

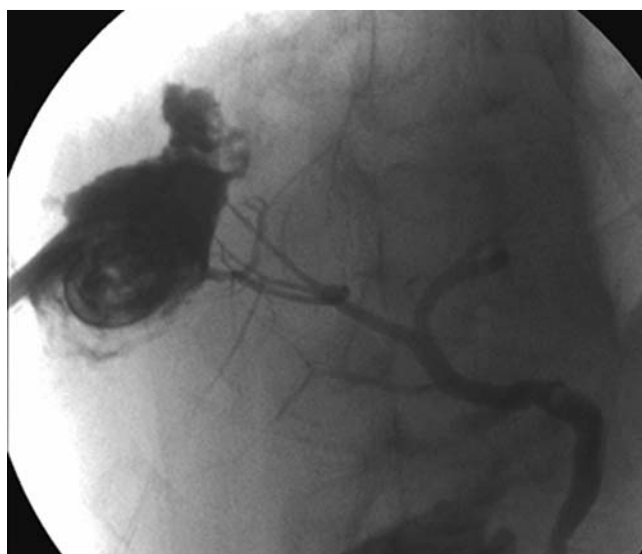
## Choledochoscope-assisted percutaneous fibrin glue sealing of bile leak complicating transarterial chemoembolization of hepatocellular carcinoma after liver transplantation



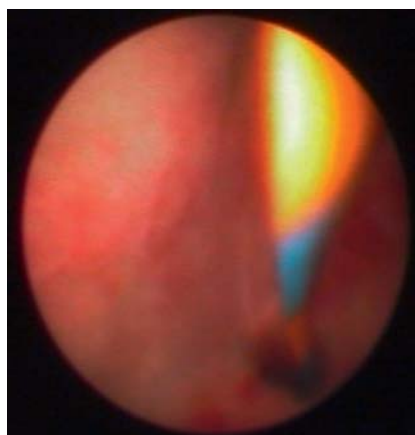
**Fig. 1** Computed tomography (CT) scan showing: **a** biloma in hepatic segment VII with all-purpose drainage loop (APDL) indwelling catheter; **b, c** the fistula is well visualized between the biloma and the segmental biliary branch (black arrows).

Transarterial chemoembolization (TACE) is recommended for patients with unresectable hepatocellular carcinoma (HCC); however, it is not a risk-free procedure and biloma may occur as a complication [1].

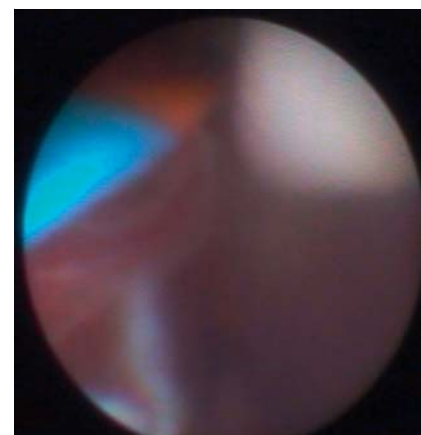
A 45-year-old man, following liver transplantation, presented with recurrent HCC



**Fig. 2** Percutaneous cholangiography confirming the biliary fistula.



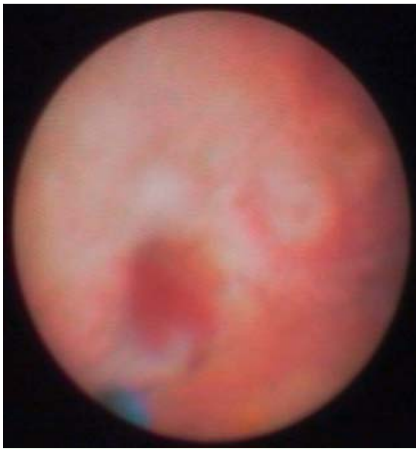
**Fig. 3** Choledochoscopic view of the fistula orifice.



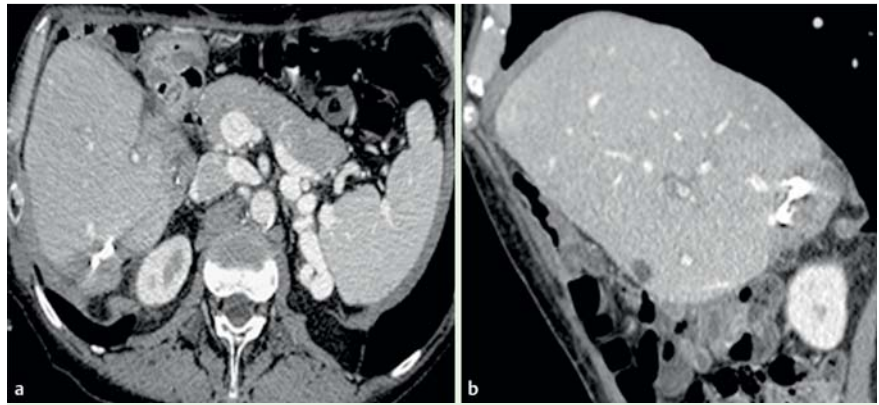
**Fig. 4** Choledochoscopy-assisted fibrin glue injections using a 19-G needle.

in the caudate lobe, close to the caval vein, and was treated by TACE. Subsequently, the patient was admitted for abdominal pain and fever. Computed tomography (CT)-guided percutaneous cholangiography confirmed the diagnosis of infected biloma (• **Figs. 1, 2**). During the following weeks there was abundant drainage, despite both external drainage and endoscopic treatment. It was decided to attempt direct closure of the fistula with a choledochoscope-assisted procedure. Briefly, an inverse rendezvous procedure was successfully carried out, allowing the retrieval of the endoscopic guide wire, fol-

lowed by insertion of a percutaneous wire-guided choledochoscope (Polyscope, Lumenis Inc., Santa Clara, California, USA) into the biloma. An angiographic introducer was inserted beside the choledochoscope and a 19-G needle was inserted in the introducer. The choledochoscopic approach allowed multiple fibrin glue injections (Tissucol, Baxter Healthcare, Deerfield, Illinois, USA) around the distal opening of the peripheral bile duct, for a total volume of 3 mL (• **Fig. 3–5**). A CT scan taken after a few days showed absence of fluid in the biloma, confirming healing of the biliary fistula (• **Fig. 6**).



**Fig. 5** Cholangioscopic view after fibrin glue sealing of bile leak.



**Fig. 6** Follow-up computed tomography (CT) scan showing the absence of fluid in the biloma in spite of the closure of the all-purpose drainage loop (APDL) catheter, thus demonstrating healing of the biliary fistula.

Conservative management of biloma allows resolution in more than 80% of cases [2–4]. However, cases resistant to well-established conservative strategies still represent a challenge. To our knowledge, this is the first report of a novel technique in the management of hepatic biloma. Use of fibrin glue injection to seal a bile leak could represent an indication for therapeutic cholangioscopy, although it requires confirmation through application in further patients.

#### Video 1

Cholangioscope-assisted percutaneous fibrin glue sealing of bile leak complicating transarterial chemoembolization of recurrent hepatocellular carcinoma after liver transplantation.

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**Competing interests:** None

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#### Bibliography

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