma. An endoscopic approach failed because a guidewire could not be traverse across the bile leakage site. He was referred for interventional management of bile leakage. Percutaneous transhepatic cholangiography confirmed bile leakage at the level of common hepatic duct (Fig. 1A).

Simultaneous percutaneous transhepatic biliary drainage (PTBD) and percutaneous catheter drainage for biloma were performed for biliary diversion (Fig. 1A). However, bile leakage failed to improve despite prolonged (about 3 months) conservative drainage. The percutaneous transhepatic treatment using retrievable covered stent was planned. The guidewire negotiated into the distal common bile duct across the bile leakage site and a 10 mm × 8 cm retrievable polytetrafluoroethylene covered stent (Song retrievable stent; TaeWoong Medical, Kimpo, Korea) was placed (Fig. 1B).

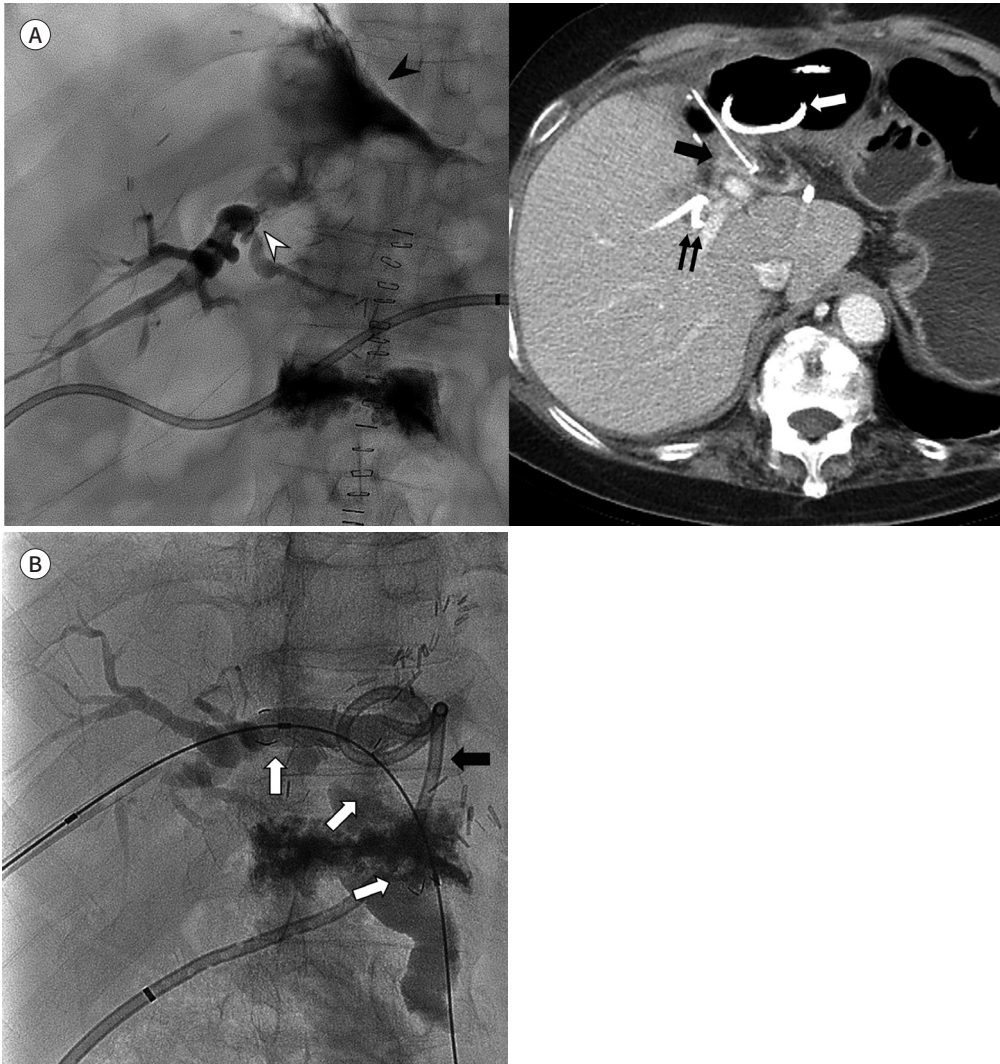
On 3 days after stent placement, follow-up abdomen radiography revealed stent migration and folding into 'V' shape (Fig. 1C). It seemed that stent have slipped into the dead space caused by previous biloma through the leakage site. Because the drainage catheter for biloma was removed on the ward a day earlier, it is suspected that stent was in contact with drainage catheter at the leakage site and withdrawn together (Fig. 1A, B). Considering the patient's medical condition, including old age, previous multiple abdominal surgeries, we determined to try percutaneous retrieval of migrated stent.

