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TOPIC HIGHLIGHT

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Surgical perspectives in peptic ulcer disease and gastritis

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Abstract

For much of the twentieth century, surgery was frequently the solution for peptic ulcer disease. Our understanding of the pathophysiology of ulcers paralleled the development of potent pharmaceutical therapy. As the surgical world developed parietal cell vagotomy which would minimize the complications of surgery, patients failing medical therapy became rare. Emergent surgery for complicated peptic ulcers has not declined however. The development of proton pump inhibitors and the full understanding of the impact of *H pylori* has led to a trend towards minimalism in surgical therapy for complicated peptic ulcer disease. In addition to the changes in patient care, these developments have had an impact on the training of surgeons. This article outlines these trends and developments.

Key words: Perspectives; Peptic ulcer disease; Gastritis

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INTRODUCTION

During the twentieth century there were major advances in the understanding of the pathophysiology of what were known as acid-peptic diseases. These advances included the understanding of the role of the vagus nerve, the discovery and eventual peptide sequencing of the hormone gastrin and the landmark discovery of *H pylori*. Advances also occurred in medical therapy. Selective histamine receptor blockers and proton pump inhibitors were developed. Antibiotic therapy was found to eradicate *H pylori*. Thus changes in treatment of acid-peptic disorders have paralleled the changes in the understanding of the pathophysiology. This review will cover current perspectives in surgical treatment and how advances in medical management have impacted surgical practice.

GASTRITIS

Gastritis literally means inflammation of the stomach. This term may refer to acute gastritis or chronic gastritis, two very different disease entities. The Sydney System, used by pathologists and gastroenterologists to classify gastritis, emphasizes the importance of combining topographical, morphological, and etiological information into a schema that helps to generate reproducible and clinically useful diagnoses[1].

Acute gastritis is in many cases synonymous with erosive gastritis. This may be due to toxic damage to the gastric mucosa, commonly from non-steroidal anti-inflammatory drugs (NSAIDs) or alcohol ingestion. Erosive gastritis may also occur in critically ill patients with sepsis, shock or major body burns. On endoscopy, these patients have diffuse superficial gastric erosions and/or petechiae[2]. On histology, there is surface cell damage but a paucity of inflammatory cells. Supportive care with fluid resuscitation and anti-acid therapy results in rapid resolution of this type of gastritis in the vast majority of cases.

Historically, the first line treatment of acute erosive gastritis has been medical therapy. The first step is cessation of the insult, including stopping NSAIDs and resolving hypotension and/or hypoxia with appropriate supportive therapy. Therapy includes anti-acid therapy of any type to bring the gastric juice to a pH > 5 in all patients. In recalcitrant cases, additional treatment such as intravenous pitressin or octreotide may be required. Prior to 1980 there were failures of medical therapy, which required surgery for unremitting hemorrhage. Proposed operative therapy included anti-ulcer operations plus over sewing of bleeding sites, gastric resection and even gastric devascularization. The mortality of these operations ranged up to 40%[2]. Fortunately with modern care the need for surgery in these cases is beyond rare.

Chronic gastritis is most commonly due to *H pylori* infection. Most of these cases are asymptomatic and there

is poor correlation between symptoms and chronic *H pylori* infections with chronic inflammation. Again, surgery plays no role in these cases.

Another type of chronic gastritis is duodenal reflux or bile reflux gastritits. These cases may be spontaneous or secondary to prior gastric surgery. The cases are characterized by abdominal pain and bilious vomiting. On endoscopy, these patients have bile in the stomach, erythematous stripes or patches and sometimes mucosal edema[4]. On histologic examination, there is foveolar hyperplasia, mucosal edema and a paucity of inflammatory cells. Treatment with mucosal protective agents, prokinetic agents, and binders of bile salts has been disappointing. Surgical therapy consists of diversion of bile away from the stomach. In cases of spontaneous bile reflux gastritis, Madura has achieved excellent results with Roux-en-y choledochojejunostomy[5]. In the cases of secondary reflux gastritis (after gastric surgery) diversion of bile and duodenal contents away from the stomach has frequently been accomplished by Roux-en-y gastroenterostomy, with a long Roux limb (> 50 cm).

