INTRODUCTION

The Digestive Disease Week (DDW) meeting was held in May 18-21, 2013 in Orlando, USA. As in previous meetings, endoscopic ultrasound (EUS) was an important topic in this meeting because it has been widely used in diagnosis and treatment of gastrointestinal and pancreatic diseases. New progresses discussed in the meeting about pancreatic diseases, biliary diseases and interventional EUS will be summarized as follows.

Diagnostic EUS

EUS-fine needle aspiration (FNA) is well-recognized as an indispensable tool for the diagnosis and staging of solid pancreatic lesions. In this year, some studies regarding EUS-FNA techniques and the choice of needle were presented. Despite the growing number of procedures and the availability of needles in different gauges and designs, there is no consensus on an optimal approach to EUS-FNA or interventions. Over 10% of FNA procedures require the use of >1 needle due to technical dysfunction. Shyam Varadarajulu reported an objective assessment of an algorithmic approach to EUS-FNA and interventions. This study was executed in two phases. Phase I was a retrospective analysis of EUS-FNA/interventions performed in 548 consecutive patients over 7 months by two endosonographers who used 19G needles for interventions and 22/25G needles interchangeably for other indications. Technical failure was defined as use of >1 FNA needle/lesion in an individual patient. At Phase I, 625 needles were used in 548 patients (diagnostic 487, therapeutic 61) with a technical failure rate of 11.5%. More failures were observed with 19G vs 22/25G needles (19.7% vs 8.8%, P = 0.004) and with transduodenal passes vs other routes (24.4% vs 5.2%, P < 0.001). Based on these observations, an algorithm was proposed by which FNAs via the duodenum was performed using a 25G needle and those through other routes with a 22G needle. While all cyst aspirations and interventions through the duodenum were performed using a flexible 19G needle, a standard 19G needle was used to perform these indications through the other routes. This algorithm was then tested prospectively in Phase II on 500 consecutive patients whose procedures were performed by three endosonographers. Technical failures for the 19, 22 and 25G needles in Phases I and II were 19.7% vs 0.8%, P < 0.001; 12.3% vs 0%, P < 0.001 and 7.3% vs 3.9%, P = 0.124, respectively. The authors concluded that the proposed algorithm for EUS-FNA and interventions yielded better technical outcomes and cost savings without compromising diagnostic adequacy.
The choice of the kind of needle is a main issue for ultrasonographers. Two different prospective randomized controlled trials (Jason Korenblit and Geoffroy Vanbiervliet) evaluated the hypothesis that the 22G ProCore needles requires fewer needle passes than the standard 22G needle to obtain diagnostic tissue in solid pancreatic mass lesions. One study was from a referral center and the other was a multicentric study (17 centers). Both studies showed that the ProCore needle offers a significantly better yield per pass and tissue diagnosis with fewer passes than the standard 22G FNA needle and that the safety profile is identical with easier EUS-FNA when using 22G ProCore needle. Because with ProCore needle are necessary fewer passes, is possible that this may reduce patient risk, endoscopist and cytologist workloads and overall procedural cost.

There are pathologies where tissue architecture obtained can be decisive for the correct diagnosis, like autoimmune pancreatitis. Jayapal Ramesh presented a multicenter randomized trial comparing the 19G and 25G needles for EUS-FNA of solid pancreatic mass lesions. The authors compared the median number of passes required to establish onsite diagnostic sufficiency, ability to procure histological samples, specimen quality (bloodiness graded as <33%, 34%-66%, >67%), technical failures and complications using the 19 vs 25-gauge FNA needles. A total of 72 patients were randomized: Adenocarcinoma in 49, neuroendocrine tumors (NET) in six, chronic pancreatitis in 11, lymphoma in two, metastatic or other neoplasm in two and indeterminate in two. While there was no difference in the median number of passes required to establish on-site diagnostic sufficiency, between the 19 and 25G needles, the 19G needles were significantly better for core tissue procurement. Jayapal Ramesh concludes that because of 19 and 25G needles perform equally well, the choice of an FNA needle for sampling pancreatic masses should be based on the need for core tissue.

An interesting study by Brintha K. Enestvedt et al., evaluated the performance of a multi-needle exchange platform (Beacon bnx®) allows for the passage of multiple sequential needles through a single delivery system without having to remove the system from the endoscope, thereby permitting additional needle passes to be made during concomitant specimen processing. They compared the mean total FNA time and mean time per needle pass between multi-needle exchange platform (multi) and a traditional single-needle platform (single). The mean total FNA time was significantly lower with multi vs single (15.9 ± 6.6 min vs. 27.6 ± 7.6 min respectively, \( P = 0.003 \)). The mean time per needle pass was significantly lower with multi (3.5 ± 1.1 min vs. 6.1 ± 0.38 min, \( P < 0.0001 \)). The authors concluded that a multi-needle exchange platform decreases the FNA time by nearly 50% compared with the traditional single-needle platform. Increased efficiency of FNA may lead to shortened procedure time, reduced anesthesia exposure for the patient and enhanced endoscopic unit efficiency.

