

# Perforated Pyloroduodenal Ulcers

## Long-Term Results with Omental Patch Closure and Parietal Cell Vagotomy

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### Objective

The authors evaluated parietal cell vagotomy and omental patch closure as treatment for perforated pyloroduodenal ulcers.

### Background Data

Since the beginning of the century, there has been a difference of opinion as to whether perforated pyloroduodenal ulcers are best managed with nonoperative treatment, simple closure, or definitive treatment, i.e., a procedure that handles the emergency problem and simultaneously provides protection against further ulcer disease. The criticism of using definitive treatment at the time of perforation has been that some patients who might not have recurrent ulcer, if a definitive operation was not performed, would be at risk of adverse postoperative sequelae, including death. Parietal cell vagotomy as treatment of intractable duodenal ulcer disease was shown to be almost without complications. The objective of this study was to determine if the operation was equally applicable to perforated pyloroduodenal ulcers.

### Methods

A group of 107 selected patients with perforated pyloroduodenal ulcers underwent definitive treatment by omental patch closure and parietal cell vagotomy. The patients were evaluated prospectively on an annual basis up to 21 years. Gastric analyses were performed on each visit for which the patient gave his/her consent. Patients suspected of a recurrent ulcer were examined endoscopically for verification.

### Results

There was one death (0.9%). Ninety-three patients were observed for follow-up for 2 to 21 years. The recurrent ulcer rate by life table analysis was 7.4%. The reoperative rate was 1.9%. Postoperative gastric sequelae were insignificant. All but four patients were graded Visick I or II at the time of their last evaluation.

### Conclusion

This study confirms that the combination of parietal cell vagotomy and omental patch closure is an excellent choice for treatment of patients with perforated pyloroduodenal ulcers, who, by virtue of their age, fitness, and status of the peritoneal cavity are candidates for definitive surgery. Virtually none of the morbidity that occurs with other forms of definitive treatment is inflicted on patients who might never have needed a definitive operation if simple closure was performed. At the same time, it provides definitive therapy for the larger number of patients who subsequently

would have required a second operation for continued ulcer disease if simple closure alone was performed. Whether this operation is performed at the time of perforation should depend on the presence or absence of risk factors, rather than whether the ulcer is acute or chronic.

The positive results initially obtained with parietal cell vagotomy (PCV) in the elective treatment of duodenal ulcer was a stimulus to extend the procedure to provide definitive therapy for perforated pyloroduodenal ulcers.<sup>1</sup> This method for managing these patients was quickly adopted by others.<sup>2-7</sup>

There is controversy about the use of definitive surgery for treatment of duodenal ulcers at the time of perforation. Some surgeons believe that simple closure is the safest, most expeditious, conservative approach to follow. We held a similar opinion before the introduction of PCV because all other forms of definitive treatment removes or destroys the pyloroantral pump that regulates gastric emptying. Destruction of this mechanism may cause disturbing, sometimes crippling, gastrointestinal complications in some patients who might not have required definitive treatment. Because PCV preserves the pyloroantral pump and rarely is associated with untoward symptoms,<sup>8</sup> it was believed that PCV might be the ideal, definitive treatment for perforated pyloroduodenal ulcers.

It has been suggested that PCV is an operation too complex, difficult, and time consuming to be performed in patients who are increased operative risks by virtue of a perforation. Parietal cell vagotomy does not defy mastery by surgeons in training or by trained surgeons. It is an operation, however, that should not be performed for perforated duodenal ulcer by surgeons who have not acquired the necessary technical skills to perform the operation with confidence. In addition, PCV should not be done in patients with perforated ulcers who have risk factors that preclude the safe performance of this or any other definitive operation. Execution of PCV may be prevented for technical reasons. Inflammation and chemical irritation may obscure landmarks along the lesser, gastric curvature or hyperemia, leading to excessive bleeding during dissection, which may increase the possibility of injury to the nerves of Latarjet or the stomach.

