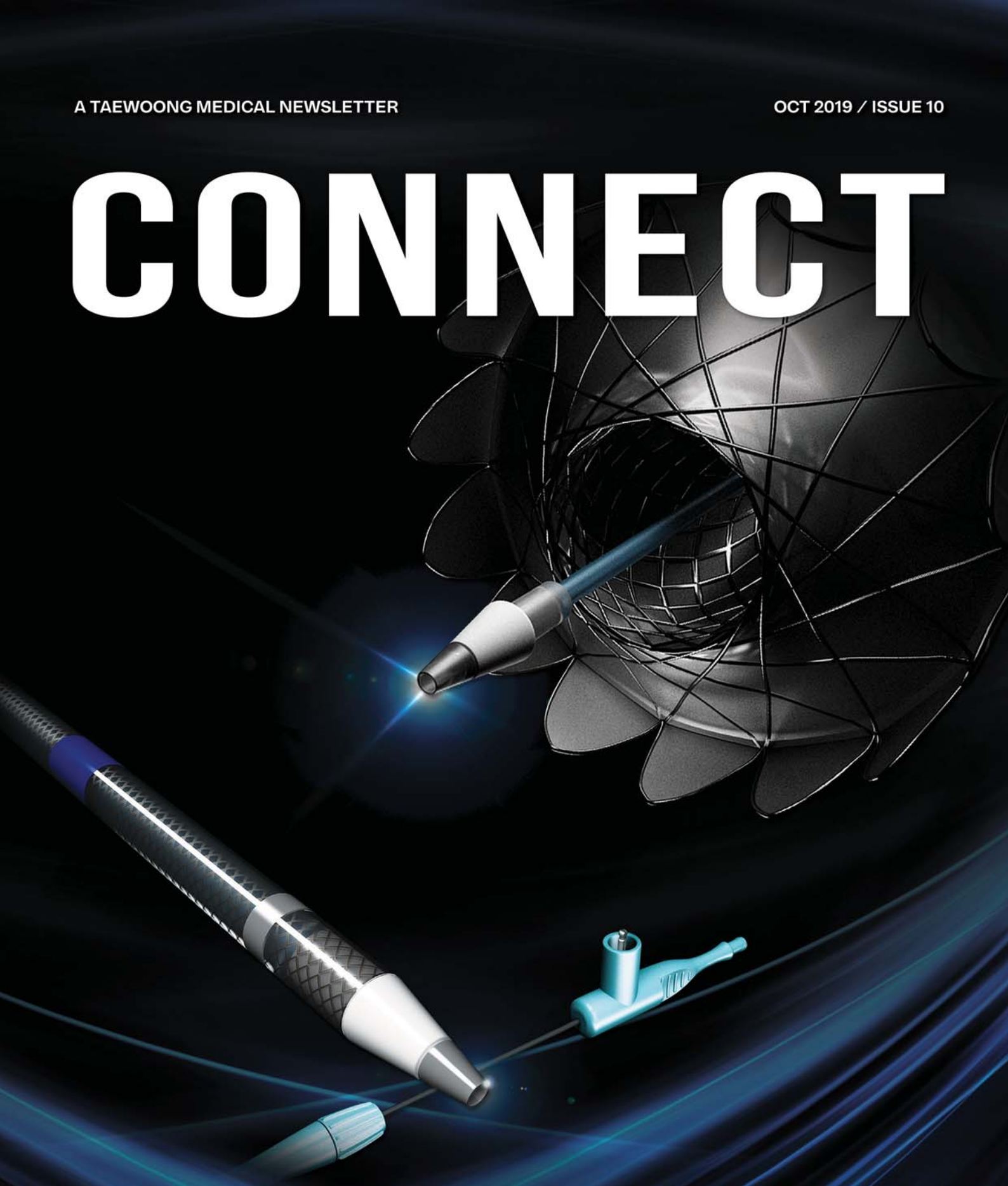
A TAEWOONG MEDICAL NEWSLETTER

OCT 2019 / ISSUE 10

CONNECT



HOT SPAXUS™
GRAND LAUNCHING

TAEWOONG MEDICAL NEWS

The 21st Düsseldorf International Endoscopy Symposium

Feb 7-9, 2019 / Düsseldorf, Germany

Taewoong Medical had the honor of contributing to one of the main endoscopy conferences in Germany as an exhibitor for five consecutive years. Many attendees visited our booth and appreciated the design of Niti-S™ stents and the philosophy behind them. Intensive attention was especially focused to products for the EUS-guided procedures. Prof. Nageshwar Reddy gave a presentation on lumen-apposing metal stents titled "Selection and application of LAMS", while Prof. Marc Giovannini presented his experience under the title "Endoscopic ablation of pancreatic tumors." Both lectures were extremely helpful in explaining the techniques and potentials of procedures as well as the products that aids these procedures.

DDW (Digestive Disease Week)

May 19-21, 2019 / San Diego, CA, USA

Taewoong Medical participated in DDW, the largest GI congress in the US for 13 consecutive years and presented Niti-S™ and RFA products. Since ELRA™ received FDA approvals in May, all RFA lines became available in the US market. Both EUSRA™, the needle type EUS-RFA probe for pancreatic tumors, and ELRA™, the bipolar endo-biliary RFA probe for hilar and the common bile duct, received extensive attention from the attendees. In addition, new abstracts regarding ELRA™ and EUSRA™ results in various indications were also published.

ESGE Days
(the European Society of Gastrointestinal Endoscopy)

Apr 4-6, 2019 / Prague, Czech Republic

ESGE Days which was founded last year on track to become one of the leading GI endoscopy society in Europe since it managed to double the attendee visits compared to its first year. Taewoong Medical participated in ESGE Days for the second time as an exhibitor. Thankfully, almost 50% of the lectures which were on EUS therapeutic procedures of pancreas were related with Taewoong Medical's RFA probe, the EUSRA™. We were able to feel the fast-growing acceptance of the RFA treatment in pancreatic tumors by European attendees compared to last year. The next ESGE Days will be held on Apr 23-25 in Dublin, Ireland.

IDEN (International Digestive Endoscopy Network)

Jun 13-16, 2019 / Seoul, South Korea

Taewoong held a booth at IDEN congress, and greeted 1,000 attendees from 30 countries. During the session, Prof. Sundeep Lakhtakia and Prof. Jae Hee Cho made presentations about their EUSRA™ experience. In addition, there were one endo-biliary RFA ablation live session using ELRA™ probe, and one EUS-guided hepaticogastrostomy procedure using Niti-S™ GIOBOR™ stent. Taewoong invited selective guests to its factory and introduced the sophisticated hand-made manufacturing process of Niti-S™ stents.

EUSRA™ Training Review

So far, the EUSRA™ product training has been provided 12 times-8 times in Marseille, France and 4 times in Seoul, Korea. As the interest in RFA products is growing continuously, there has been constant requests for specialized lectures and intensive hands-on training sessions.
Participants expressed deep satisfaction at the implemented EUSRA™ training which had been an effective way of imparting EUS knowledge and skills with the latest advances in EUS-RFA in practice.
Taewoong Medical will continue to implement EUSRA™ training programs in Marseille and Seoul in coming years, and anyone who is interested is welcome to participate.

UPCOMING EVENTS

- **UEG Week** (United European Gastroenterology)
  Oct 21-23, 2019 / Barcelona, Spain
  Taewoong Booth: Hall 8.1 / 018

- **APDW** (Asian Pacific Digestive Week)
  Dec 12-15, 2019 / Kolkata, India
  Taewoong Booth: S33

TAEWOONG MEDICAL USA ADVANCING FORWARD

FDA Clearance for ELRA™ in the USA

◀ Dr. Varadarajulu (Acclaimed EUS Specialists), who will be discussing EUS RFA at the upcoming Conference/Congress (WCOG) in Turkey this September 2019.

Taewoong Medical USA is taking great strides in creating an everlasting movement in the U.S. There has been significant progress with the EUSRA™ and ELRA™ that have a considerable impact on the medical community in the U.S.

