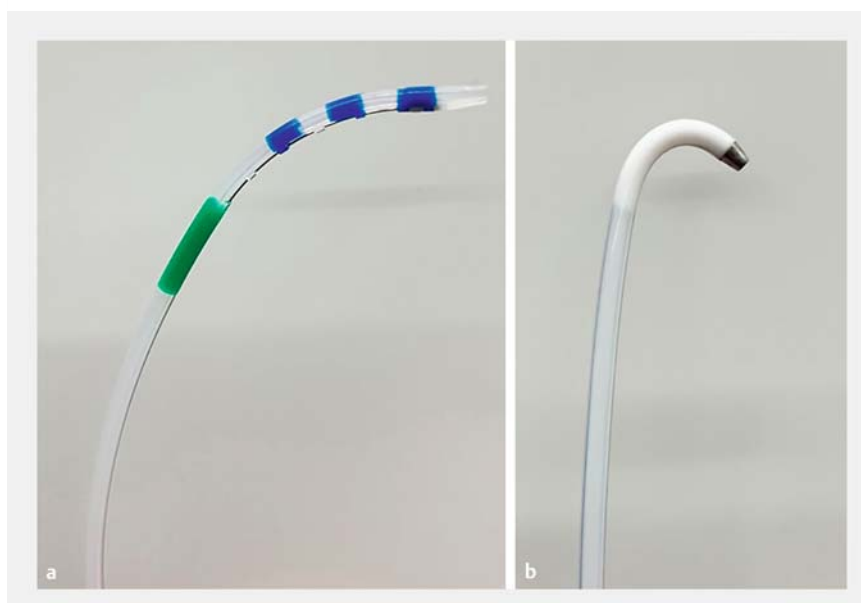


## A novel controllable catheter with a short flexible tip for guidewire insertion in severe malignant hilar biliary stricture

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During stenting for a malignant hilar biliary obstruction (MHBO), guidewire insertion to the intended intrahepatic bile duct is sometimes very technically challenging [1]. It is especially difficult when the bend in the bile duct is steep and involved in the stricture. A novel controllable catheter (Zeon Medical, Tokyo, Japan) with a short flexible tip is more flexible and can be bent more than conventional controllable catheters (Swing Tip cannula; Olympus Medical Systems, Tokyo, Japan) [2], which have a range of 90 degrees upwards and downwards. Furthermore, the fulcrum for the tip bend is closer to the tip (15 mm) than in the conventional catheter (30 mm) (► **Fig. 1**).

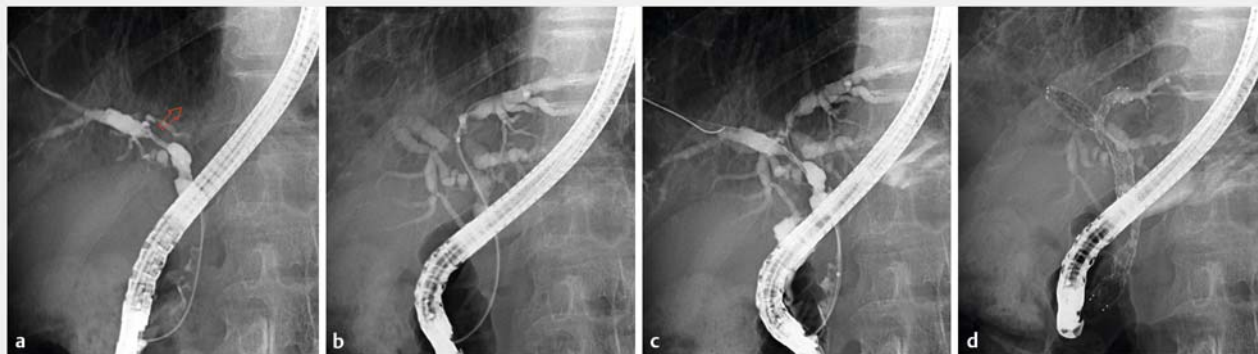
An 81-year-old man developed obstructive jaundice with cholangitis due to liver and lymph node metastases. Endoscopic retrograde cholangiography revealed a severe Bismuth type IIIa stricture, and the bifurcation angle of the left hepatic duct (LHD) was extremely steep due to the displacement by metastatic lesions. The LHD was assumed to branch from near the upper end of the stricture. Although guidewire insertion into the LHD was attempted with various types of guidewires and a Swing Tip cannula, the procedure was unsuccessful. Therefore, we inserted the novel controllable catheter and bent its tip toward the LHD to adjust the axis. Subsequently, guidewire insertion into the LHD was achieved (► **Video 1**). Thereafter, an additional guidewire was inserted into the right intrahepatic duct, and a bilateral metal stent placement using the stent-in-stent method was finally performed (► **Fig. 2**). Clinical success with sufficient and effective drainage was obtained without any adverse events.



► **Fig. 1** **a** The conventional controllable cannulae have large radii when the tip is angled. **b** The novel controllable catheters have a much smaller radius when the tip is angled. The tip diameter of the novel catheter is 1.4 mm, the catheter length is 2200 mm, and the compatible guidewire is 0.025/0.035 inch.



► **Video 1** Guidewire insertion with the novel controllable catheter with a short flexible tip in a case with severe malignant hilar biliary obstruction.



► **Fig. 2** **a** The left hepatic duct had an extremely steep angle and branched from near the upper end of the stricture (arrow), making it impossible to insert a guidewire. **b** The guidewire could be inserted after moving the tip with the novel controllable catheter and aligning the axis. **c** After that, an additional guidewire was inserted into the right intrahepatic duct. **d** Metal stents were finally placed using the stent-in-stent method.


Since this novel catheter has a movable fulcrum very close to the tip, it can be moved flexibly even in the narrow bile ducts involved in the stricture. This novel catheter could be a useful option as a salvage device in MHBO stenting where guidewire selection is difficult.

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## Competing interests

The authors declare that they have no conflict of interest.

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