An 8-F sheath (Balkin; Cook Medical, Bloomington, IN, USA) was inserted through PTBD tract to facilitate the procedure. A 25 mm Amplatz Gooseneck snare (EV3; Plymouth, MN, USA) was advanced through the sheath. However, the stent was deeply impacted in the dead space, it was difficult to manipulate snare catheter to engage the free end of folded stent. As a secondary strategy, a 0.035" guidewire (Radifocus Guide Wire M; Terumo, Tokyo, Japan) was passed through two openings of stent using a 5-F catheter (Kumpe; Cook Medical) and then a wire loop was made by snaring the distal end. The 10 mm balloon catheter (Mustang; Boston Scientific, Marlborough, MA, USA) was advanced over a guidewire through stent and inflated within the stent. Afterward, the whole unit pulled gently backward to straighten a folded stent and to relocate it into a position at the bile leakage site (Fig. 1D). After the proximal end of stent entered into the bile duct, balloon catheter was removed and the retrieval hook wire was introduced to retrieve stent via PTBD tract (Fig. 1E). After successful removal of stent, a retrievable covered stent was placed again across the bile leakage site. The patient was eventual-

**Fig. 1.** A 72-year-old man with bile leakage after left hemihepatectomy.

**A.** Percutaneous transhepatic cholangiography (left image) demonstrates bile leakage at the level of the common hepatic duct (white arrowhead) into the biloma cavity (black arrowhead). Contrast-enhanced axial CT after biliary diversion (right image) shows a T-tube (black arrow) in the common bile duct and drainage catheters in the biloma cavity (white arrow) and right hepatic duct (double black arrows).

**B.** A retrievable covered stent (white arrows) is deployed across the bile leakage site via the percutaneous transhepatic biliary drainage tract. A percutaneous drainage catheter for biloma (black arrow) is also noted adjacent to the stent.



ly discharged in stable condition without significant complication after one month.

## DISCUSSION

The IFB are challenging complication to the both interventionalist and patient, resulting in impaired quality of life and substantial financial cost. The presence of IFB is associated with potential cause of serious complications including distal embolization, vascular perforation, inflammatory reaction and cardiac problem. In the past decade, IFB were most commonly

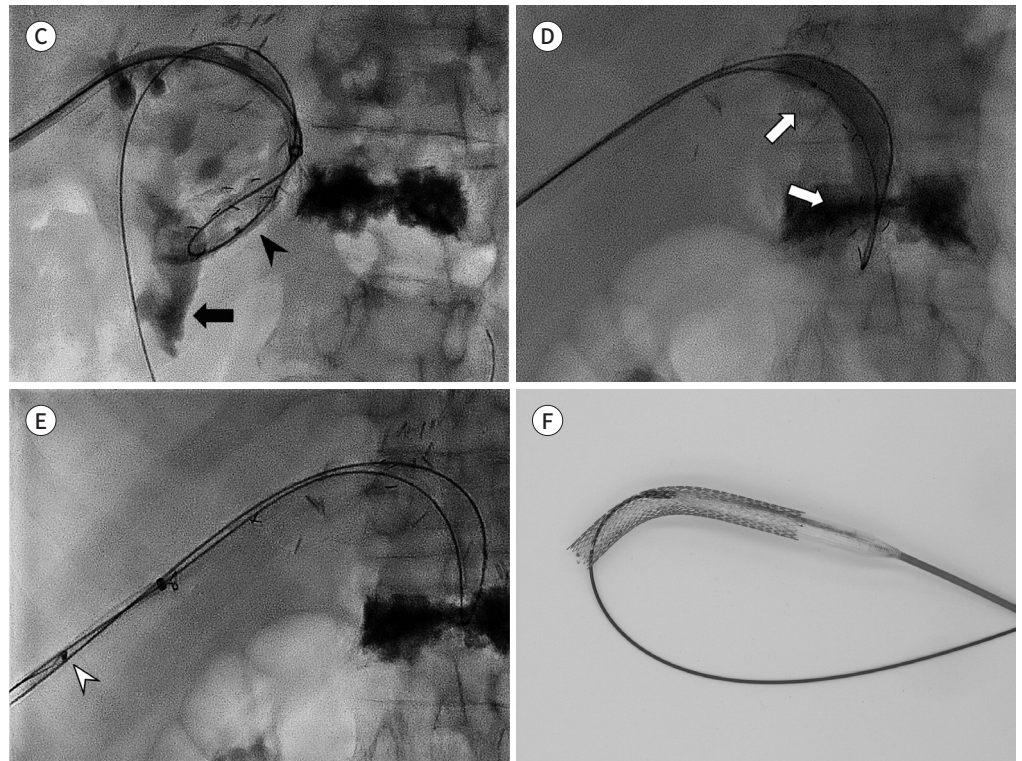
**Fig. 1.** A 72-year-old man with bile leakage after left hemihepatectomy.