Taewoong Medical USA has recently received FDA clearance for the ELRA™ (EndoLuminal Radiofrequency Ablation) electrode. The addition of ELRA™, along with the already cleared EUSRA™ device, has created a strong movement for Taewoong Medical USA as one of the leaders in RFA for the US endoscopy space. Such a movement that key opinion leaders from the US such as Dr. Jeffery Lee (MD Anderson), Dr Manoop Bhutani (MD Anderson), Dr. Haber (New York University), Dr. Michel Kahaleh (Robert Wood Johnson), Dr. Michael Levi (Mayo Clinic Rochester), Dr. Shyam Varadarujulu (Florida Hospital), Dr. Michael Sanders (University of Washington), Dr Eun Ji Shin (Johns Hopkins) and Dr. Tamas Gonda (Columbia University) have all committed to TaeWoong with these new exciting technologies to only name a few.

In recent months, EUSRA™ has been presented and discussed at a few of the conferences throughout the US such as the MAGIC Course (Mid-Atlantic Gastrointestinal Interventional Course), The Johns Hopkins International Therapeutic Endoscopy Course (HITEC) and most recently the 6th Annual Orlando Live EUS 2019 that focuses on the latest EUS advances in the world.

RESPONSIVE PUNCTURE-ABILITY

Sharp cutting needle tip for precise targeting and sampling with minimal bleeding.

ECHOGENIC MARKER

Provides precise guidance for the target site with ultrasound visibility.

USER-FRIENDLY HANDLE

Enables a convenient one hand operating system and designed for efficient manipulation.

CE APPROVED

EUSTAR™

Endoscopic Ultrasound Fine Needle Aspiration Device

Specification

EUS Approach				
Code	**Needle Tip [End Hole]**	**Outer Tube**	**Usable Length**	**Tip Outer Diameter**
EUSTAR F 19 N	19G	Braided tube 7Fr [OD 2.3mm]	1380mm	1.06mm
EUSTAR F 21 N	21G			0.81mm
EUSTAR F 22 N	22G			0.71mm

HOT SPAXUS™

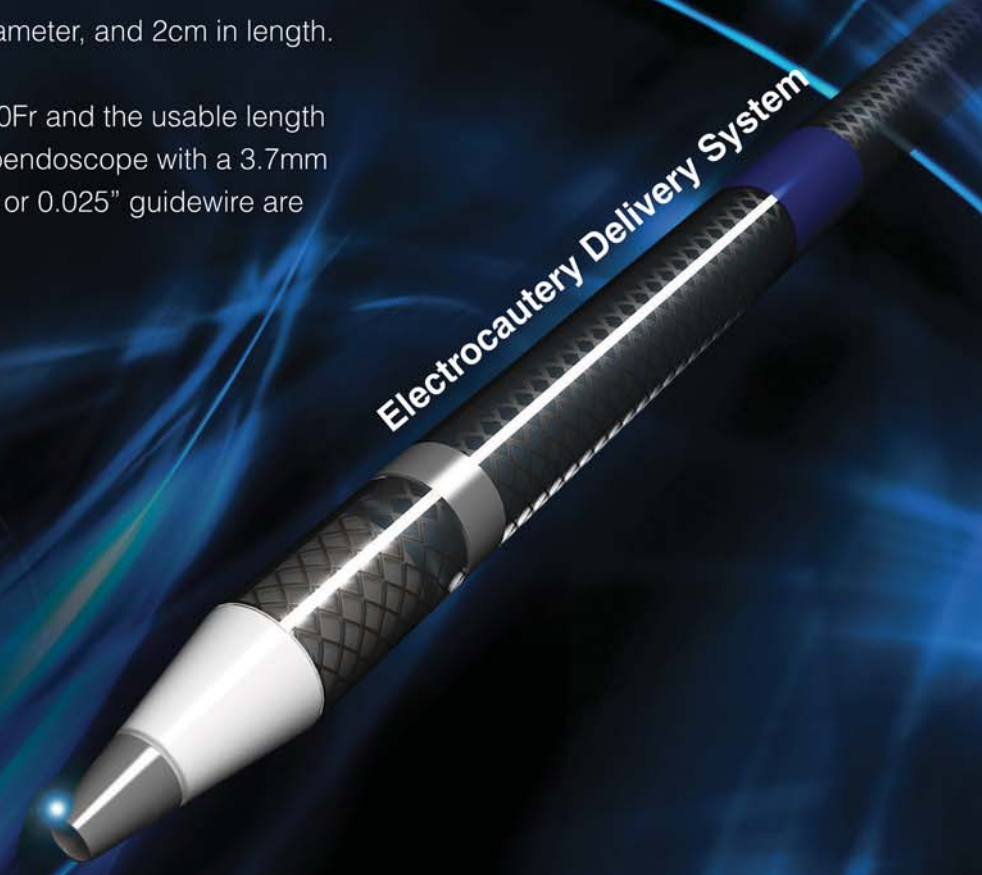
Electrocautery-Enabled Tip of Catheter

HOT SPAXUS™ is available in Europe and other CE based countries from this Autumn. **HOT SPAXUS™** is a lumen-apposing metal stent indicated for transgastric or transduodenal endoscopic drainage of pancreatic pseudocyst or gallbladder under EUS guidance.

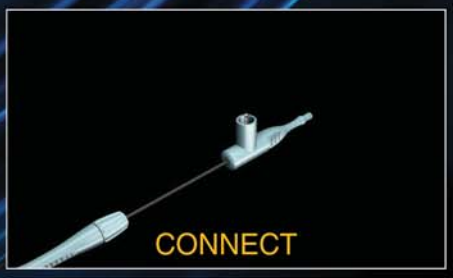
The **HOT SPAXUS™** delivery system is extremely intuitive. It is based on the SPAXUS™ delivery system, as we have applied an electrocautery tip and plug to make the **EUS-Guided Drainage procedure Simpler, Easier and Safer**.

Stent itself comes in 8,10,16mm in diameter, and 2cm in length.

The profile of the delivery system is 10Fr and the usable length is 180cm. For the procedure, an echoendoscope with a 3.7mm working channel or larger and 0.035" or 0.025" guidewire are needed.



HOT SPAXUS™ PROCEDURE

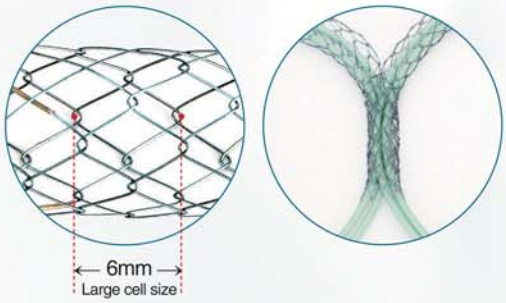

CONNECT


PUNCTURE


DEPLOY

Niti-S™ M Biliary Stent

is a hybrid of woven and braided wire construction. It shows reduced foreshortening while preserving optimal conformability. With the new 6Fr delivery system, 2 delivery systems can be introduced simultaneously into the working channel of the duodenoscope for **"the Side-by-Side procedure"** at the hilar biliary obstruction.



Niti-S™ LCD™ Biliary Stent

has a large cell (6mm) structure. While preserving the high conformability of the Niti-S™ D Biliary Stent, the large cell structure is designed for the smooth introduction of the delivery system of the 2nd stent through the cell of the 1st stent for the hilar biliary obstruction **"the Stent-in-Stent procedure"**. LCD™ can be used for "the Side-by-Side procedure" as well.

Single stent insertion | Two stent-in-stent technique | Three stent-in-stent technique

by Tae Jun Song, M.D. Ph.D.
Division of Gastroenterology, Department of Internal Medicine Asan Medical Center, Seoul, South Korea

6Fr

CE APPROVED

BILIARY STENTS WITH 6Fr DELIVERY SYSTEM

With the new slim 6Fr delivery system, the management of hilar biliary obstruction can be done much easier. Taewoong introduces two stent models which come with the 6Fr delivery system.

