Feasibility of per-oral cholecystoscopy and advanced gallbladder interventions after EUS-guided gallbladder stenting (with video)

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Background and Aims: The recent development of EUS-guided gallbladder drainage (EGBD) with a lumen-apposing stent has made endoscopic assessment and advanced gallbladder interventions via the stent possible. The aim of this study was to assess the feasibility and safety of per-oral cholecystoscopy and the types of gallbladder interventions that can be performed.

Methods: This was a retrospective review conducted in the Prince of Wales Hospital from June 2012 to March 2016. All patients who had acute cholecystitis with EGBD were included. Cholecystoscopy was performed 1 to 3 months after stent insertion. Patients' demographic data, technical success, types of intervention, and adverse events were recorded.

Results: Twenty-nine cholecystoscopies were performed in 25 patients. Twenty-seven of 29 cholecystoscopies were successful (93.1%). Magnifying endoscopy was performed in 10 patients, confocal endomicroscopy and EUS in 1 patient, and endocytoscopy in another patient. Fourteen patients (56%) had spontaneous stone passage. Eleven patients (44%) had residual gallstones on cholecystoscopy, and removed in 8. Overall stone clearance rate was 88% after a mean (standard deviation) number of 1.25 (0.46) sessions of cholecystoscopy.

Conclusions: Per-oral cholecystoscopy and advanced gallbladder interventions were feasible and safe. This opens up exciting possibilities for endoscopic treatment of gallbladder pathologies. (Gastrointest Endosc 2017;85:1225-32.)

(footnotes appear on last page of article)

The gallbladder is traditionally difficult to access by per-oral endoscopy. However, the development of EUS-guided gallbladder drainage (EGBD) with a lumen-apposing metal stent (LAMS) has made gallbladder access by the endoscope via the stent possible. Through the cholecysto-duodenal or cholecystogastric anastomosis created by the LAMS, advanced endoscopic evaluation and interventions to the gallbladder can be performed. The aim of this study was to assess the feasibility and safety of per-oral cholecystoscopy using the LAMS as a portal to the gallbladder and the types of interventions that can be performed in these patients.

This video can be viewed directly from the GIE website or by using the QR code and your mobile device. Download a free QR code scanner by searching "QR Scanner" in your mobile device's app store.

METHODS

This was a retrospective study of all patients who underwent per-oral cholecystoscopy after EGBD from June 2012 to March 2016. The institution's ethics committee approved the study. All patients who had acute cholecystitis and were considered unfit for cholecystectomy by surgeons and anesthesiologists received transgastric or transduodenal EGBD with placement of a LAMS (AXIOS; Boston Scientific, Natick, Mass, USA).[1] None of the patients received interval cholecystectomy. Per-oral cholecystoscopy was performed as a routine 1 to 3 months after

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stent insertion to assess for the presence of residual gallstones. All stents were removed after the gallbladders were cleared of stones.

EUS-guided gallbladder drainage

All procedures were performed with the patient under conscious sedation or monitored anesthesia by an endosonographer experienced with the procedure. Initially, the Cold AXIOS stent (Boston Scientific, Natick, Mass, USA) was used for drainage but this was subsequently replaced by a newer version of the stent: the Hot AXIOS stent (Boston Scientific, Natick, Mass, USA), which is equipped with a cautery tipped delivery system.[1] The gallbladder was identified by a linear echoendoscope (GF-UTC 260; Olympus, Tokyo, Japan), and a suitable puncture site in the stomach or the duodenum without intervening blood vessels was located. The gallbladder was punctured with a 19-gauge needle (Expect; Boston Scientific, Natick, Mass, USA or Echotip; Cook Medical, Bloomington, Ind, USA), and the position was confirmed by aspiration of bile and minimal contrast injection during fluoroscopy. A 0.635 mm (0.025 inch) or 0.889 mm (0.035 inch) guidewire was passed through the needle and looped in the gallbladder. In patients with Cold AXIOS stent placement, the track was dilated with a 6F cystotome (Endo-flex; Voerde, Düsseldorf) and a 4 mm biliary balloon (Hurricane RX dilation balloon; Boston Scientific, Natick, Mass, USA). The delivery system of the AXIOS stent was then inserted. After the Hot AXIOS system became available, no track dilation was required. The delivery system of the stent is equipped with cautery, which allows single-step puncture and placement of the stent. A 15 × 10 mm stent was used. The distal flange of the stent was deployed under EUS guidance and the proximal flange under endoscopic or EUS guidance. Once deployed, the gallbladder was completely emptied by suction and irrigation until the effluent through the stent was clean (Video 1, available online at www.giejournal.org).

Advanced per-oral cholecystoscopic evaluation and interventions

All patients were scheduled for a follow-up cholecystoscopy 1 to 3 months after EGBD to check for clearance of gallstones. The feasibility of performing several advanced endoscopic evaluations and interventions in the gallbladder was also assessed. All procedures were performed under carbon dioxide insufflation with prophylactic antibiotics. To define the micro-anatomy of the mucosa of the gallbladder, narrow-band magnifying imaging was performed with a 9.8 mm magnifying endoscope (GIF-H290Z; Olympus, Tokyo, Japan) with a short cap (D-201-11304; Olympus, Tokyo, Japan) attached. The mucosal micro-vascularity and micro-villus structures were observed. These images were correlated with endoscopic biopsy. In one patient, endocytoscopy was performed with a 10.8 mm magnifying endoscope (GIF-Y0002 prototype; Olympus, Tokyo, Japan). GIF-Y0002 has lens that can consecutively increase the magnification from the conventional endoscopy level to 380× magnification (tissue field of view 700 × 600 um) using a hand lever. In another patient in whom gallbladder carcinoma was suspected, EUS was performed by inserting a 12 MHz miniprobe (UM-2R; Olympus Medical, Tokyo, Japan) through the endoscope and LAMS into the gallbladder. This was followed by probe-based confocal laser microscopy (Gastroflex, Cellvizio; Mauna Kea Technologies, Paris, France) to correlate with histologic assessment. When the stones were too large to pass out spontaneously, basket mechanical lithotripsy (BML-110A-1; Olympus, Tokyo, Japan) was used to break down the stones followed by laser lithotripsy if this was not successful. In patients in whom concomitant common bile duct (CBD) stones were suspected, a cholecystogram was performed by injection of contrast through the cystic duct opening under fluoroscopy. After confirmation of stone clearance in the gallbladder, the LAMS were removed with rat tooth forceps.

TABLE 1. Outcomes of per-oral cholecystoscopy and gallbladder interventions

Cholecystoscopic interventions	No. (%)
Stents inserted via antrum	6/25 (24)
Stents inserted via duodenum	19/25 (76)
Technical success	27/29 (93.1)
Spontaneous stone clearance	14/25 (56)
Overall stone clearance	22/25 (88)
Magnifying endoscopy	10
Confocal microscopy	1
Endocytoscopy	1
EUS with miniprobe	1
Laser lithotripsy	1

Outcome measurements and statistical analysis

Data recorded included background demographics, overall success rates of various procedures (Table 1), types of intervention, and adverse events. The severity of adverse events was graded according to the lexicon of endoscopic adverse events.[4] Statistical analyses were mainly descriptive and done using the SPSS 22.0 statistical software (SPSS, Armonk, NY, USA).

RESULTS

The mean (standard deviation [SD]) age was 83.62 (7.7) years and the male to female ratio was 12:17. The median (range) American Society of Anesthesiologists