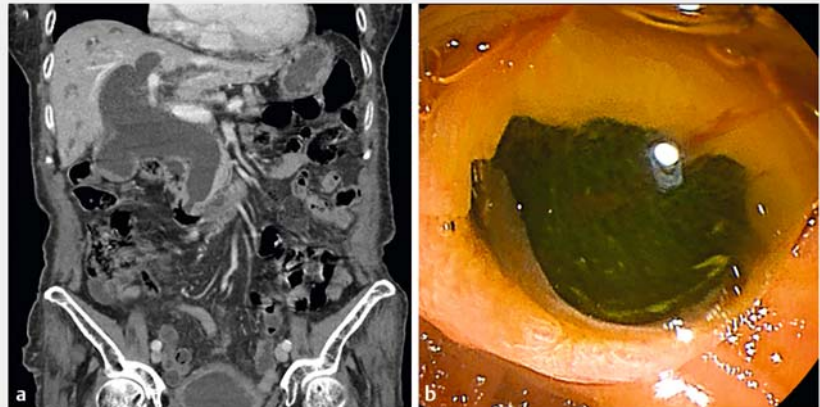


Argon plasma coagulation under direct peroral cholangioscopy for intraductal papillary mucinous neoplasm of the gallbladder

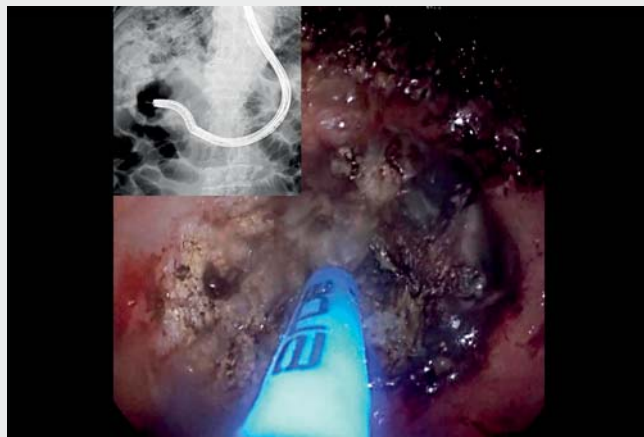


A gallbladder intraductal papillary neoplasm, similar to a bile duct and pancreas intraductal papillary mucinous neoplasm (IPMN), is a rare premalignant lesion characterized by superficial spread, dilated gallbladder and bile ducts, and multifocal distribution [1, 2].

A 91-year-old woman presented to the emergency department with jaundice. An abdominal computed tomography scan revealed a markedly dilated cystic duct and intra- and extrahepatic bile ducts, without visible stones or masses (► **Fig. 1a**). On endoscopic retrograde cholangiopancreatography (ERCP), abundant mucin exuding from papilla appeared as fisheye signs, and amorphous filling defects occupying the extrahepatic duct, consistent with mucobilia (► **Fig. 1b**), were observed. The patient refused surgery because of her current condition and extremely old age. Despite multiple sessions of ERCP with mucobiliary clearance, she experienced recurrent episodes of obstructive cholangitis resulting from mucus impaction. After initial failure of direct peroral cholangioscopy using an ultrathin endoscope for clearance, a standard upper endoscope was introduced into the extrahepatic duct and inserted into the hilum (► **Video 1**). After sufficient mucus suction, direct peroral cholangioscopy demonstrated multiple exophytic papillary protrusions in the cystic duct and gallbladder (► **Fig. 2a**). Histological evaluation of the specimens revealed IPMN with low-grade dysplasia in the gallbladder nodularities (► **Fig. 2b**). To prevent recurrent cholangitis by reducing the tumor burden and mucin production, argon plasma coagulation (APC) was performed. After two sessions of direct peroral cholangioscopy, APC was applied to all visible nodularities in the gallbladder and cystic duct with a pulsed mode of 40 watts, effect 1, and 1.0 L/min. Intermittent suction was followed by APC to reduce gas overdistention. At follow-up,



► **Fig. 1** Initial abdominal computed tomography (CT) and endoscopic findings. **a** Initial abdominal CT scan reveals a markedly dilated cystic duct and intra- and extrahepatic bile ducts. **b** Endoscopic image showing abundant mucin and fisheye signs.

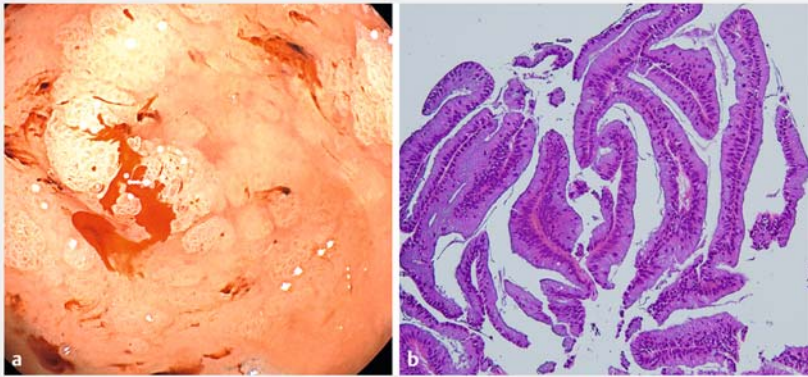


► **Video 1** Argon-plasma coagulation was performed at papillary lesions to reduce tumor burden for reducing mucin production during 2nd session of direct peroral cholangioscopy. The lesions were successfully ablated.

direct peroral cholangioscopy showed a significant reduction of mucobilia and fibrotic scar changes. The remaining nodules were treated with APC in the third direct peroral cholangioscopy session. Cholangitis was not observed after endoscopic therapy.

Although surgery is the treatment of choice for gallbladder IPMN, surgically unfit patients benefit from minimally invasive endoscopic therapies, including APC [3, 4].

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▶ Fig. 2 Endoscopic and pathologic findings of the gallbladder. **a** Endoscopic image showing multiple exophytic papillary protrusions. **b** Hematoxylin and eosin staining ($\times 100$) showing an intraductal papillary mucinous neoplasm with low-grade dysplasia.

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Endoscopy 2023; 55: E823–E824

DOI 10.1055/a-2094-9526

ISSN 0013-726X

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Funding

This research was supported by a grant from the Patient-Centered Clinical Research Coordinating Center (PACEN), funded by the Ministry of Health & Welfare, Republic of Korea (grant number: HC21C0016000021).

Competing interests

The authors declare that they have no conflict of interest.

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