Prospective multicenter international study on the outcomes of a newly developed self-approximating lumen-apposing metallic stent for drainage of pancreatic fluid collections and endoscopic necrosectomy

Anthony Yuen Bun Teoh, Amol Bapaye, Sundeep Lakhtakia, Thawee Ratanachu, Rungsun Reknimitr, Shannon Melissa Chan, Hyung Jong Choi, Harshal P. Gadhikar, Pradermchai Kongkam, Sravan Kumar Korrapati, Yun Nah Lee, Jahangeer Medarapalem, Wiriyaporn Ridtitid and Jong Ho Moon

Hong Kong, India, Thailand, Korea

[Digestive Endoscopy, Published online version of Record before inclusion in an issue]

BACKGROUND

A novel self-approximating lumen-apposing metallic stent (LAMS; Niti-S SPAXUS) has recently become available. The aim of the present study was to evaluate the outcomes for drainage of pancreatic fluid collections (PFC).

METHODS

This was a prospective international multicentered study conducted in six high-volume institutions across Asia. Consecutive patients suffering from pancreatic pseudocyst or walled-off pancreatic necrosis (WOPN) requiring endoscopic ultrasonography-guided drainage were recruited. Outcomes included technical and clinical success, adverse events, procedural events, interventions through the stent and recurrence rates.

RESULTS

Between August 2016 and November 2017, 59 patients were recruited to this study. Thirty-nine patients (66.1%) had WOPN and mean (SD) size of PFC was 11.5(5.1)cm. Technical and clinical success rates were 100%. Mean (SD) procedural time was 35.0 (17.2) minutes. Sixteen-millimeter stents were used in 66.1% of the patients. Fifty-four sessions of necrosectomy were carried out with the stent in situ in 17 patients. Stent-related adverse event (AE) rate was 6.8%. Three patients (5.1%) suffered from bleeding after stenting and one required angiographic embolization. Two patients (3.4%) suffered from recurrence during a mean (SD) follow-up time of 325.6 (355.5) days. There were no differences in outcomes between those with pseudocysts or WOPN except for the duration of hospital sty (P=0.012).

CONCLUSION

Use of a self-approximating LAMS for drainage of PFC was safe and effective. Endoscopic necrosectomy could be carried out through the stent with ease. The device was associated with a low rate of stent-related AE.

Table 2. Details of procedures carried out on patients suffering from pancreatic pseudocyst or WOPN requiring endoscopic ultrasonography-guided drainage

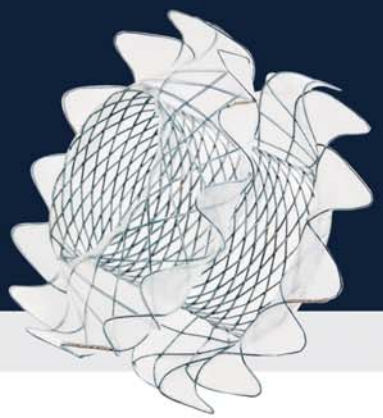
Parameter	No. of patients N = 59
Technical success (%)	100
Clinical success (%)	98.3
Total procedural time (min)†	35.0 (17.2)
Time for stent insertion (min)†	11.6 (8.8)
Drainage organ (%)	
Stomach	51 (86.4)
Duodenum	8 (13.6)
Sizes of stent (%)	
10 X 20 mm	20 (33.9)
16 X 20 mm	39 (66.1)
Methods of tract dilation (%)	
Cautery	47 (79.7)
Non-cautery	12 (20.3)
Additional plastic stent insertion (%)	20 (33.9)
Additional nasocystic drain inserted (%)	4 (6.8)
Necrosectomy	
Total no. of sessions (range)	54 (1-9)
Adverse events (%)‡	5 (8.5)
Bleeding	3 (5.1)
Migration	0 (0)
Pneumoperitoneum	1 (1.7)
Multi-organ failure	2 (3.4)
Stent in-dwell time (days)†	39.4 (21.3)
Mortality (%)	2 (3.4)
Hospital stay (days)†	11.4 (13.0)

†Data are shown as mean (SD).
‡Patients may have more than 1 AE.

Efficacy of a novel lumen-apposing metal stent for the treatment of symptomatic pancreatic pseudocyst

Tae Jun Song, Sang Soo Lee, Jong Ho Moon, Hyun Jong Choi, Chang Min Cho, Kwang Hyuck Lee, Se Woo Park, Seong-Hun Kim, Seung Ok Lee, Yun Nah Lee, Jong Kyun Lee

Seoul, Bucheon, Daegu, Dongtan, Jeonju, Republic of Korea



[GIE, Article in Press, Published online May 29, 2019]

AIM

The purpose of this study was to evaluate the effectiveness and safety of a newly designed LAMS for EUS-guided drainage to treat symptomatic pancreatic pseudocysts.

METHODS

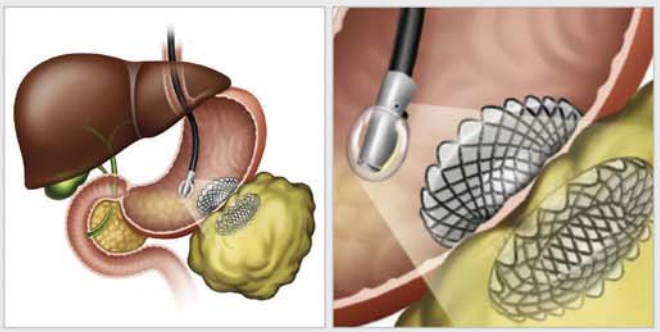
This prospective multicenter cohort study included 34 patients with symptomatic pancreatic pseudocysts from 2016 to 2017. The patients underwent EUS-guided drainage with the newly designed LAMS (Niti-S™ SPAXUS™, Taewoong Medical). Effectiveness outcome measurements included technical success rate, clinical success rate, successful stent removal rate, and procedural time. Safety outcome measurements included procedure and/or stent-related adverse events (AEs) and over AEs. Patients were prospectively followed, and consecutive data were collected at discharge, at stent removal, and 20 days after stent removal.

RESULTS

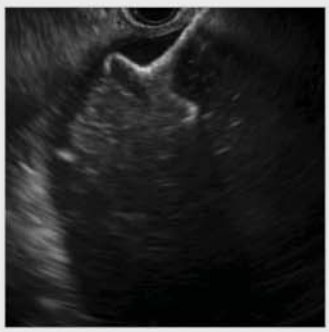
Thirty-four patients (mean age 51.7±13.3 years, 26 men) were enrolled. The mean pseudocyst size was 9.23±3.54cm. The technical success rate was 97.1% (33/34). The clinical success rate was 94.1% (32/34). All stents were successfully removed. The mean procedural time from needle puncture to stent deployment was 10.3±5.7 minutes. Four patients (11.8%) experienced procedure and/or stent-related AEs, including stent maldeployment (n=1) and pseudocyst infection (n=3). All patients completely recovered from the AEs. Bleeding caused by the stent or buried LAMS syndrome was not observed. No unplanned endoscopic procedures were required.

CONCLUSION

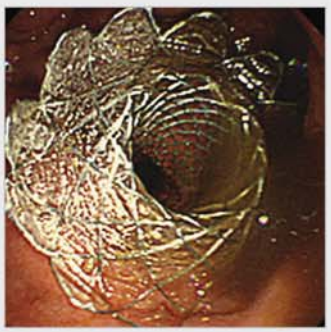
This study showed that EUS-guided drainage using the newly designed LAMS is technically feasible and effective for the treatment of symptomatic pancreatic pseudocysts.



A. EUS-guided drainage using Niti-S™ SPAXUS™ for the treatment of symptomatic pancreatic pseudocysts.



B. EUS-guided placement of a SPAXUS™ stent.



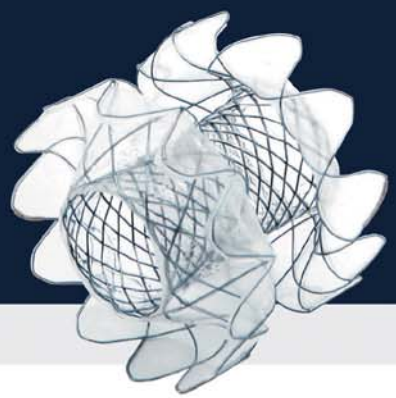
C. Endoscopic image of an inserted stent.