One position repeatedly expressed in the literature is that definitive treatment of perforated pyloroduodenal

ulcers should be restricted to patients who have chronic ulcers. As pointed out previously, the difficulty related to the distinction between acute and chronic ulcers led us<sup>9</sup> and other surgeons<sup>10-12</sup> to perform definitive surgery in all suitable patients with perforated duodenal ulcers. One group<sup>13</sup> that recommends PCV in chronic ulcer patients under 30 years of age will consider the same operation in good-risk patients with acute ulcers because of its safety and minimal side effects.<sup>14</sup> We report the long-term results of patch closure and PCV in 107 selected patients with perforated pyloroduodenal ulcer, in whom there appeared to be no contraindications to definitive surgery, and at operation, with whom there was no technical reason to prevent safe execution of PCV.

## CONDUCT OF STUDY

One hundred seven selected patients with perforated pyloroduodenal ulcers were treated prospectively between 1978 and 1992 with an omental patch and PCV. Patients who had risk factors including shock, sepsis, or major medical illnesses were not selected for this operation. If the inflammatory reaction along the lesser curvature of the stomach was of the intensity to obliterate landmarks and increase the risk of injury to the stomach or the nerves of Latarjet or, if bleeding caused by hyperemia became a problem, the operation was terminated.

There were 103 male and 4 female patients in the study. The mean age was 48.5 years and the range was 20 to 74 years. The distribution of patients was around two age peaks, one at 32 and the other at 56 years of age. Forty-four percent of patients were older than 50 years of age. The mean duration of ulcer symptoms before perforation was 3.5 years. There were two peaks; 31 patients had pre-existing symptoms 6 months or less and 44 patients had symptoms between 6 and 20 years. In 11% of patients, perforation was the first sign of an ulcer, which is similar to the experience of others.<sup>15</sup> A peptic ulcer history before perforation of more than 2 years was elicited from 67 patients. The approximated mean time from the onset of symptoms of perforation until patients underwent operation was 9.5 hours. Twelve patients had a perforated ulcer 24 hours or longer at time of operation.

The perforated ulcers were located in the prepylorus area of six patients, on the pylorus in 6 patients and in the duodenum in 56 patients. As the study progressed and the importance of the location of the ulcers was appreciated, greater attention was given to this documentation. Nevertheless, the size of the perforation and the

Presented at the 106th Annual Session of the Southern Surgical Association, December 4-7, 1994, Palm Beach, Florida.

Supported by Veterans Administration Medical Center, Houston, Texas.

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Accepted for publication January 17, 1995.

surrounding inflammation frequently made it impossible to determine the exact site of origin of the ulcer by examination of serosal surfaces. Based on operative findings, the ulcers were classified as chronic in 44 patients and acute in 7. Based on the duration of an ulcer history of more than 2 years or less than 2 years, an additional 33 patients were classified as having chronic ulcers and 23 were classified with acute ulcers. Thus, 77 patients were classified as having chronic ulcers, and 30 were classified as having acute ulcers. The patient's intense pain on arrival at the hospital often created a discrepancy in the past history of ulcer symptoms obtained before and after operation. At the time of operation, 33 of the patients regularly consumed excessive alcohol, 8 patients indulged in "crack" cocaine or heroin,<sup>16</sup> and 9 patients used nonsteroidal anti-inflammatory drugs or prednisone.

We attempt to observe the patients annually in the hospital to perform gastric analysis studies and to obtain better interviews. Our perforated ulcer patients, as a group, are more transient than those who underwent operations for intractable duodenal ulcer symptoms. As a result, it was more difficult to obtain follow-up information. The majority of patient interviews were made by us or by nurses who have worked for years with the patients in the gastric analysis laboratory.

The operative technique for PCV<sup>17</sup> and the modified Visick grading scale<sup>18</sup> used to evaluate the clinical results were reported previously and did not change during the study. The perforations were closed with a tag of viable omentum, which was fashioned of sufficient length so that tension on the duodenum would not cause it to rotate and obstruct. The omentum was secured to the area of perforation with a series of individual silk sutures placed circumferentially around the perforation (Fig. 1). The patch was applied in this way to avoid compromise of the pyloroduodenal lumen by Lembert sutures and to prevent through and through sutures acting as foreign bodies within the lumen of the duodenum. When adequacy of the lumen was questioned, a 40-F dilator was passed via the mouth through the stomach into the pylorus. Passage of the dilator without force or resistance ensured adequacy of the pyloric and duodenal lumen.

