EDITORIAL

Transgastric surgery in the abdomen: the dawn of a new era?

To launch new developments means to break down borders and to disobey rules in an intelligent fashion. Going beyond the ''natural'' margins among medical disciplines may enrich all sides and may lead to new views of classical indications and therapeutic strategies. In their current papers on endoscopic gastrojejunostomy, Kantsevoy, Kalloo, and coworkers of the Apollo Group show, for the first time, more details of their work going beyond the gastric wall and working with an perorally introduced flexible endoscope via a sterile overtube in the abdominal cavity.[1,2]

In an animal study, with survival over 2 weeks, the investigators demonstrated that a patent gastroenteric anastomosis could be created by actively perforating the anterior stomach wall toward the larger curvature with a needle-knife. The cut then was enlarged with a sphincterotome to 2 cm, which opened the door to the abdominal cavity for highly disinfected and sterilized endoscopes and instruments via a sterile overtube. With a special endoscopic suturing device, the ''Eagle Claw'' (prototype; Olympus Optical, Tokyo, Japan), a loop of small intestine was fixed to the gastric wall after having been pulled into the gastric cavity. Anastomoses were radiologically patent after 1 week and after 2 weeks on examination after euthanizing the animals.

Is this the beginning of a new era: transgastric endoscopic surgery? Others investigators, e.g., Paul Swain, a pioneer in endoscopic suturing, are heading, as well, to new frontiers and have reported with their workgroups on transgastric cholecystectomy, endoscopic transgastric jejunostomy, and EUS-controlled gastroenterostomy.[3-6] Peroral transgastric appendectomies in patients allegedly have been performed in India, albeit nothing yet has been published as a MEDLINE-searchable full paper (N. Reddy, V. G. Rao, oral communications, May 15 and 19, 2005; N. Reddy, oral communication, May 2004). Jagannath et al[7] of the Apollo group recently published a paper describing peroral transgastric ligation of fallopian tubes in pigs by using a similar setup as described above. Will diagnostic laparoscopy (peritoneoscopy) with liver biopsy as performed years ago by most internists be used more widely again when performed transgastrically? Sanowski et al[8] had done it the other way in 1981, by using a flexible pediatric gastroscope for laparoscopy!

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Interdisciplinary borders seem to be falling.[9] However, it is not new that gastroenterologists go beyond their natural boundaries, the gastric wall or the small intestine, because these organs are relatively sterile.

EUS-controlled transgastric drainage of symptomatic pancreatic pseudocysts or abscesses is a standard procedure today and has replaced surgery for most of the cases in major endoscopic centers.[10-12] Seifert went a step ahead and not only perforated the gastric wall with a needle-knife but entered the retroperitoneum with a gastroscope after enlarging the incision and then actively debrided infected pancreatic necroses with a Dormia basket.[13] In one of these patients, he completely removed a necrotic spleen transgastrically. Crazy? Maybe. Thirty years ago, pioneers such as Ludwig Demling, Meinhard Classen, Michel Cremer, and Peter Cotton may have been called crazy by surgeons when performing their first biliary or pancreatic sphincterotomies. Today this originally ''surgical'' territory is mainly in the hands of the less invasive interventional endoscopist, in most cases, a gastroenterologist.

Transgastric endoscopic surgery is a new and evolving approach that will require the cooperation of endoscopists and surgeons. Examples include transgastric gastrojejunostomy, appendectomy, or cholecystectomy, as well as gastroplasty and bypass surgery for obesity.

TRANSGASTRIC ACCESS: WHO SHOULD DO IT AND WHERE SHOULD IT BE PERFORMED?

Who will perform these new transgastric techniques, discussed above, in the near future? The gastroenterologist? He is the one who usually knows best from daily clinical practice how to handle the endoscope. Will it be the abdominal surgeon, who feels at home in the abdomen and who is used to performing minimally invasive surgery through rigid laparoscopic instruments? Is the surgeon the one who should have his hand on an intra-abdominal technique in a sterile environment?