INDICATION FOR USE: The Niti-S™ SPAXUS™ Stent is indicated for drainage of pancreatic pseudocyst or gallbladder through transgastric or transduodenal approach.

Feasibility and safety of endoscopic ultrasound-guided gallbladder drainage using a newly designed lumen-apposing metal stent

Dong Hui Cho, Seok Jug Jo, Jae Hoon Lee, Tae Jun Song, Do Hyung Park, Sung Koo Lee, Myung-Hwa Kim, Sang Soo Lee

University of Ulsan College of Medicine, Asan Medical Center, Seoul, South Korea



[Surgical Endoscopy (2019) 33:2135-2141]

AIMS

Endoscopic ultrasound-guided gallbladder drainage (EUS-GBD) is increasingly accepted as an effective treatment option in patients who require drainage for acute cholecystitis. A newly designed lumen-apposing metal stent (LAMS) has been introduced recently in this procedure. In this study, we evaluated the feasibility and safety of the newly designed LAMS in patients with acute cholecystitis who were unsuitable for cholecystectomy.

METHODS

Between Mar 2017 and Oct 2017, 22 patients with acute cholecystitis who were unsuitable for cholecystectomy underwent EUS-GBD with the newly designed LAMS. We evaluated the technical and clinical success and the adverse event profiles.

RESULTS

EUS-GBD with newly designed LAMS was technically and clinically successful in 21 of the 22 patients. EUS-GB stenting was performed at urgent setting in 17 patients, while 5 patients, who had undergone initial PTGBD, underwent EUS-GB stenting to remove PTGBD tube. The median procedure time was 11.5 (range 8.8-17.0) min. A late adverse event of stent occlusion developed in one patient. Stent migration was not observed during follow-up (median 318.0 days, range 39.0-398.0 days) and cumulative stent patency rate at 1 year was 95%.

CONCLUSION

EUS-GBD with newly designed LAMS is feasible and shows acceptable safety profiles for both the urgent drainage of acute cholecystitis and elective internalization following PTGBD in patients with high surgical risk.

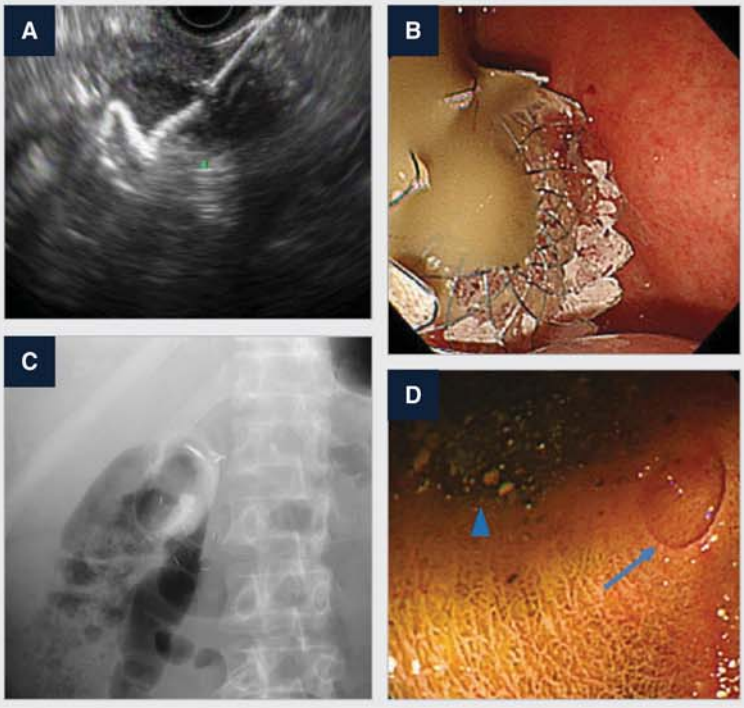
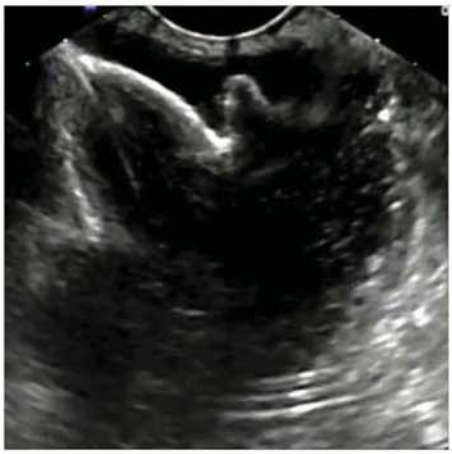


Fig 2.
EUS-guided gallbladder drainage with the newly designed LAMS (SPAXUS™ stent) and cholecystoscopy. **A.** Deployment of the proximal flange is well visualized on EUS. **B.** Endoscopic view reveals the intragastric flange in the antrum with drainage of pus. **C.** The LAMS (Spaxus stent) is identified on the fluoroscopic view. **D.** Direct cholecystoscopy through the stent shows small gallbladder stones (arrow head) and the opening of the cystic duct (arrow)

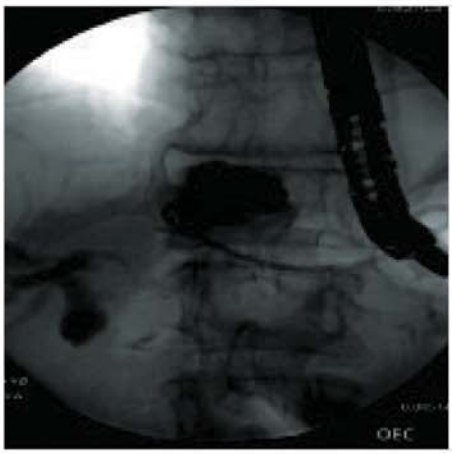
SPAXUS™
CASE REPORT



CASE REPORT 01.

A 71-year-old woman with jaundice due to a pancreatic adenocarcinoma was treated with ERCP and placement of a fully covered Self-expandable metal stent (FCSEMS). The patient developed severe acute pancreatitis, complicated by a 12cm necrotic infected fluid collection in the pancreatic body. EUS-guided drainage was performed using Niti-S™ SPAXUS™ stent and the symptom resolved within 24 hours. After 2 weeks, the patient was readmitted due to a fever. The CT scan and gastroscopy found out that the stent is occluded with a necrotic tissue. Fortunately, the large stent diameter allowed necrosectomy to be performed and the anchoring flanges prevented stent dislodgement during the procedure.

Endoscopic ultrasound-guided drainage of a pancreatic fluid collection using a novel lumen-apposing metal stent complicated by stent occlusion [Pietro Capone et al. Italy, Endoscopy 2016; 48: E203]



CASE REPORT 02.

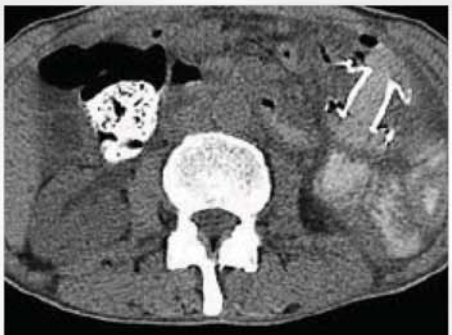
An 80-year-old man, who had undergone Whipple surgery in 2012 for pancreatic adenocarcinoma, was referred for bile duct and afferent loop dilation. A nodule of carcinomatosis in the gastrojejunal anastomosis was histologically confirmed for carcinoma relapse. A 2cm-16mm Niti-S™ SPAXUS™ stent was deployed under fluoroscopic view. The stent lumen was dilated with an 8mm dilation balloon and a 7cm - 7Fr pigtail stent was inserted within the stent to prevent migration. No serious complication was reported after the procedure, except for abdominal pain, which was managed with analgesic. The patient was discharged 4 days after the procedure. The patient died 3 months after the procedure because of disease progression.

EUS-guided gastroenterostomy for afferent loop syndrome treatment stent [Dina Chaaro Benallal et al. France, Endosc Ultrasound. 2018 Nov-Dec; 7(6): 418–419.]

CASE REPORT 03.