Gastric analyses were performed, as reported previously,<sup>19</sup> at each postoperative hospital visit that the patient permitted. These analyses included 2-hour basal acid output and a 2-hour maximal stimulated output in response to Histalog (1.7 mg/kg) and subsequently, to pentagastrin (6 µg/kg) when that drug became available. The peak basal and peak maximal hourly outputs were calculated. Because there were no preoperative gastric analyses, postoperative inhibition of the preoperative rates could not be used to evaluate the adequacy of vagotomy.



**Figure 1.** A viable omental tag is secured to the perforated ulcer with a circumferential row of sutures. This is done to avoid narrowing of the pylorus that might occur with Lembert sutures.

On the second day of the study, a 2-hour basal acid output was repeated and then followed by insulin stimulation. Insulin tests were performed on patients with no history of myocardial disease. After a basal collection of gastric juice for 2 hours, 0.2 units of insulin per kilogram body weight was given. Acid secretion was collected in 15-minute aliquots for 2 hours. The response was positive if the concentration of acid for anyone 15-minute period after insulin was 20 mEq/L greater than the highest concentration measure in any 15-minute period before insulin. For an insulin test to be acceptable, the blood sugar must fall 50% or more, and it must fall below 40 mg/percent.

Patients who had symptoms possibly related to an ulcer underwent esophagogastroduodenoscopy to verify existence of a recurrent ulcer. A patient who developed a recurrent ulcer was considered a failure and graded Visick IV for that annual examination period. If the ulcer healed, the patient was regraded at subsequent periods of examinations. A patient operated on for a recurrent ulcer was graded Visick IV for that period. Follow-up examinations continued, but the patient was no longer evaluated as a PCV after the recurrence.

## STATISTICAL METHODS

The Kaplan-Meier<sup>20</sup> life table analysis was performed using the Computer Program Lifetest SAS (SAS Insti-

tute, Inc., Cary, NC).<sup>21</sup> The probability of ulcer recurrence was thus calculated. The 95% confidence limits for the rate of recurrence was calculated as  $\pm$ two times the standard error. Between-group comparisons were made using Fisher's exact test for  $2 \times 2$  tables of frequencies.<sup>22</sup>

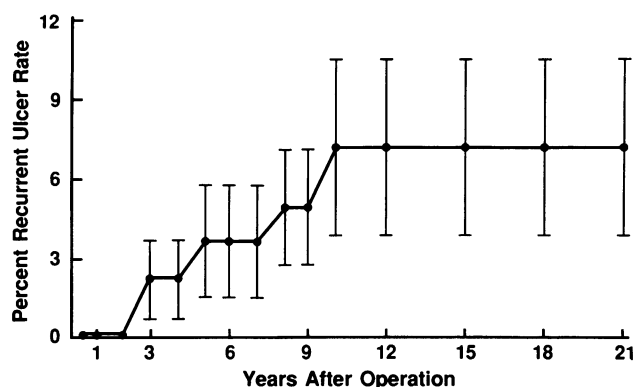
## RESULTS

There was one operative death, for a mortality rate of 0.9%. This patient was 61 years old. He had had ulcer symptoms for 6 years and had been perforated 45 hours before operation. The cultures of his peritoneal cavity were positive for *Pseudomonas aeruginosa*. On the second postoperative day, he developed cardiac arrest, followed by renal failure. The electroencephalogram showed evidence of severe cerebral damage. He became septic and *P. aeruginosa* was cultured from the sputum, urine, and blood. Pulmonary edema contributed significantly to his death 1 month after operation.

