

## Case Report

# Endoscopic Intrabiliary Placement of a Fibrin "Plug" for the Treatment of Traumatic Bile Duct Injuries

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A variety of traumatic and iatrogenic injuries can lead to bile duct leaks or fistula<sup>1,2,3,4</sup>. These leaks are commonly managed by transpapillary biliary stent placement, which reduces intraductal pressure and facilitates closure<sup>5,6,13</sup>. A small percentage of these lesions are resistant to this technique, however. We propose a novel endoscopic approach for traumatic bile duct injuries that uses commercially available cryoprecipitate/thrombin, simultaneously administered during endoscopic retrograde cholangiopancreatography (ERCP), creating a fibrin "plug" within the region of leakage. Two cases are presented that detail our experiences.

### Case 1:

A 30-year-old male presented to our regional trauma center following a motor vehicle accident. Extensive injuries including a grade V liver laceration were identified. The patient was admitted to the Intensive Care Unit (ICU) and his liver injury was assessed and initially managed non-surgically. Abdominal distension and progressive ascites developed during this initial period of treatment. Paracentesis revealed a markedly elevated ascitic bilirubin concentration. An ERCP identified the lesion and a 10 French (Fr) - 5 centimeter (cm) intrabiliary stent was placed across the papilla. (Fig 1)

Despite stent placement a leak persisted (Fig 2) and was confirmed by HIDA (Hepatic Technicium 99m-labelled iminodiacetic acid) scan five days after placement. A subsequent ERCP again identified the location of the defect. Intrabiliary instillation of 2.5 ml of Fibrin glue (cryoprecipitate/thrombin) at the site of the leak along with ductal decompression with a 10Fr - 5cm biliary stent permanently resolved the bile duct leak and symptomatic peritonitis without additional interventions. (Fig 3)