A 58-year-old patient who underwent an esophageal epiphrenic diverticulum resection met a complication of esophageal pleura fistula and it was successfully treated with a fully covered metal stent. One week after stent removal, the patient experienced dysphagia and vomiting and the endoscopy confirmed a short esophageal stenosis. After two unsuccessful balloon dilations, a 2cm-16mm Niti-S™ SPAXUS™ stent was placed to maintain the patency of the esophageal lumen. At 2 months after stent was removed. There were no adverse events and no recurrence at the 6-month follow-up.

Novel lumen-apposing stent to treat benign esophageal stricture [Antonino Granata et al. Italy, Endoscopy 2017; 49: E273–E274]



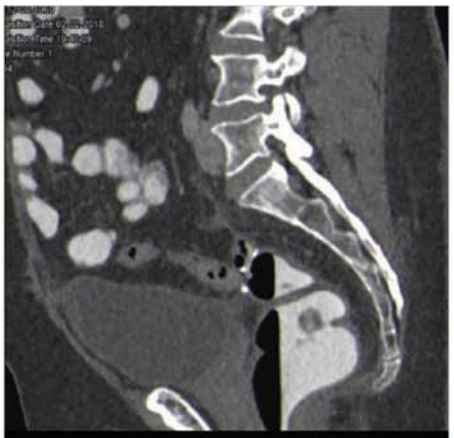
Computed tomography image showing the lumen-apposing metal stent in position.

Follow-up endoscopy at 3 months showing the metal stent in position, with complete drainage of the afferent loop.

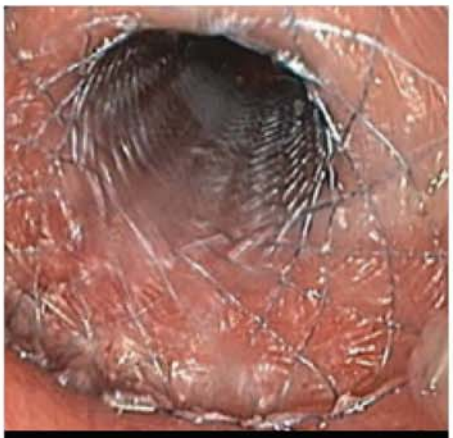
CASE REPORT 04.

A 65-year-old man who had undergone distal gastrectomy with gastrojejunostomy 40 years ago presented with jaundice, fever, and abdominal pain. An abdominal CT scan showed a grossly dilated afferent limb with dilated common bile duct and pancreatic duct along with peripancreatic fat stranding. ERCP was not technically feasible because of the surgically altered anatomy. Therefore, he underwent EUS-guided drainage of the afferent limb using a 2cm-16mm Niti-S™ SPAXUS™ stent across the newly created fistulous tract between the afferent and efferent jejunal loops. There were no periprocedural complications. The patient's symptoms gradually resolved with improvement in his liver function. A correct position of the stent was confirmed until 5-months follow-up and the intention was to remove the stent at 6-months follow-up after the index placement procedure to allow a stable and permanent anastomosis to form between the afferent and efferent jejunal loops.

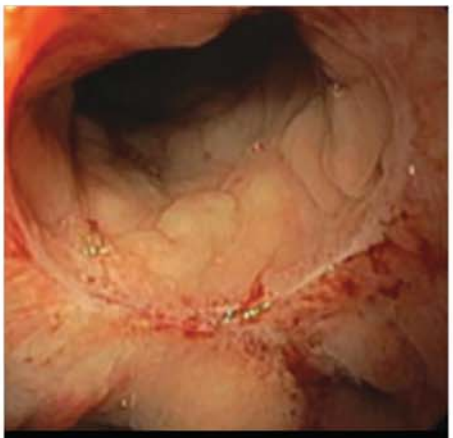
Endoscopic ultrasound-guided transjejunal drainage of an obstructed afferent loop using a novel lumen-apposing metal stent [Sundeep Lakhtakia et al. India. Endoscopy https://doi.org/10.1055/a-0890-3182]



Computed tomography scan showing complete stenosis of colorectal anastomosis.



Lumen-apposing metal stent at the end of the procedure.



Complete lumen recanalization 2 weeks after the stent removal.

CASE REPORT 05.

A 57-year-old male was diagnosed with a sigmoid colon perforation by an adenocarcinoma underwent intestinal transit reconstruction, and a colorectal anastomosis with protective ileostomy was performed. In the postoperative period, complete anastomotic stenosis developed. Using a forward-viewing linear echoendoscope introduced through the anus, EUS guided puncture of the upstream colon loop was accomplished with a 19G needle. After dilating the conduit with a 6Fr cystotome and 8,10mm balloons, a 2cm-16mm Niti-S™ SPAXUS™ stet was deployed. The stent was removed after 1 week. Complete recanalization of the anastomosis was achieved without extraluminal leakage.

EUS-guided recanalization of complete colorectal anastomotic stenosis using a lumen-apposing metal stent [Goncalo Nunes et al. Portugal, DOI: 10.4103/eus.eus_62_18]

INDICATION FOR USE: The Niti-S™ SPAXUS™ Stent is indicated for drainage of pancreatic pseudocyst or gallbladder through transgastric or transduodenal approach.

Endoscopic ultrasound-guided radiofrequency ablation for pancreatic neuroendocrine tumors and pancreatic cystic neoplasms: a prospective multicenter study

Authors Marc Barthet, Marc Giovannini, Nathalie Lesavre, Christian Boustiere, Bertrand Napoleon, Stéphane Koch , Mohamed Gasmi, Geoffroy Vanbiervliet, Jean-Michel Gonzalez

Marseille, Lyon, Besançon, Nice, France

INTRODUCTION

This prospective, multicenter, open-label, nonrandomized, phase I study planned to include pancreatic NETs or PCNs (IPMN and MCA) in inoperable patients treated with a dedicated cooling RFA needle. The primary objective of this study was to investigate the safety of EUS-guided pancreatic RFA (severe complications or minor complications). The secondary objective was to assess its efficacy based on 1-year follow-up imaging.

METHODS

Patients and criteria for inclusion

This study was conducted as a prospective, multicenter, open label, nonrandomized, phase I study, which planned to include 30 patients presenting with either NETs or PCNs over a 2-year period with a 1-year follow-up. The expected rate of complications according to a previous series reporting EUS-guided tumor treatment was 10% . The study received the approval of an independent ethics committee (Comité de protection des personnes Sud Méditerranée I; 17 November 2014; reference number 2014-AO147443). The inclusion criteria were: the presence of a pancreatic NET <2cm with histological proof and inoperability or refusal of surgery, or a branch duct IPMN with worrisome features, including mural nodes >5mm or MCA. All indications for medical or surgical management were discussed in a multidisciplinary meeting. The patients were 16 men and 14 women (mean age 54.4 years, range 49–84 years), 12 of whom had NETs and 17 with PCNs. One patient who received a final diagnosis of late pancreatic metastasis of renal carcinoma was excluded.

Objectives and end points

The primary objective of this study was to check the safety of the treatment. The safety end points used were: major complications including acute pancreatitis, perforation, bleeding, and injury to adjacent structures; minor complications including pain and fever. The secondary objective was to assess the anti tumor efficacy at 1-year follow-up. The efficacy end points at 6 months and 1 year were: complete necrosis, diameter decrease >50% and diameter decrease <50% assessed by CT scan or MRI. The diagnosis of necrosis in NETs was based on the absence of contrast enhancement in the arterial phase in a low-density lesion. The diagnosis of disappearance was based on the lesion being nonvisible in a comparable cross-section on CT scan or MRI. Results were classified as complete resolution (disappearance or necrosis), significant response (decrease >50% or complete resolution), or failure (decrease <50% or no effect).

RESULTS

Patients

The study group included 12 patients with 14 NETs (7 men [58%]; mean age 59.9, range 45-77). All of the tumors were well-differentiated nonfunctional NETs belonging to WHO grade 1 classification, one of which was associated with multiple endocrine neoplasia (MEN) type 1.The mean size of the NETs was 13.1mm (range 10-20mm). Their locations were three in the head, six in the body, and five in the tail. The mean serum level of CgA was 344mg/L (range 84-1230mg/L) (▶ **Table 1**)

Table 1. Description of the 31 pancreatic lesions in 29 patients that were included in the study.