Operative and immediate postoperative complications included the need for splenectomy (three patients); subphrenic wound infection (one patient); wound infection (one patient); and small bowel obstruction requiring reoperation (one patient). Later in the postoperative follow-up, two additional patients required reoperation for small bowel obstruction. Early postoperative gastric retention was encountered to some degree in 12 patients. This did not prolong hospitalization and required no specific medical or surgical management before improvement in any case. One patient developed a ventral hernia and one patient required a fundoplication because of reflux-causing aspiration.

The postoperative follow-up period ranged from 2 to 21 years in 93 of the 106 patients who survived operation. The average follow-up was  $9 \pm 4.5$  years. Five patients were unable to be observed for follow-up within the first 6 months. Nine patients were observed for 6 months to 1 year. Two patients died within the first year, one from carcinoma of the lung and the other from an unknown cause. Altogether, we have documented 28 late deaths. The known causes of death were cardiac disease (eight patients), carcinoma of the lung (eight patients), vascular disease (two patients), head and neck cancers (four patients), carcinoma of the urinary bladder (one patient), Parkinson's disease (one patient), gunshot wound (one patient), and carcinoma of the stomach (one patient). There were no late deaths as a consequence of pyloduodenal ulcers or gastric surgery.

There were five recurrent or possible recurrent ulcers among the 106 patients who survived operation. To calculate the recurrent ulcer rate, the numerator was the total number of recurrent ulcers. The denominator was the number of patients observed for follow-up 2 years or longer. The overall recurrent ulcer rate was 5.3% (5/93).



**Figure 2.** The cumulative expected probability curve  $\pm$  two standard error for recurrent ulcer after parietal cell vagotomy for perforated pyloroduodenal ulcers.

The recurrent ulcer rate for pyloric and prepyloric ulcer patients was 16% (2/12). If we assume that a duodenal ulcer was present preoperatively in all patients other than those who had confirmed pyloric or prepyloric ulcers, the recurrent ulcer rate for duodenal ulcers was 3.7% (3/81). The cumulative probability of recurrent ulcer rate calculated by the life table method was 7.4% (Fig. 2).

Patients with recurrent ulcers are summarized in Table 1. The first patient listed had an unconfirmed recurrent ulcer. He did not complain of symptoms until 10 years after operation. He did not permit secretory studies to be performed, nor would he permit endoscopy for verification of an ulcer. His basal acid output at years 1 and 2 were 0.8 mEq/hr. Stimulation tests were not performed. He severely abused his stomach with alcohol. The second patient had a positive insulin test. The peak maximal stimulated output was 24.2 mEq/hr, and the peak basal acid output was 10.4 mEq/hr. These findings were consistent with an unsatisfactory vagotomy. This patient underwent truncal vagotomy and pyloroplasty 3 years after the original operation. His acid secretory studies were unchanged by truncal vagotomy. He has complained of diarrhea and dumping for 8 years after his second operation. He has had no further evidence of ulcer disease. His final result is classified as Visick III, although he is difficult to evaluate because of his alcohol consumption. The third patient had a negative insulin test. He underwent antrectomy and Billroth I for a large, recurrent, prepyloric ulcer similar to the preoperative ulcer. His peak acid output was 15 mEq/hr preoperatively and fell to zero after antrectomy. He had some dumping after the second operation, but he currently is graded Visick I 5 years later. The fourth patient developed a very small gastric ulcer 8 years after operation. The ulcer healed after treatment with an H<sub>2</sub> antagonist. The ulcer has remained healed without further treatment for 8 years. He is graded as Visick I. The fifth patient developed a prepy-

**Table 1. SUMMARY OF PATIENTS WITH RECURRENT ULCER**

Patient	Recurrence (Months Postoperative)	At Time of Recurrence		Location of Ulcer		Treatment	Months Followed Without Recurrence
		PAO mEq/hr	Insulin Test	Original	Recurrent		
15	120	—	Negative	Duodenum	No examination*		—
30	36	24.2	Positive	Duodenum	Pyloric	TV-P	96
35	60	15.2	Negative	Prepyloric	Prepyloric	A-B <sub>1</sub>	60
43	96	16.2	Negative	Duodenum	Gastric ulcer type I	Zantac	96
68	36	10.2	Negative	Duodenum	Prepyloric	Stopped Motrin	96

\* Patient intoxicated, would not permit examination.

loric ulcer 3 years after operation, when he started to take Motrin (The Upjohn Company, Kalamazoo, MI). This drug was stopped. The ulcer healed immediately and has remained healed for 8 years. The insulin test was negative in patients 4 and 5.