**C.** Percutaneous transhepatic cholangiography reveals migration of the folded stent from the bile duct (arrow) to the chronic biloma cavity (arrowhead). The guidewire is navigated through the two openings of the stent and a wire loop is created by snaring the distal end.

**D.** The balloon catheter is advanced over the guidewire through the stent (arrows). The whole unit is pulled gently backward to straighten the folded stent and relocate it into a position across the bile leakage site

**E.** The retrieval hook wire (arrowhead) is introduced into the sheath and retrieved the stent via the percutaneous tract.

**F.** Balloon catheter technique. Once the balloon catheter was introduced into position, the balloon was inflated until it was embedded within the stent to capture the stent.



originated from fractured catheter or guidewire and the loop snare catheters are conventionally first choice of technique (6).

As endovascular procedures progressed rapidly with wide spectrum of interventional devices such as coil, plug, and stent, the possible IFB and associated complications have become immensely diverse. At the same time, the equipment and techniques for removal of intravascular IFB have undergone significant advances over past decades (3, 7). On the other hand, there have been only a limited number of studies regarding percutaneous removal of intra-abdominal foreign body due to limited access route and difficult manipulation (5).

The preferred treatment for a postoperative bile leak is endoscopic approach and transpapillary placement of plastic biliary stent. The placement of covered biliary stent is alternative option for a selected group of patients with refractory bile leakage (8). In the previous studies with the use of covered stent for bile leakage, a few complications including stent migration, biliary stricture, cholecystitis and pancreatitis have been reported (9, 10). However, migration of biliary stent into chronic biloma cavity via the bile leakage site is an extremely rare condition, which has not been described. It could be partly explained by large size of biliary

defect or inappropriate selection of biliary stent. In the present case, removal of adjacent drainage catheter without fluoroscopic guidance is suspected to be the most direct cause of stent migration (Fig. 1A, B).

The accurate information about characteristics of IFB including morphology, size and flexibility is paramount for successful extraction of IFB. The size and shape of IFB determine the escape route and the size of introducer sheath to be extracted without risk of damage. The open tubular shaped IFB could provide additional removal strategy by passing the guidewire through it. If the foreign body is flexible object with small diameter such as disconnected catheter, a wire loop with catheter could be retracted together. In the present case, if the folded stent was pulled out with a wire loop, both ends of the stent will pass through the access route at the same time, causing significant direct injury. By using balloon catheter technique, the folded stent could be straightened and repositioned into the bile duct to minimize stent-strut injury during retrieval (Fig. 1F).

A noncompliant balloon catheter of suitable size should be selected for the retrieval of misplaced stent. A balloon catheter that is too small cannot hold the stent tight during withdrawal. If a balloon catheter is too large, it may result in stent fracture or cannot pass through the stent. The snare catheter may be additionally introduced along the guidewire to increase the grasping power by holding both stent and balloon catheter (3).

In conclusion, the interventional approach could be a valid treatment option for intra-abdominal foreign body as well as intravascular foreign body. A thorough understanding of devices and techniques can provide interventional radiologist with valuable information regarding procedural planning and management of IFB. Creatively combined available strategies may provide successful bailout procedure, even in difficult cases.

### Conflicts of Interest

The author has no potential conflicts of interest to disclose.

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## 만성 담즙종 공동 내로 이동한 담도 스텐트의 경피경간적 제거

이형남\*

의인성 이물질은 인터벤션 의사와 환자 모두에게 심각한 합병증이며, 환자의 삶의 질을 악화시키고 경제적 부담을 준다. 본 증례 보고에서는 복강 내 이물질을 경피경간적 경로로 성공적으로 제거할 수 있었던 드문 증례를 보고하는 바이다. 72세 남자 환자는 좌간절제술 후에 발생한 난치성 담즙 유출을 치료하기 위해 피막 담도 스텐트 설치를 받았다. 설치 3일 후에, 스텐트에 접힘 변형이 발생하면서, 담즙 유출 부위를 통해 스텐트가 만성 담즙종 공동 내부로 이동하였다. 풍선 카테터 기법을 이용하여 접힌 스텐트를 곧게 펴고 담도 내로 위치를 재조정하여, 제거하는 동안 스텐트-스트럿에 의한 손상을 최소화할 수 있었다. 중재적 시술은 혈관 내 이물질뿐만 아니라 복강 내 이물질에도 유효한 치료 방법이 될 수 있다. 이용 가능한 시술 장비들과 술기들에 대한 철저한 이해는 이물질 제거를 위해 보다 효과적인 전략을 수립하는 데 많은 도움을 줄 수 있다.

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