	Neuroendocrine tumor	Pancreatic cystic neoplasm
Number of lesions	14	16 IPMN / 1 MCA
Location		
Head	3	10
Body	6	4
Tail	5	3
Mean size (range), mm	13.1 (10-20)	28 (9-60)
CgA level (range), U/mL	344 (84-1230)	NA
Mural nodes, n (%)	NA	12 (70.6%)
Thick cystic wall, n (%)	NA	4 (23.5%)

IPMN, intraductal pancreatic mucinous neoplasm; MCA, mucinous cystic neoplasm; CgA, chromogranin A; NA, not applicable.

Safety

Overall three adverse events occurred (10%) in three different centers, of which two occurred in the two initial patients, these being the first patient in each center's experience. These complications were considered as major

complications. The first adverse event, which occurred in the first patient to be included, was acute pancreatitis with an area of early infected necrosis located close to the tail of the pancreas. This patient with MEN 1 underwent treatment for two NETs located in the tail: one a 15-mm cystic NET, the other an 8-mm solid NET. The Second adverse event occurred in the second patient to be included who had an IPMN cyst located in the uncinated process of 18mm in diameter with high grade dysplasia shown on EUS-FNA. One RFA shot was applied without suction. The patient experienced pain and fever 12hours later and a CT scan showed pneumoperitoneum with a fluid collection. The patient underwent surgical exploration and a perforation of an adjacent jejunal loop was found and surgically treated. (▶ **Fig 2**)

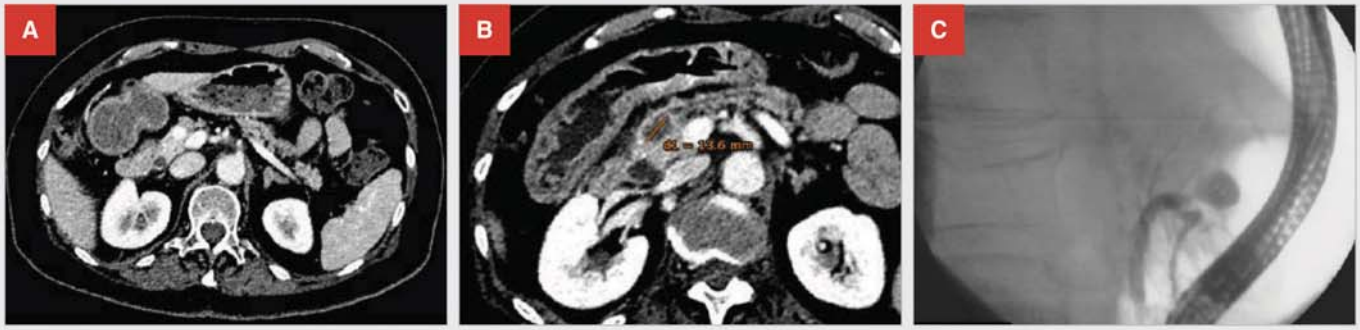


Fig 2. Endoscopic ultrasound (EUS)-guided radiofrequency ablation (RFA) for a neuroendocrine tumor (NET). **A, B** Computed tomography scan images showing: **A** a NET (12mm in size, hyperenhancing in the arterial phase) located at the neck of the pancreas; **B** the appearance 1 week after RFA with complete necrosis of the tumor and a dilatation of the upstream duct of Wirsung. **C** Endoscopic retrograde cholangiopancreatography image showing the necrotic NET filled with contrast and fistulized with the duct of Wirsung.

Efficacy in neuroendocrine tumors

Technical success (ability to target the RFA needle) was achieve in all tumors. At 6-month follow-up, nine of the NETs had disappeared or showed complete necrosis, and one had decreased in diameter by >50%. Therefore, responses were considered to have been significant in 71% of the tumors. Four patients were considered to have failed treatments (decrease in diameter <50% in three patients, no change in one). The mean serum level of CgA decreased from 344 U/mL (range 84-1230 U/mL) to 253.3 U/mL (range 72-616 U/mL). At 1-year follow-up, 12 of the NETs had completely disappeared or undergone necrosis (86%). Two treatments were considered to have been failures: a 20-mm tumor in the tail of the pancreas, which showed an increase in size by 3mm, and a 16-mm lesion located in the body of the pancreas, which remained unchanged in size but no longer displayed a Doppler signal on EUS examination. The mean serum level of CgA was 257.5 U/ml (range 64-648 U/mL) (▶ **Table 2**).

Table 2. Results of endoscopic ultrasound-guided radiofrequency ablation in the 31 pancreatic lesions

	6 months follow-up	12 months follow-up
Neuroendocrine tumors (n=14), n (%)		
Significant response	10 (71.4)	12 (85.7)
Disappearance or necrosis	9 (64.3)	12 (85.7)
Decrease in diameter > 50%	1 (7.1)	0 (0)
Failure*	4 (28.6)	2 (14.3)
Pancreatic cystic neoplasms (n=17), n (%)		
Significant response	11 (64.7)	12 (70.6)
Disappearance or necrosis	8 (47.1)	11 (64.7)
Decrease in diameter > 50%	3 (17.6)	1 (5.9)
Failure*	6 (35.3)	5 (29.4)

*No change in size or decrease in diameter<50%.

DISCUSSION

This prospective, multicenter, open-label, phase I study was planned as its first objective to assess the safety of EUS-guided RFA for pancreatic premalignant tumors because no data were available in prospective series. EUS-guided treatments for pancreatic tumors have been developed for many years for adenocarcinoma, NETs, or PCNs, the most popular being ethanol ablation, which carries the risk of uncontrolled diffusion of ethanol. The primary objective of our study was to assess the safety of the treatment including 30 patients with a follow-up duration at least 1 year. We focused on premalignant pancreatic tumors such as NETs or PCNs to assess the safety of this procedure as no procedure should be further developed if it is not safe for the patient.

In conclusions, EUS-RFA management of pancreatic NETs or PCNs using a dedicated operative cooling needle is associated with a 10% morbidity rate. This complication rate should be decreased by an improved prophylactic protocol. The efficacy for the management of NETs reached 86% (all complete disappearances) although this sometimes did not occur until the 1 year follow Up, while the efficacy for PCNs appears to be lower with a 71% significant response rate. Further studies with more patients and a longer follow-up are required.

The safety of newly developed automatic temperature-controlled endobiliary radiofrequncy ablation system for malignant biliary strictures: a prospective multicenter study

Yun Nah Lee, Seok Jeong, Hyun Jong Choi, Jae Hee Cho, Young Koog Cheon, Se Woo Park, Yeon Suk Kim, Don Haeng Lee, Jong Ho Moon

Korea

INTRODUCTION

Endoscopic radiofrequency ablation (RFA) of the bile duct is an emerging modality for the local treatment of MBS. Its advantage is that it can be performed during conventional endoscopic retrograde cholangiopancreatography (ERCP) as a catheter-based procedure. Intraductal RFA delivers thermal energy to the biliary stricture through a dedicated catheter fitted with bipolar electrodes and results in coagulation necrosis of the adjacent tissue. Intraductal RFA is safe, with a low incidence of significant adverse events. Our aim was to confirm the clinical safety of termperature-controlled endobiliary RFA using the newly developed catheter for the treatment of extrahepatic MBS.

METHODS

Patients

This prospective, single-arm, pilot study was performed at five tertiary academic medical centers between September 2015 and September 2016. Consecutive patients with unresectable MBS, including common bile duct cancer, pancreatic cancer, and gallbladder cancer, were prospectively enrolled. This study has been registered in the UMIN Clinical Trial Registry (UMIN000025847).

A new RF catheter and power setting

The new RF catheter (ELRA™) tested in this study is a 7 Fr catheter with a 175cm working length. The bipolar electrodes at the terminal portion of the catheter are stainless steel rings connected to an RF energy generator (VIVA Combo™). (**Fig 1**)

The recommended pre-set values were a target temperature of 80°C, an RF power of 7 W with the 18 mm catheter or 10 W with the 33 mm catheter, and a duration of 120s. The length of the RFA catheter was determined according to the length of the bile duct stricture.