PEPTIC ULCER SURGERY

The surgical treatment of peptic ulcer disease, the main focus of this review, has changed dramatically over the years. To better understand the evolution of peptic ulcer surgery we must trace its development. We will review some of the highlights in the development of ulcer surgery as we know it today. In 1882 Czerny, a member of Billroth's department, performed local excision of a gastric ulcer, just one year after Billroth's first successful gastric resection for an obstructing carcinoma[6]. The Heinecke-Mikulicz pyloroplasty was first introduced separately by Heinecke in 1886 and by von Mikulicz in 1887. This commonly used pyloroplasty involves a longitudinal incision over the pylorus that is closed transversely. The Jaboulay pyloroplasty, introduced in 1892, is a side-to-side gastroduodenostomy used to bypass the pylorus. Finney later modified the Jaboulay pyloroplasty in 1902 by incising through the pylorus and creating a single lumen. It is important to recall that these operations were developed to treat ulcer induced fibrotic strictures.

Thanks to Pavlov's research, the role of the vagus nerves in gastric secretion was recognized by surgeons fairly early in the twentieth century. In fact, Laterjet *et al* appreciated the need for gastrojejunostomy for the gastric atony induced by vagotomy. Dragstedt popularized truncal vagotomy for the treatment of peptic ulcer disease during the 1940's. He published "Vagotomy for Gastroduodenal Ulcer" in the Annals of Surgery in 1945[7]. Dragstedt rediscovered that vagotomy alone resulted in gastric emptying problems, which again led to the combination of truncal vagotomy with a gastric emptying procedure. In 1937, Graham[8] described the omental patch that we so frequently call the "Graham patch" as a simple technique for treatment of a perforated ulcer.

In 1977, Nyhus *et al*[9] published a large cooperative prospective randomized study at the Veterans Administrations Hospitals showing the best results with vagotomy and antrectomy, making it the most frequently performed operation for duodenal ulcers during the 1970's and 1980's. The truncal vagotomy-antrectomy combination, had an ulcer recurrence rate of 5% or less and a very low post operative mortality rate. Unfortunately, postoperative symptoms including dumping syndromes continued to occur.

A proposed advance in ulcer surgery was selective vagotomy. Selective vagotomy denervated the stomach but spared the hepatic and celiac branches. A drainage procedure was still required. It was hoped that this procedure would result in fewer postoperative digestive sequelae. Unfortunately, trials could demonstrate no advantage of this procedure over traditional anti-ulcer surgery[10]. The progression of physiologic surgery for peptic ulcer disease continued in 1970, when Johnston *et al*[11] in England as well as Amdrup *et al*[12] in Denmark separately successfully performed parietal cell vagotomy also known as highly selective vagotomy. Highly selective or parietal cell vagotomy denervates the parietal cell mass but preserves innervation of the distal stomach (the motor unit). There was a flurry of enthusiasm for this operation. However, the procedure required operative finesse and training which was best acquired in an operating room working with a surgeon who has demonstrated good results with PCV[13].

Great advances in medical management of peptic ulcer disease began in 1977 when histamine H_2 antagonists were introduced to the market. Further improvement in medical treatment of peptic ulcer disease came in 1988 when a proton-pump inhibitor, omeprazole, was introduced to the market. Advances in medical therapy would go on to almost eliminate "failure of medical management" in peptic ulcer disease. Before the advent of H_2 receptor antagonists 50 percent of all duodenal ulcer operations were performed for intractable pain. Today most symptoms are adequately managed by medications. In fact, some believe that intractability may be due to noncompliance with and not resistance to medical therapy[14]. Another dramatic discovery occurred in 1982 (work published in 1984) when the association between *H pylori* infections and peptic ulcer was identified[15,16]. It was astonishing to believe that in the majority of patients, peptic ulcer was an infectious disease. In 1994, at the Consensus Development Conference, the National Institutes of Health panel concluded that infection with *H pylori* plays a significant role in the development of ulcers and that optimal treatment involves combination therapy using histamine H_2 antagonists or proton-pump inhibitors coupled with broad-spectrum antibiotic therapy. The medical literature of the world is replete with studies regarding *H pylori*; and there is now clear evidence, and general acceptance, that treatment with eradication of *H pylori* can cure peptic ulcer.

