Temporary placement of a fully covered self-expandable metal stent with electrohydraulic lithotripsy under direct cholangioscopic control for intrahepatic stones upstream of a stenosis after choledochal cyst excision

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A 25-year-old woman had undergone extrahepatic excision of a congenital choledochal cyst and Roux-en-Y hepaticojejunostomy. Twenty-five years later, she was referred to our hospital for treatment of intrahepatic stones causing recurrent cholangitis. MRCP revealed dilated lateral hepatic ducts filled with stones (Fig. 1). At the hospital she had visited previously, cholangiography of the right hepatic ducts was successful using double-balloon enteroscopy, but both cholangiography of the left hepatic duct and guidewire insertion into it failed, perhaps because the duct was packed with stones.

As the first step, electrohydraulic lithotripsy of the stone packed in the orifice of a left hepatic duct branch was performed under direct cholangioscopic control using a cholangioscope (SpyGlass DS; Boston Scientific Japan, Tokyo, Japan; Fig. 2). Because the working channels of balloon

![Figure 1. MRCP stereo image from anterior showing dilated lateral hepatic ducts filled with stones.](image)

![Figure 2. A, Direct cholangioscopy using the SpyGlass DS through the colonoscope revealed a stone packed in the orifice of a left hepatic duct branch. B, Cholangiography through the SpyGlass DS did not depict the bile duct upstream of the packed stone.](image)
enteroscopes (maximum 3.2 mm) are not suitable for the
cholangioscope (3.6 mm in diameter), a variable-stiffness
colonoscope with a 3.7-mm working channel (CF-
HQ290ZI; Olympus, Tokyo, Japan) was used as a
mother–baby system. After opening the area of the packed
stone, cholangiography showed many more stones occup-
ying the dilated duct just upstream, and electrohydraulic
lithotripsy was continued. Furthermore, a stenosis farther
upstream made it difficult for the SpyGlass DS to reach
the upstream stones. A mechanical lithotripter could pass
through the stenosis and was used successfully to extract
these stones (Fig. 3). In this step, the lateral inferior
ducts were not depicted.

As the next step, the lateral inferior ducts were depicted
by wedging the tip of the colonoscope into the orifice of
the left hepatic duct to increase the internal pressure suf-
ficiently to pass contrast medium through the packed
stones. Cholangiography showed innumerable stones
occupying the space of the dilated ducts (Fig. 4). Mecha-
nical lithotripter baskets could not open enough to
grasp the stones. Furthermore, the area downstream of
the dilated ducts was constricted with a flexure, and it
was difficult to reach the stones with the cholangioscope.
The procedure was abandoned.

To create a favorable setting, a fully covered self-expandable
metal stent (c-SEMS), 10-mm × 4-cm BONASTENT M-Intra-
ductal (Standard Sci-Tech Inc, Seoul, South Korea) was placed
at the stenosis to facilitate upstream access (Fig. 5). Twenty-
four hours later, the stent had expanded sufficiently, and the
cholangioscope was inserted through it. Electrohydraulic litho-
tripsy was performed, and fragmented stones were extracted
by retrieval balloon and baskets (Video 1, available online at
www.VideoGIE.org, Fig. 6). The stent was removed during
the procedure because c-SEMS placement causes cholangitis
with obstruction of other branches. Although it took 3
lithotripsy procedures with temporary c-SEMS placement,
almost all stones were extracted, and dilatation of the lateral
hepatic ducts improved (Fig. 7).

The success of peroral direct cholangioscopy in patients
with altered anatomy requires various ingenious approaches
to the procedure. In the present case, using a colonoscope
made the procedure possible. Intrahepatic bile duct stenosis
is thought to be one of the major causative factors for
recurrent cholangitis with intrahepatic stones after
choledochal cyst excision, especially in patients with type
IVa. In the present case, a c-SEMS was placed at the stenosis
to facilitate upstream access. With c-SEMS placement into
the hepatic duct, there is concern about obstruction of

Figure 3. A, Cholangiography after opening the area of the packed stone revealed many more stones occupying the dilated duct just upstream, and electrohydraulic lithotripsy was continued. B, A stenosis farther upstream made it difficult for the SpyGlass DS to reach the upstream stones (arrow). C, A mechanical lithotripter was passed through the stenosis and used to extract these stones.

Figure 4. A, After the lateral superior duct, the lateral inferior ducts are depicted, and innumerable stones occupied the space of the dilated ducts (B).
nontargeted branches. Thus, timing c-SEMS removal to occur after the c-SEMS has expanded sufficiently and before cholangitis worsens is important. In the present case, the appropriate timing was 24 hours later. This case report shows the challenges encountered during endoscopic treatment of intrahepatic stones after choledochal cyst excision and how to deal with them, how to reach the hepaticojejunostomy with the cholangioscope, how to pass

Figure 5. A, The region downstream of the dilated lateral inferior ducts was constricted with a flexure (arrow). B, A BONASTENT was placed at the stenosis.

Figure 6. A, The BONASTENT had expanded sufficiently 24 hours later, and (B) the SpyGlass DS was inserted through it. C, Electrohydraulic lithotripsy was conducted for stones upstream of the stenosis.
contrast medium through packed stones, and how to deal with stones upstream of a stenosis. Temporary c-SEMS placement can be an option for treatment of stones upstream of a stenosis.

DISCLOSURE

All authors disclosed no financial relationships.

Abbreviation: c-SEMS, covered self-expandable metal stent.

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