Temperature-controlled endobiliary radiofrequency ablation and metallic stenting

Endoscopic intraductal RFA of the bile duct was performed using a duodenoscope under conventional ERCP conditions. Stricture features, including location and length, were evaluated via cholangiograms taken before the endobiliary RFA.

The radio-opaque electrode of the RF catheter, selected according to the length of the strictures, was positioned at the stricture along with a guidewire inserted under fluoroscopy guidance. Then, endobiliary RFA was performed. After withdrawal of the RF catheter from the bile duct, immediate adverse events, such as perforation of the bile duct, were assessed using cholangiograms. A self-expandable metallic stent (SEMS) was places at the stricture during the same endoscopic session for palliative biliary drainage.

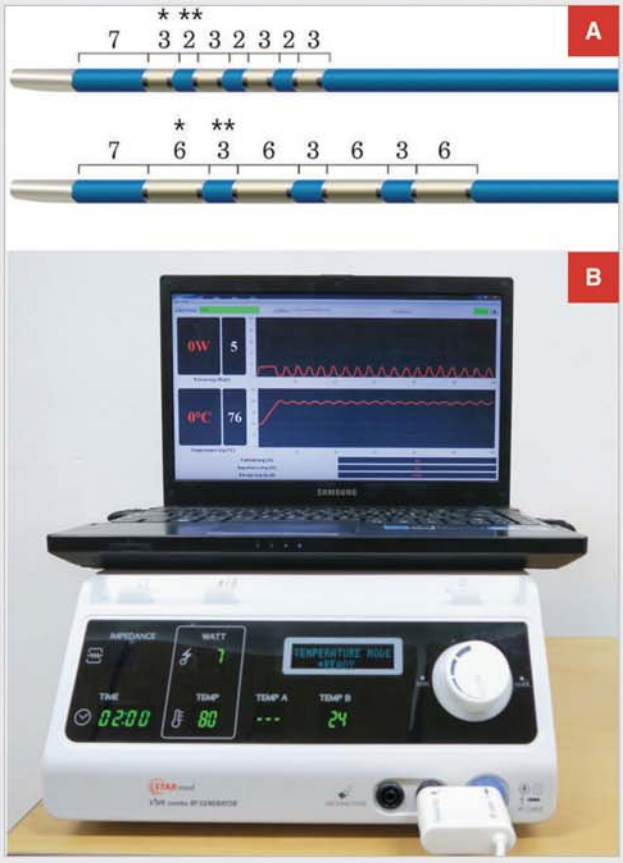


Fig 1. (**A**) The new radiofrequency (RF) catheter for endobiliary radiofrequency ablation (RFA). Two types of ELRA RF catheters (18 and 33 mm according to the electric coagulation length) were used. After a 9-mm leading tip and 7-mm insulated portion, each electrode (*) are separated by insulated segments (**). (**B**) The RF generator. Temperature and power status were monitored during the procedure. [Color figure can be viewed at wileyonlinelibrary.com]

RESULTS

Of the 52 patients with distal MBS who werescreened, 22 were excluded due to surgical treatment (n = 6), a proximal margin of the stricture that was close to the hilum (n = 5), ampulla of Vater not endoscopically accessible (n = 2), and/or refusal to participate in the study (n = 9). The basic characteristics of the 30 patients enrolled in the study are shown in **Table 1**.

Table 1. Baseline characteristics of patients

Characteristics	n = 30
Male: female	11: 19
Age, mean ± SD, years	76.7 ± 8.9
Diagnosis, n (%)	
Cholangiocarcinoma	19 (63.3)
Pancreatic cancer	9 (30.0)
Gallbladder cancer	2 (6.7)
Length of stricture, mean ± SD, mm	22.1 ± 6.6
Length of RF probe, n (%)	
18 mm	18 (60.0)
33 mm	12 (40.0)
Metallic stenting, n (%)	
Uncovered	10 (33.3)
Covered	20 (66.7)
Location of stenting, n (%)	
Crossing the ampulla of Vater	23 (76.7)
Above the ampulla of Vater	7 (23.3)

CBD, common bile duct; RFA, radiofrequency ablation; SD, standard deviation.

The adverse events was observed in a total of three patients (10.0%). Mild pancreatitis occurred in two patients (6.7%) and was resolved with conservative treatment. Acute cholangitis developed in one patient (3.3%) and was managed with medical treatment. Hemobilia or bile duct perforation did not occur in any of the patients (**Table 2**).

Table 2. Adverse events of temperature-controlled endobiliary RFA

Characteristics, n (%)	n = 30
Pancreatitis	2 (6.7)
Cholangitis	1 (3.3)
Hemobilia	0 (0.0)
Bile duct perforation	0 (0.0)
Acute cholecystitis	0 (0.0)
Total	3 (10.0)

RFA, radiofrequency ablation.

The mean follow-up duration of patients was 208 days (range, 24-688). The cumulative duration of stent patency was 236 days (95% CI, 171-301). During the follow-up period, death was observed in 13 patients (43.3%) and the cumulative duration of patient survival was 383 days (95% CI, 264-502).

DISCUSSION

Endoscopic bile duct RFA therapy with a dedicated catheter has emerged as an adjunctive treatment of MBS arising from biliopancreatic malignancies. RFA therapy has already been used to treat patients with hepatocellular carcinoma or Barrett's esophagus with dysplasia.

The new RF catheter, with a temperature control mode, improves the safety of RFA by avoiding unexpected excessive heating. The temperature at the electrodes located at the catheter tip is automatically monitored and an automatic on and off function maintains the preset temperature. The median depth of maximal ablation was 2.7 mm (range, 2.5-4.3) at a setting of 10 W with the 33-mm catheter for 120 s and 2.1 mm (range, 1.7-2.4) at a setting of 7 W with the 18-mm catheter. There were no adverse events, such as bile duct perforation or bleeding, in the 12 mini pigs used in that study. In another animal study, the long-term effects of endobiliary RFA included the development of segmental stricture with cholangitis, but neither bleeding nor perforation was observed during the 28 days after endobiliary RFA. The adverse events consisted of pancreatitis and cholangitis and were managed with conservative treatment.

Whether the new temperature-controlled endobiliary RFA is safe in this setting requires preclinical animal studies using an energy setting adapted for the perihilar MBS. We are also planning a clinical study using the temperature-controlled endobiliary RFA with an adapted energy setting for patients with perihilar MBS. In conclusion, in this prospective, multicenter clinical trial, temperature-controlled endoscopic RFA of the bile duct using a new RF catheter was safely performed in 30 patients. Temperature-controlled RFA avoids excessive heating and thus significant vessel or bile duct injury. However, its efficacy remains to be confirmed in future prospective, controlled, clinical trials.

EUSRA™ ABSTRACT

Endoscopic ultrasound-guided radiofrequency ablation for management of gastric gastrointestinal stromal tumor

Sergio Bazaga Pérez de Rozas, Mario Alberto Gallardo Ramírez, Francisco Javier GarcíaAlonso, Ana Yaiza Carbajo, Manuel PérezMiranda Castillo, Carlos de la Serna Higuera Gastroenterology and Hepatology Department, Hospital Universitario Rio Hortega, Valladolid, Spain

A 56-year-old man presented with abdominal pain and dyspepsia. On upper digestive endoscopy, a submucosal lesion was found in the distal gastric lesser curvature, but no conclusive diagnosis could be achieved with conventional biopsies. Endoscopic ultrasound (EUS) showed a 12 x 7 mm well-defined, homogeneous, hypoechoic nodule without signs of infiltration into the muscularis propria, suggestive of benign gastrointestinal stromal tumor (GIST). (**Fig 1**)

Fine-needle aspiration with a 22-gauge needle was performed, confirming a low risk GIST. Histopathological examination revealed a GIST presenting less than 5 mitoses per high-power field. The patient rejected surgical treatment, so we proposed EUS-guided radiofrequency ablation (RFA). (**Video 1**)

We punctured the lesion with an 18-gauge EUS-RFA electrode needle connected to a radiofrequency generator (VIVA Combo™), and applied ablative radiofrequency four times (50W for 10 seconds). EUS follow-up was performed after 4weeks, and showed a slight mural thickening of the muscularis propria and submucosal layers; the lesion itself could not be identified. (**Fig 2**)

A fine-needle biopsy with 22-gauge histological needle was performed and confirmed the absence of GIST-type mesenchymal structures. A second EUS 6-months later confirmed eradication of the lesion, and showed a well-preserved layer pattern. (**Fig 3**)

Guidelines recommend radical surgical resection with a clear margin (R0) as the gold standard for localized primary GIST. Although endoscopic resection of GISTs has been reported, it is not supported by current guidelines because of the low rate of successful R0 resections achieved. RFA uses high frequency alternating current applied via an electrode to generate localized areas of coagulative necrosis and tissue desiccation. Although it is usually applied percutaneously or laparoscopically, successful outcomes of EUS-guided RFA using an 18 gauge needle for benign and malignant pancreatic lesions have been reported recently. To our knowledge, this is the first report of a successful ablative radiofrequency therapy of a gastric GIST.

