

ADVANCES IN ENDOSCOPY

Current Developments in Diagnostic and Therapeutic Endoscopy

Section Editor: Klaus Mergener, MD, PhD, MBA

Interventional Endoscopic Ultrasound: The New Frontier



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G&H How did endoscopic ultrasound transition from a purely diagnostic tool to a therapeutic tool as well?

MK Endoscopic ultrasound (EUS) was developed to stage tumors. When it first emerged, radial echoendoscopes enabled endoscopists to visualize the layers of the gastrointestinal tract, pancreaticobiliary system, liver, and surrounding structures, and to diagnose tumors. However, these echoendoscopes did not allow the performance of fine-needle aspiration or fine-needle biopsies. After that

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came linear echoendoscopes, which permitted endoscopists to perform fine-needle aspirations. That development changed care because now endoscopists could diagnose a tumor and also stage it at the same time. That was a large leap in the field of endoscopic ultrasonography. Years later, an endoscopist from France performed the first therapeutic EUS procedure. He used a linear echoendoscope to drain the bile duct.

G&H Why was this significant?

MK The standard of practice has been to perform endoscopic retrograde cholangiopancreatography (ERCP) to access and drain the bile ducts. However, when ERCP fails, historically the only option was to place percutaneous stents by interventional radiologists. Although these stents work well, they present several challenges. Patients may have difficulty dealing with outside drains that can fall out. They can become clogged. They can cause pain and bleeding. They are also associated with a nontrivial risk of infection, bile leak, and other complications.

Placing internal stents with a linear echoendoscope was a major accomplishment because it enabled the placement of endoscopic stents internally using ultrasound guidance. This achievement also led to further investigation of interventional uses of EUS. The last several years have seen tremendous progress in this direction. There are now instruments and stents that are tailored for interventional EUS.

G&H Is this approach appropriate only after ERCP is tried first?

MK Some recent studies have looked at EUS as a primary treatment modality, not awaiting a failed ERCP. The limitation of these studies is that the procedures were performed by experts in EUS. That raises the questions: can this be scaled? Can these results apply to less-experienced physicians? Personally, I do not think so. The EUS procedure has to become easier, faster, and safer to scale and to challenge ERCP as a primary approach. With ERCP, approximately 500,000 procedures per year are performed in the United States alone. It is a major procedure that is commonly performed.

I believe the results from initial trials signal that EUS can potentially challenge ERCP as the first modality used

to drain bile ducts. However, in order for that to happen, the procedure needs to become easier and safer.

G&H What is another important breakthrough for interventional EUS?

MK The biggest change has been with EUS-guided formation of anastomosis, which means connecting 2 organs together by a stent. Interventional EUS enables the establishment of that connection by placing anastomotic stents. This work has had a large impact on the field.

The main procedure that requires anastomosis is EUS-guided gastrojejunostomy, in which EUS is used to connect the stomach to the jejunum. This procedure is performed when the distal stomach or proximal small bowel is obstructed, usually by a tumor. Forming an anastomosis between the stomach and the jejunum allows food to bypass the obstructed segment. Now, instead of having to perform surgical gastrojejunostomy, EUS-guided gastrojejunostomy can be performed.

G&H What are the effects of this procedure on patients?

MK EUS-guided gastrojejunostomy is not a curative treatment. It is a palliative procedure to treat malignant gastric outlet obstruction. For example, in patients with pancreatic cancer, the tumor mass compresses the duodenum, preventing the patient from eating without vomiting. The gastric outlet obstruction is palliated by placing gastrojejunal stents using EUS guidance. The procedure allows the patient to stay nourished, to have the pleasure of eating, and to avoid being admitted to the hospital for obstructive symptoms such as nausea, vomiting, distension, and abdominal pain.

G&H What are some new promising avenues for EUS?

MK Expanding the number of procedures performed with EUS is the most promising avenue. These procedures will become easier and safer to perform, which means more physicians will do them and more patients will be helped by them.

There is a lot of ongoing research focused on making EUS easier through improvements in accessories and instruments. If EUS is technically demanding, then the number of physicians using it therapeutically will remain limited. Therefore, I foresee an increase in the number of these procedures as they become easier and safer, and as techniques become more refined.

In addition, EUS provides direct access to tumors, so tumor therapy is on the horizon. I do not believe EUS

will be the sole treatment strategy, but rather an adjunct therapy that allows for the application of chemotherapeutic or radioactive agents into the tumor. For some malignancies that are resistant to chemotherapy, EUS can

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render tumor cells more porous so that the chemotherapeutic agents may reach them more easily. This area is still in its infancy. However, the concept makes sense; a needle is inserted into tumors to obtain cells for diagnosis, so there is access to provide therapy directly.

G&H Is training a factor in expanding the use of interventional EUS?

MK Yes. More and more people are becoming experienced in interventional EUS, which means that they are training the future generation. More people performing the procedure will result in an exponential increase in the number of interventional endosonographers in the future.

That training has to occur alongside the instrumentation becoming easier to use. The industry has seen the large increase in the number of interventional EUS procedures and that the results are good. The industry is now capitalizing on this by dedicating resources to innovation in the field.

G&H Are there any advances that exemplify this progress?

MK For EUS-guided anastomosis, a double-balloon catheter from Japan has made the procedure much easier to perform. Studies show that it renders the procedure safer, easier to train in, and easier to perform. This is a small example of how whenever a new procedure is developed, endoscopists always figure out how to make it simpler, faster, and safer. Once physicians and industry leaders see the benefit, they can work together to make these improvements happen.

G&H How does the cost-benefit ratio look with interventional EUS?

MK These are advanced therapeutic procedures that utilize expensive scopes and instrumentation, are usually performed at tertiary centers, and usually require that the patient be under general anesthesia. Therefore, they are expensive. However, interventional EUS is mostly performed as an alternative to other procedures, which could be major surgeries or other approaches that are associated with longer hospitalizations and repeated interventions.

When it is possible to avoid major surgeries and comorbidities, as well as the need for repeated hospitalizations, money will eventually be saved. The index procedure is costly, but the overall costs of health care utilization can be minimized by diminishing the need for major procedures, shortening hospitalizations, and eliminating or reducing repeated admissions. Hospitalizations are costlier than these procedures; if hospitalizations can be avoided, a lot of money can end up being saved.

Quality of life also needs to be taken into account. Avoiding major surgery, outside tubes and catheters, and repeated hospital stays improves the patient's quality of life. With interventional EUS, I believe that money is likely being saved and that there is a positive impact on the patient's quality of life.

G&H What is your current research focused on?

MK My colleagues and I are currently conducting a randomized trial under an investigational device exemption from the US Food and Drug Administration comparing EUS-guided gastrojejunostomy to the current standard

of care, which is duodenal stenting. We are recruiting patients at Johns Hopkins, and the study will be linked to a multicenter international investigation with more than 20 institutions participating around the world.

G&H What other research in this field are you following?

MK There are multiple ongoing studies investigating EUS-guided biliary drainage, EUS-directed transgastric ERCP, and EUS-guided tumor therapy, among other procedures. The field is expanding both within the United States and globally.

Disclosures

Dr Khashab is a consultant for BSCI, Olympus, Pentax, Medtronic, Apollo, and GI Supply. He receives research support from BSCI and royalties from UpToDate and Elsevier.

Suggested Reading

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