Regina Imada from Paoli-Calmette Institute in Marseille, France, showed very interesting results regarding contrast-enhanced harmonic-EUS (CEH-EUS) in cystic lesion of pancreas. Previous studies in solid lesions shows that CEH-EUS allows an improved visualization of vessels with very slow flow in the real time and that it is possible that could improve the diagnostic accuracy to differentiate between benign and malignant lesions. Regina Imada analyzed the applicability of CEH-EUS in cystic lesions of the pancreas. A total of 42 patients underwent CEH-EUS and FNA of pancreatic cystic lesion. Anatomopathological confirmation was obtained in 19/42 patients (45.2%): 7 (36.8%) adenocarcinomas, 7 (36.8%) intraductal papillary mucinous neoplasm (IPMN), 1 (5.3%) mucinous cystoadenoma, 1 (5.3%) serous cystoadenoma, 1 (5.3%) lymphoma, 1 (5.3%) NET, 1 (5.3%) pseudocyst. Six of seven patients diagnosed as adenocarcinoma had solid component and showed hypervascularity with positive enhancement of the nodule inside the tumor in 83.3% and negative enhancement of wall in 71.4%. The authors concluded that a solid component with positive enhancement at CEH-EUS could be an important data to differentiate between benign and malignant lesion.

The accuracy for differentiation of a real tumor in chronic pancreatitis had been an interesting topic without answer until this moment. Can Xu et al., delivered the topic of a computer-aided analysis of EUS images in differentiation of pancreatic cancer from chronic pancreatitis. A support vector machine predictive model was built, trained and validated. After 200 trials of randomized experiments, the average accuracy, sensitivity, specificity, the positive and negative predictive values of pancreatic cancer were (94.25 ± 0.17)%, (96.25 ± 0.45)%, (93.38 ± 0.20)%, (92.21 ± 0.42)% and (96.68 ± 0.14)%, respectively. These results show that maybe an inexpensive, non-invasive and effective diagnostic tool for the clinical determination of pancreatic cancer without FNA in the near future could be factsible.

**Interventional EUS**

Some interesting progress in interventional EUS was showed in DDW 2013. Raj J Shah performed a prospective multicenter study with a novel anchoring covered self-expanding metal stent (ACSEMS) for EUS-guided drainage of pancreatic pseudocysts (PP). The AXIOSTM (XLUMENA, Inc.) stent ACSEMS, a fully-covered nitinol stent, has a dual-flange design allowing an anchoring effect to maintain a cystenterostomy tract. The objective was to evaluate the safety and efficacy of ACSEMS for PP drainage, seven tertiary care centers (6 US, 1 EU) participated in the study. A total of 33 patients were enrolled and ACSEMS was successfully placed in 30 (91%) cases, with remaining three receiving double pigtail stents. Procedure time was 64 ± 38 min. PP resolution was achieved in 31/33 (94%) and 28/30 (93%) receiving ACSEMS with 93% lumen patency at stent removal. Complications included abdominal pain (\( n = 3 \)), spontaneous stent migration and back/shoulder pain (\( n = 1 \)) and access-site infection and stent dislodgement (\( n = 1 \)). The
authors concluded that ACSEMS was successfully placed in 91% of subjects. In ACSEMS subjects, PP resolution of 93% is comparable with plastic pigtail stent data with the distinct advantage of single-step stent deployment and the ability to perform endoscopic necrosectomy through the stent. Specifically in this topic of PP drainage, maybe we have to ask if it is really necessary and useful to use ACSEMS (or any other metallic stent) considering the time that we need it in place, cost and complications.

Since 2001, Marc Giovanni described the first choledochoduodenostomy and since then, multiple cases series have been reported. In this DDW 2013, Takao Itoi described the creation of a choledochoduodenostomy using a novel luminal apposition device. This device consists of braided nitinol heat-set into a dual flange configuration. Fully expanded, the stent diameter and length measure 6 mm and 8 mm, respectively. The flange diameter is 14 mm. In eight patients (three male, mean age 61.1, range: 62-99) with distal biliary obstruction and jaundice due to four pancreatic cancers, three ampullary cancers and one distal bile duct cancer, the apposition device was placed using a 3.7 mm channel curved array echoendoscope. All apposition devices were safely placed without acute complications, including bleeding or perforation. The apposition device did not migrate, dislodge or otherwise change position after deployment. Four patients had self-limited abdominal pain after the procedure, with mild elevation of the white cell count. Acute cholecystitis occurred in one patient, who proceeded to percutaneous transhepatic gallbladder drainage.