Today medical therapy cures peptic ulcer in the vast majority of cases. Therefore in many areas of the world elective surgery for peptic ulcer disease has all but disappeared[17]. Surgical management of peptic ulcer disease is still useful in cases of drug failure or for patients unable to obtain the drugs or to comply with medical therapy. In most parts of the world, surgical therapy is now utilized primarily for complications of peptic ulcer.

These are usually emergency operations. Currently up to 90 percent of all ulcer operations are interventions for complications including hemorrhage, perforation, or obstruction[14]. While the numbers of elective ulcer operations have plummeted there is conflicting data on whether the incidence of complications has remained unchanged, decreased, or even increased over the years. Some believe that the need for emergency surgery has not fallen, probably because of the increasing incidence of NSAID-associated complications[17]. A recent review from California indicates that acute surgical emergencies for bleeding or perforated ulcers are on the rise and mortality remains high[14]. Others feel that proton-pump inhibitors and *H pylori* eradication have resulted in fewer emergency operations for peptic ulcer disease[18]. Recent data from Finland from 1987-1999 revealed that elective surgery for peptic ulcer disease has virtually disappeared and that surgical mortality from ulcer surgery has remained unchanged (8%) over the last 15 years[19]. The stable mortality rate probably reflects a balance between an improvement in overall care but in an aging population.

Current surgical options for the management of peptic ulcers and their complications include truncal vagotomy and pyloroplasty, truncal vagotomy and antrectomy, parietal cell vagotomy (PCV), subtotal gastrectomy, patch repair for ulcer perforation, and oversewing of bleeding vessels. Older literature recommended that the choice of operation be based on factors such as patient age, comorbidity and nutritional status[20]. Since 1990, the trend has been towards more minimal operations. This is due to the belief that most patients are either on NSAIDS or will be found to be *H pylori* positive.

Several series have suggested patients with complicated peptic ulcer (bleeding or perforation) are less likely to be *H pylori* positive compared to non-complicated ulcers[21-23]. Others refute this, finding high *H pylori* infection rates in patients with perforated ulcers[24,25]. With bleeding ulcers; a major concern is false negative *H pylori* tests[26]. Thus the rapid urease test is unreliable in the face of bleeding[27]. and even results with the polymerase chain reaction for *H pylori* are controversial[28,29]. Although the role of *H pylori* infection in complicated ulcer disease, however, remains controversial, several clinical trials demonstrate that patients with eradication of *H pylori* infection have a reduction in rebleeding rates and rate of ulcer recurrence[30-33]. Similarly, the rate of recurrent ulcer disease following perforation also has a demonstrable association with persistent *H pylori* infection, and post-operative eradication seems to be a necessary step in the management of these patients[24,25,34]. Further, patients with gastric outlet obstruction have been shown to have better outcomes, with fewer recurrences or complications when *H pylori* eradication is a part of their therapeutic management[35].

With the current understanding of pathophysiology most surgeons feel that it is prudent to pursue a conservative approach in the majority of patients. This includes repair of perforations or oversewing of bleeding vessels without performing a definitive ulcer operation. This approach is supported by modern medical regimens designed to eradicate *H pylori* infection[3]or by the cessation of NSAIDS[37]. It has been demonstrated that *H pylori* eradication may significantly reduce the rate of duodenal ulcer re-bleeding, and that if the infection is cured, the preventive effect may be maintained for at least 48 mo[31].