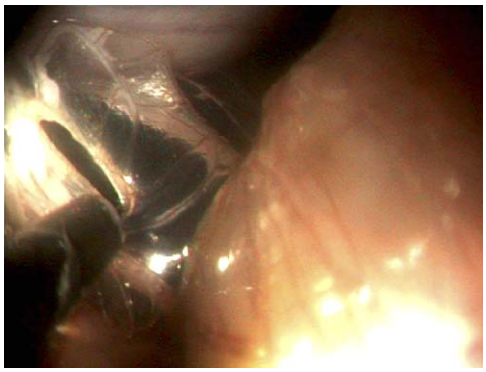

Figure 1. Opening the mesenterium with a needle-knife.

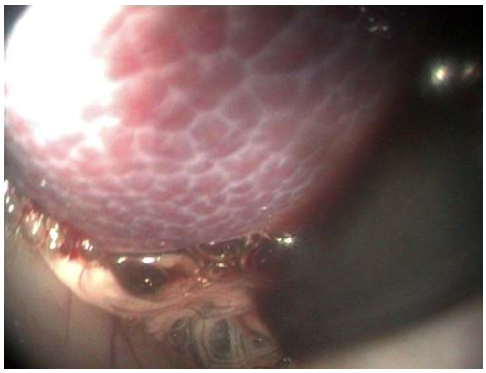

Figure 2. Intraabdominal retroflection toward the transgastric access, and lateral view onto the dorsal liver surface of the right lobe.

Is transgastric surgery going to take place in the operating room or in the endoscopy suite? Other interventional techniques, such as neuroradiologic brain interventions and percutaneous transhepatic accesses to the bile duct are mostly carried out in a filter-clean, nonsurgical interventional suite in the radiology department. Why not transgastric surgery in a specially equipped interventional endoscopy suite? What about the management of complications? Hemostasis, a field that had been clearly in the hands of surgeons for decades, or for centuries, can nowadays be handled in 9 of 10 patients less invasively by gastroenterologists. The interventional endoscopist attacks spurting vessels, performs large gastric EMRs, and can close perforations.

Gastroenterologists and those surgeons who spend a significant part of their time turning black knobs will be the specialists for invasive endoscopic techniques as in the past. Indications and the combination of procedures may change over time. Laparoscopies had been carried out in the endoscopy suite years ago and had then moved mostly to the operating room. Will there be a move back and wider diagnostic use in the future?

ARE WE PREPARED FOR THE NEW FIELD?

We will have to think about new concepts. Young endoscopists of the future will need interdisciplinary training. They have seen things from a gastroenterologist's as well as from a surgeon's perspective, requiring sufficient theoretical and practical background. New techniques have learning curves and they evolve, getting modified and adjusted over time, and when surgeons and gastroenterologists meet, experiences from different perspectives may enrich these developments.

Imagine gastroenterologists and surgeons sitting together, as in the case of the two authors of this editorial, and thinking about new training concepts, about curricula that would prepare our future fellows for their new jobs. Should the new breed of endoscopic interventionalists not be equipped with a special training for the new task? Maybe with 2 years in abdominal or general surgery and 2 years of gastroenterology? Should they not be trained within a special program covering different topics of diagnostic and therapeutic endoscopy, as well as different surgical techniques? Should they not be embedded in a structured curriculum, with lectures and practical simulator training in the laboratory, as discussed before?[14,15] Theoretical examinations and practical tests on topics such as management of GI bleeding, polypectomy and EMR under oncological aspects, hygiene, and laparoscopic techniques could be taught theoretically, as well as in practical teaching sessions in different models and simulators at training centers. Our group recently was able to show that a systematic additional hemostasis training in the simulator can increase the technical success rate not only in the simulator but also in the patient and may decrease clinical complication rates.[16]

Clinical training in interdisciplinary digestive disease units where patients with abdominal problems are seen from both disciplines and where the financial support of the total unit depends on the overall number of cases treated could be one perspective. Maybe here the future ''surgical endoscopist,'' ''endoscopic surgeon,'' or, to avoid names of existing departments, the ''endoscopic interventionalist'' would have a good place. This may result in a special fellowship training accessible for surgeons and gastroenterologists likewise. These demands may yet seem to be premature, but technical developments that have the potency of being less traumatic and less invasive may stimulate accelerated engineering activity leading rapidly to new clinical standards and the demand for more specialists.