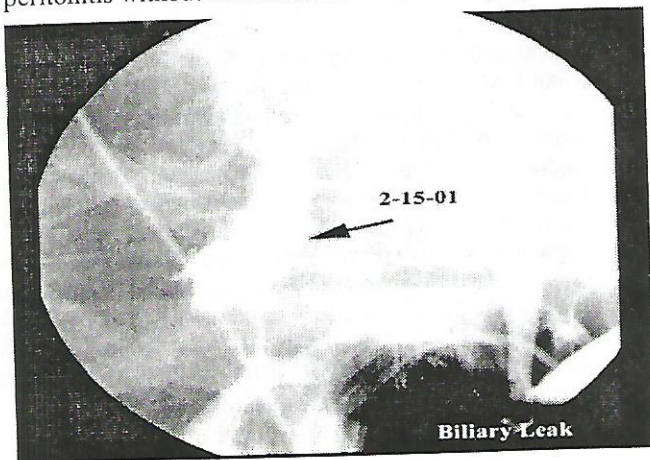


Fig.1

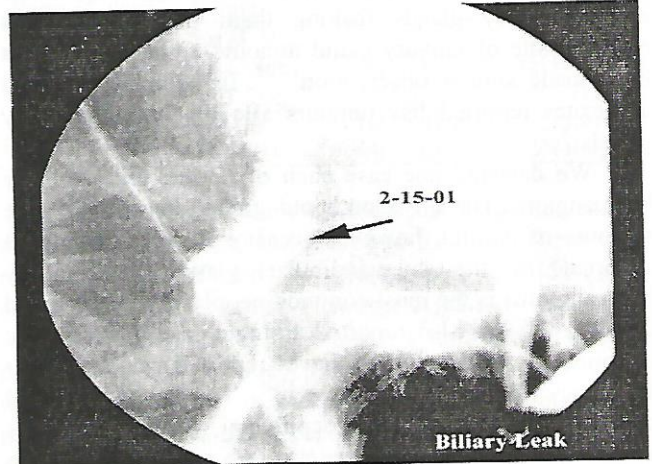


Fig. 2

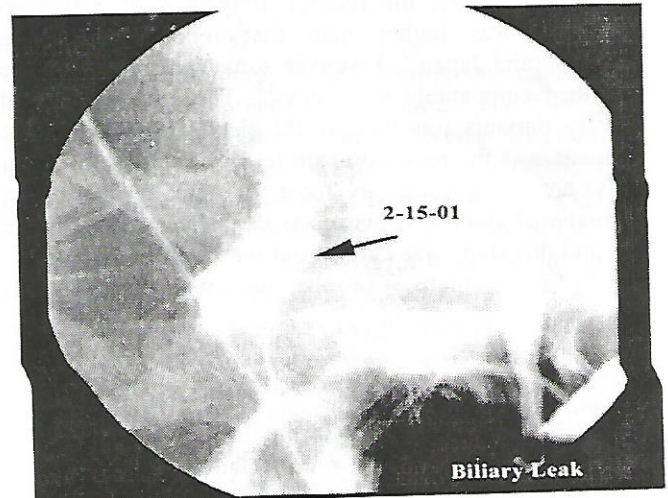


Fig.3

### Case 2:

A 38-year-old male underwent open cholecystectomy for acute cholecystitis. Initially laproscopic, the procedure was converted to an open approach due to inadequate exposure of the surgical field. A bile leak developed at the site of a surgical drain placed in the vicinity of the cystic duct remnant. An ERCP 3 days after the surgery identified the lesion and a 7 Fr- 7cm biliary stent was placed across the papilla. Despite this maneuver increasing outputs continued for two weeks following stent placement.(Fig 4) During the subsequent ERCP cryoprecipitate/thrombin was injected in the defect region with complete resolution of bilious drainage and closure of the cutaneous fistula which was confirmed week later by another ERCP. (Fig 5)

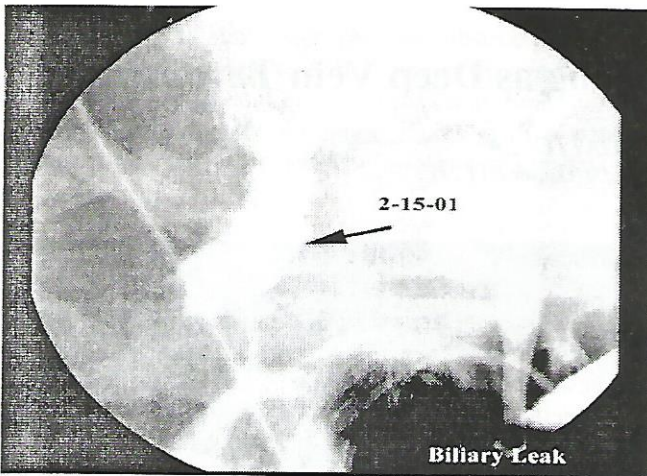


Fig.4

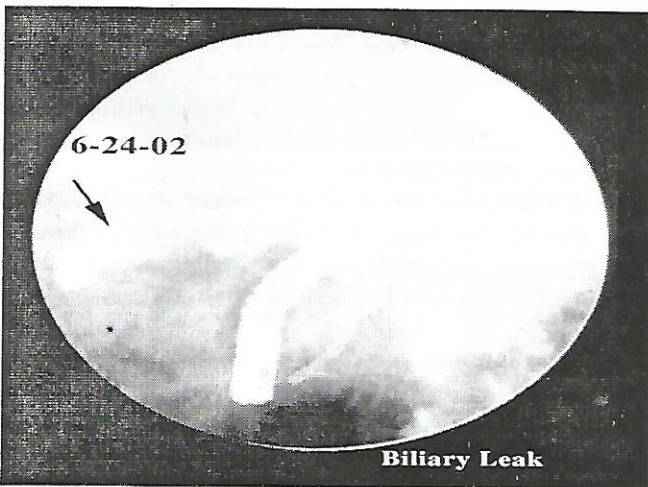


Fig. 5

#### Discussion

The final step in the clotting cascade converts fibrinogen to fibrin monomer, which in the presence of factor XIII and calcium forms fibrin polymer and a stable clot.(7,8)

This physiologic event has been applied in the surgical setting since the 1940's to achieve hemostasis.

Available in Europe since the early 1960's, it has been used in the cardiothoracic and vascular surgery disciplines. Recent applications include closure of anal fistulas, repair of thoracic duct leaks, closure of bronchopleural fistula and in ocular surgery.

The inherent risk for blood-borne pathogens from pooled plasma prevented its acceptance in the US although single donor plasma sources and autologous harvesting have greatly reduced the risk of infection. Bile leaks can develop during iatrogenic, or noniatrogenic trauma.

Anomalies of the cystic and hepatic ducts predispose to bile duct injury during surgery. Fistulas between the cystic duct and common bile duct related to an impacted cystic duct stone can also lead to biliary leak following cholecystectomy<sup>9</sup>.

Limited exposure during laposcopic approaches can also increase the risk of inadvertent bile duct trauma. Most bile leaks can be successfully managed by trans-sphincteric stent placement to overcome the biliary intraductal pressure gradient, however for a small number of patients this approach is inadequate. A Medline search did not reveal this application in traumatic bile duct lesions. Our experiences may suggest a viable approach for patients who have failed stent placement alone or in whom extensive surgical exploration cannot be tolerated<sup>10,11,12</sup>.

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