Recent data available suggests that perforations caused by *H pylori* and NSAIDS may be two distinct entities, and supports a policy of patch repair followed by eradication of *H pylori* in those who are infected[38]. A series of more than one hundred patients with perforated duodenal ulcer treated by simple closure of the perforation and *H pylori* eradication therapy versus simple closure and omeprazole revealed far lower ulcer recurrence rates in the *H pylori* eradication group[34]. Several other series support this approach[39,40]. In addition, a survey of surgeons in the United Kingdom reveals a conservative bent towards ulcer surgery in that nation[41]. However, it is essential to recognize that the recommended approach of patch repair and antibiotics for *H pylori* for peptic ulcer perforation treatment may never be supported by trial data comparing minimal surgery and *H pylori* eradication to an anti-ulcer operation[42]. Reasonable exceptions to the conservative approach in treating complications of peptic ulcer disease may be seen in patients who have failed an anti- *H pylori* regimen, have suffered other ulcer complications, have dependency on chronic NSAID therapy, or are known to be *H pylori* negative[36]. Also, the role (if any) of *H pylori* in ulcer recurrence after peptic ulcer surgery is unclear[43-47]. Virtually all anti-ulcer operations have now been performed laparoscopically. Laparoscopic patch repair of perforated duodenal ulcers has been widely applied with success[48]. Laparoscopic parietal cell vagotomy has been performed using a variety of techniques[49]. Widespread use of this operation is again unlikely for the same reasons that open PCV has dropped from favor. With improvements in instrumentation and robotics, minimally invasive gastric resections will become less formidable. Certainly truncal vagotomy via laparoscope is not difficult for any surgeon versed in laparoscopic anti-reflux surgery. However, while these approaches become readily available, their need is diminishing.

Future trends may be impacted by swings in the HP pendulum. As mentioned, some suggest that the incidences of HP infection in complicated ulcers might be lower than in non complicated ulcers[21-23]. Three recent series suggest that the HP infection rate in complicated ulcers is between 81% and 93%[24,25,34]. In contrast some feel that the rate of HP infection in ulcer patients is decreasing[50]. Widespread eradication of *H pylori*, may result in the emergence of idiopathic (no-*H pylori* and no-NSAIDs) ulcers. Such a trend may reverse the current conservative approach to the surgical treatment of ulcer complications. Finally, one must consider the impact of all trends on surgical training. An examination of trends in American surgical residencies is illustrative. For all gastric-related surgery, the average reported cases per chief resident ranged from 9.8-12.4 with a peak in 1990 and a nadir in 1999; in 2001 the reported case average was 11.3. Over the same interval, vagotomy decreased from 24% in 1990 to 7% in 2001[51]. Graduating chief residents in surgery in the United States have performed (on average) less than 1 parietal cell vagotomy (PCV) during their residency. The

average number of all types of vagotomy for graduating chief residents was 3.5, including 3.2 truncal vagotomies and 0.3 PCV procedures. Because residents may never see a PCV performed during their residency, it is possible that PCV, once in the mainstream of surgery, is obsolete[52].

In conclusion, the understanding of the pathophysiology of peptic ulcer and the development of powerful pharmaceuticals has had a great impact on the practice of surgery in this disorder. The discovery of and treatment for *H pylori* in peptic ulcer disease has affected surgical approaches. Complications of peptic ulcer disease have not gone away although they are being treated non-surgically with increasing frequency. When surgery is required for complicated peptic ulcer disease most surgeons now favor a minimalist approach with closure of perforations or simple over sewing bleeding vessels but without a definitive anti-ulcer operation. When the next generation of surgical residents finish their training will ulcer surgery even exist, or will it simply be a historical topic in surgical textbooks? Will case numbers drop to the point where we won't have surgeons who are trained in performing these operations or will endo-luminal approaches eliminate the need for these operations? Surgery for unremitting hemorrhage from gastritis has disappeared. Considering the advances made in the twentieth century is there reason not to think that with future advances anti-ulcer surgery will go the same route?

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