Regarding EUS-guided biliary drainage (EUS-BD) a very important report was carried out by Michel Kahaleh with the biggest sample reported until this moment. Access route, stricture etiology, altered anatomy, technique (intrahepatic or extrahepatic), stent placement route (transpapillary, transanastomotic/transenteric, hepaticogastrostomy), stent type (metal or plastic), outcome and post-procedure as well as long-term complications were collected. A total of 281 patients (152, 54% males) with a mean age of 64.6 ± 14.9 were included for analysis, 232/281 (86%) achieved successful BD through EUS-BD. A total of 236 (84%) patients had malignant strictures and 45 (16%) had benign strictures. Only 54 patients had altered anatomy (19%). Intrahepatic technique was used in 152 patients (54%), while extrahepatic was in 129 cases (46%). Rendezvous approach was used in 26 cases (9%). Transpapillary route was used in 74 (26%) cases, transenteric/transanastomotic in 114 (41%) cases and hepaticogastrostomy in 89 (32%) cases. Metal stents were placed in 185 (66%) cases and plastic stents in 63 (22%). Complications were seen in 97/281 (34.5%) cases. The authors concluded that successful outcomes and safety profile are not different for gender, stricture type, extrahepatic or intrahepatic technique or stent placement route. Different techniques and approaches may be employed based on etiology, stricture location and eventual altered anatomy emphasizing the need to individualize treatment for every case.

Radiofrequency ablation (RFA) is a technique using high-frequency alternating current to ablate diseased tissue and has been used to treat tumors in various organs. However, the lack of well-shaped probes fitting into the EUS-needle limits the size of the coagulative necrosis and its potential for clinical applications. In the study by Madhava Pai, initial experience with EUS-RFA for cystic neoplasms and NET of the pancreas was described. They included eight patients (four a mucinous cyst, one had IPMN and one a microcystic adenoma) and two had a NET in the head of pancreas. Among the six patients with a cystic neoplasm, the post-procedure imaging in 3-6 months showed complete resolution of the cysts in two patients, whilst in three patients; there was almost a 50% of reduction in size. Using cross-sectional imaging in two patients with NET, a change in vascularity and central necrosis after EUS-RFA was demonstrated. Only two patients had a minor complication (mild abdominal pain). Madhava Pai et al. concluded that these initial results suggest that the procedure is technically easy and safe.

Because the results with endoscopic necrosectomy are not optimal yet, Jeffrey J Easler reported the results of a multicenter pilot study with the initial experience with the use of hydrogen peroxide-assisted endoscopic necrosectomy. A total of 14 patients were included, but only eight patients underwent EUS-guided access of the collection (57%). A median of 2.5 endoscopic procedures per patient (range: 1-7) were performed. Median length of follow-up was 7 months (3-26). Resolution of the collection occurred in 11/14 (79%) patients at a median time interval of 3 months. The authors concluded that hydrogen peroxide irrigation in endoscopic necrosectomy resulted in marked necrotic tissue debridement and potentially shortens procedure time and decreases labor intensity. We have to say that the success is similar to previous reports without hydrogen peroxide irrigation and that comparative study is necessary to evaluate if the time of the procedures is shorter with hydrogen peroxide irrigation vs traditional irrigation.

Everson Artifon showed the initial results of a prospective trial about EUS-guided vs interventional radiology to hepatic intra-arterial chemotherapy to treat unresectable hepatic metastasis from colorectal primaries. EUS-guided injection was performed in 12 patients with a 22G needle and searching the intrahepatic artery with a response rate of 85% and 33% of complications. The authors concluded that EUS-guided intra-arterial chemotherapy appears to be safe and feasible in a subset of patients with metastatic liver disease.

Aparna Repaka performed a human Phase I trial of EUS-guided intratumoral and systemic administration of Panvac for treatment of patients with locally advanced inoperable pancreatic adenocarcinoma. A total of 13 patients were enrolled at two dose levels of the intrapancreatic vaccine. Patients received a total of two EUS-guided fine needle injections given 2 week apart. The authors concluded that the results suggest a prolongation in survival of patients without preexisting metastatic disease, with none of these patients going on to develop metastatic disease.
SUMMARY

The DDW 2013 allows to endoscopists to know and exchange the novel knowledge on diagnostic and interventional EUS. Very interesting issues were commented and new techniques and accessories to improve the diagnostic yield of EUS-FNA were showed. Interesting question about interventional EUS were answered, mainly regarding EUS-BD and new ones are consequences of the studies showed in the meeting.