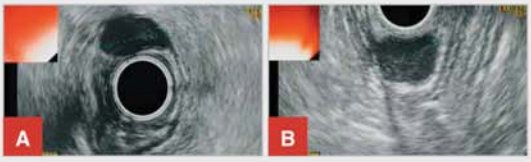
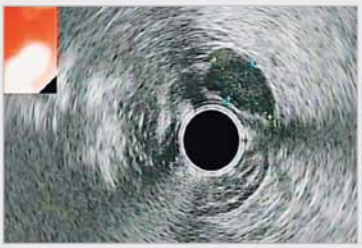


Fig 1. Endoscopic ultrasound image of gastrointestinal stromal tumor. **A** Radial view. **B** Linear view.



Video 1. Diagnosis of benign gastrointestinal stromal tumor (GIST) and treatment with endoscopic ultrasound (EUS)-guided radiofrequency ablation (RFA). EUS follow-up was performed after 4 weeks, and showed a slight mural thickening of the muscularis propria and submucosal layers, while the lesion itself could not be identified. A second EUS 6 months later confirmed eradication of the lesion, and showed a well-preserved layer pattern.

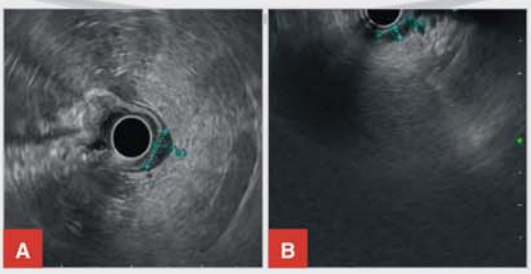


Fig 2. Endoscopic ultrasound image of gastrointestinal stromal tumor after treatment with ablative radiofrequency. **A** Radial view. **B** Linear view.

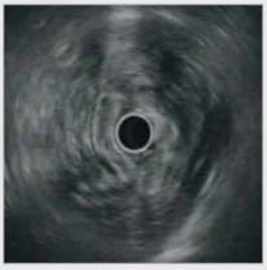


Fig 3. Endoscopic ultrasound 6 months later confirmed eradication of the lesion, and showed a preserved layer pattern.

EUS-guided Radiofrequency ablation plus chemotherapy versus chemotherapy Alone for unresectable pancreatic cancer (ERAP): Preliminary results of a prospective comparative study

Tiankanon, K; Kongkam, P; Orprayoon, T; Luangsukrerk, T; Seo, DW; Sriuranpong, V; Nantavithya, C; Jantarattana, T; Cañones, A; Angsuwatcharakon, P; Ridtitid, W; Kullavanijaya, P; Rerknimitr, R

AIMS

To compare EUS-RFA plus chemotherapy versus chemotherapy (CMT) alone as a primary treatment of unresectable pancreatic Cancer (UPC) in a prospective comparative cohort study.

METHODS

Since July 2017 until August 2018, 20 patients (mean age 65.2 ± 11.5 years; M: F = 1: 3) at King Chulalongkorn Memorial hospital with UPC were recruited. Patients treated with EUS-RFA plus concurrent CMT (n = 10) versus CMT alone (n = 10) were classified as group A and B, respectively.

RESULTS

29 EUS-RFA procedures were performed with median number of procedure at 3 times (1-4 times), median total ablation time at 400 seconds (37-518 seconds), and complication rate at 10.3% (3/29). Three complications were post-procedure infection treated with intravenous antibiotic (length of stay (LOS) 7 days), bleeding from gastric wall at puncture site requiring a hemo-clip (LOS 7 days), and mild pancreatitis managed with conservative treatment (LOS 2 days). No delay of scheduled chemotherapy. Dosage reduction of morphine equivalent analgesia was significantly better in group A, 15 mg/day (0-60) versus 0 mg/day (-20 to 30) (p = 0.005), respectively, as well as median percentage of dosage reduction (50% (37.5 to 100) versus 0% (-100 to -42.9), p = 0.007), respectively. No enlargement of tumor measured by maximal target lesion after intervention in group A whereas in group B, both mean maximal target lesion diameter (mm) and tumor volume (ml) were statically increased after treatment (before vs. after; 53.0 ± 20.7 mm vs. 59.2 ± 16.6 mm (P = 0.039), respectively, and 76.3 ± 77.0 ml vs. 91.1 ± 83.6 ml (P = 0.014), respectively). No significant difference of 6month survival rate between both groups.

CONCLUSIONS

In UPC patients, EUS-RFA plus concurrent CMT could significantly reduce morphine dosage requirement for pain controlled than Just given CMT. RFA additionally stabilized the tumor measured by maximal target lesion diameter and tumor volume whereas Only CMT failed to halt tumor progression.

Endoscopic Ultrasound guided radiofrequency ablation of insulinomas is safe and effective

Dancour, A; Benson, AA; Epshtein, J; Jacob, H; Wengrower, D; Grozinsky-Glasberg, S; Goldin, E; Livovsky, DM

AIMS

Insulinomas can produce symptomatic hypoglycemia and life threatening events. Complex surgical procedures with morbidity and occasional mortality are the treatment of choice. We aim to present our experience using a minimally invasive approach with a new, through-the-echoendoscope radiofreqency ablation (RFA) device.

METHODS

We used a Pentax EG-3870UTK linear echoendoscope with a Hitachi Preirus or Noblus Ultrasound console and a 150 cm, 19 gauge needle-electrode (EUSRA™- Taewoong medical) with RF delivery in the distal 10 mm, connected to a RF generator (VIVA Combo™) settled to deliver 50w.

RESULTS

Since March 2017, 8 patients (4 females) were treated; all presented with recurrent hypoglycemic events. Median age was 58 (IQR 42.2-65). Seven patients refused surgery and one was referred after a failed surgical attempt. Lesions were located in the uncinate process, head, body and tail in 3, 2, 2, and 1 patient respectively. The median lesion size was 16 mm (IQR 13.37-17.25). The tumor was completely ablated in 7 of the 8 patients during a single session with a median of 6 (IQR 2.75-7.25) RF applications (impedance 100-130 Ohms) during 5-12 seconds. No severe adverse events occurred. After a median follow up of 9.25 (range 1.5-21) months, all patients had excellent clinical response, judged by normalization of glycaemia, by their ability to return to a normal diet and by the absence of symptoms during overnight fast. None of the patients required additional treatment.

CONCLUSIONS

EUS-guided RFA is feasible, safe and effective for the treatment of insulinomas. It represents a promising, less invasive and more cost-effective alternative to surgery.

HEAD OFFICE
14, Gojeong-ro, Wolgot-myeon, Gimpo-si, Gyeonggi-do, Korea 10022

SALES OFFICE
Bldg.C 4F, 158 Haneulmaeul-ro, ilsandong-gu, Goyang-si, Gyeonggi-do, Korea 10355
E: contact@stent.net **T:** +82 31 904 6153 **F:** +82 31 904 6157

taewoong medical taewoong medical **www.taewoongmedical.com**

TaeWoong MEDICAL