LIMITS, ALTERNATIVES, AND PERSPECTIVES

Transgastric access to the abdominal cavity opens a new window and may be especially beneficial for patients at increased operative risk (Figs. 1 and 2). However, it has to be proven that it offers general advantages besides omitting skin incisions. Alternative minimal invasive techniques have to be taken into consideration, such as for the endoscopic

GE described as percutaneous or the endoscopic placement of magnets in the stomach and the small intestine to create a gastroenteric compression fistula that is kept open by a covered stent. This technique[17] originally developed by Cope, in Philadelphia in the 1990s, as a radiologic technique recently has been applied successfully on the endoscopic route in 13 of 15 patients.[18-20] After 5 years of intensive clinical research and preliminary experience in endoluminal treatment for GERD, things get clearer.[21-25] Many lessons have been learned and have certainly been fruitful for the development of other endoluminal endoscopic-surgical techniques.

Morbid obesity seems to rapidly evolve as a field of high research interest for peroral endoscopic-surgical treatment. Endoscopic vertical band gastroplasty has been performed experimentally in vitro and in animal experiments.[26-28] As with GERD, a high commercial interest to come up with a technique that replaces another one or that saves money spent in other health care sectors will push research. Already in the year 2000, the health care costs related to obesity in the United States were estimated to be $117 billion (an $18 billion increase from 5 years earlier).[29,30] After a failure of a first generation of gastric balloons in most patients in the long-term treatment run at the end of the 1980s,[31] laparoscopic bariatric surgery evolved. Indeed, patients with morbid obesity may be good candidates for peroral transgastric bypass jejunostomy as proposed by both peer groups cited above.[2,4,16-28] Access with the first trocar through a large layer of fat often is cumbersome and risky, and increased wound infection rates could be omitted. However, in obese patients, the facility of intra-abdominal inspection may be diminished, even with open surgery. If this also is the case with endoscopic interventions is currently unclear. Combining strategies might help.

Transgastric bypass jejunostomy for palliation of pancreatic cancer is certainly another example. However, peritoneal carcinosis, one major cause for intestinal obstruction, may render endoscopic anastomoses difficult or even impossible. Regular intestinal transport may be rapidly impaired despite a patent gastoenteric anastomosis because of progessive peritoneal carcinomatosis. How does one identify a suitable part of the small intestine for the anastomosis? Additional guidance by some sort of laparoscopic or intestinal markers from inside will be needed. Isolated obstructions, such as in the case of the second part of the duodenum may easily be bypassed by a gastroenterostomy, as discussed above. Also, in this case, it may be of advantage to be guided from the outside. Such combined procedures or rendezvous maneuvers may be established in a broader extent.

Economic aspects must be discussed. Laparoscopic surgery is more time consuming and more expensive than classical surgery. However, despite increased costs of laparoscopic gastric bypass surgery, patients suffer fewer life-threatening perioperative complications, return earlier to normal activity, and are discharged earlier from the hospital.[32] Therefore, actual expenditures might be outweighed by decreased consequential costs. This may be similar for the transgastric techniques.

Whether less fixation of the distal end of the endoscope introduced via an overtube transgastrically is compared to a short-distance laparoscopic access is less important than flexibility and minimal invasiveness is currently unclear and will depend on safety. When it comes to the stenting of hilar biliary tumors, both interventionalists—the radiologist via the short percutaneous transhepatic route, as well as the gastroenterologist via the longer endoscopic retrograde route—may offer effective treatment. However, the one who offers a fast relief of symptoms with less invasiveness and the highest safety will individually be the best choice for the patient.

DO WE NEED THESE NEW TECHNIQUES?

Standing still means floating back. All new techniques have to face criticism from their related disciplines concerning success and recurrence rates, the potential for oncologic cure, costs etc., issues that go beyond invasiveness and elimination of external scars. Existing achievements will be reevaluated, and indications will be redefined when new developments or new technical equipment evolve.

Morbidity and mortality are a matter of discussion in all medical fields. We have to think and to struggle for improvements and alternatives. In an evolving process, clinical relevance must be reevaluated again and again. Fine tuning then will lead to even better therapeutic strategies or at least lead to a better understanding of inherent limitations in what medicine can achieve. Ultimately, the benefit of the patient has to remain the number one priority in the development of new techniques. The Germans say: ''Es muss etwas geschehen aber es darf nichts passieren.'' (Something has to change but nothing should happen…. in this case to the patient… and of course to the doctor.) Let's head to new frontiers!

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