The acid secretory response to insulin hypoglycemia was performed on 70 of the 106 surviving patients. The insulin tests were positive in 14 of 70 patients after PCV. This included one of five patients with recurrent ulcers. The average peak acid output 2 to 5 years after elective PCV was 17.1 mEq/hr and 18.9 mEq/hr (NS) in patients with and without recurrent ulcer respectively.<sup>23</sup> This compares with the average peak acid output of 16.9 mEq/hr and 13.2 mEq/hr (NS) in patients operated for perforated ulcer with and without recurrent ulcer (Table 2). There was no significant difference in the peak acid output for patients with recurrent ulcers, whether they had elective or emergency surgery; in addition there was no difference for patients without recurrent ulcers. There was no significant difference in the peak acid output for patients who underwent elective surgery, whether or not

they had recurrent ulcers. There also was no difference for patients who had emergency surgery, whether or not they had recurrent ulcers.

Postoperative gastric sequelae were uncommon after PCV for perforated ulcers, just as they were after elective operations. Symptoms were mild, easily relieved, more frequent early after operation, and disappeared with the passage of time. At the last examination of the 93 patients who were observed 2 to 21 years, all patients were in Visick I or II categories except for 4 (Table 3). One patient did not complain of epigastric pain until 10 years after operation. Early secretory studies suggested a good vagotomy, but the patient would not permit secretory studies or endoscopy at the time of his symptoms. He was last seen at his 10-year follow-up. This patient, without confirmatory evidence, is considered to have had a recurrent ulcer and is classified as Visick IV. One patient underwent truncal vagotomy and pyloroplasty for a recurrent ulcer. He was a binge drinker and had diarrhea and dumping after his second operation. He was graded a Visick IV because of reoperation for recurrent ulcer, as well as for his symptoms. The third patient was a young alcoholic who complained of nervousness, vomiting, diarrhea, and epigastric pain. Upper endoscopy revealed

**Table 2. PEAK ACID OUTPUT 2 TO 5 YEARS AFTER PARIETAL CELL VAGOTOMY PERFORMED UNDER ELECTIVE AND EMERGENCY CONDITIONS**

	Without Recurrent Ulcer	With Recurrent Ulcer	Statistical Significance
PCV for intractability	n = 67 17.1 ± 8.7 mEq/hr	n = 10 18.9 ± 4.8 mEq/hr	NS
PCV for perforation	n = 62 16.9 ± 9.6 mEq/hr	n = 4 13.2 ± 9.9 mEq/hr	NS
Statistical significance	NS	NS	

± Standard deviation.

**Table 3. SUMMARY OF CLINICAL RESULTS AT LAST FOLLOW-UP**

Follow-Up (yrs)	No. of Patients	Visick Score	
		1 and 2	3 and 4
0	3	—	—
2 mo-1	11	11	—
2-5	29	27	2
6-10	27	26	1
11-15	26	25	1
16-21	11	11	—

no ulcer. He was graded Visick III. The fourth patient underwent antrectomy for recurrent ulcer and was graded Visick IV because he required reoperation. However, he was graded Visick I 7 years after the second operation, with regard to his clinical status.

## DISCUSSION

The oldest evidence for the type of perforated ulcer reported in this paper was in a 60-year-old Chinese man who died in 167 B.C. His corpse was in an exceptionally good state of preservation when exhumed in 1975.<sup>24</sup> Autopsy revealed he died of a perforated prepyloric ulcer. Duodenal ulcers were recognized in the late 17th century, but a perforated duodenal ulcer was first reported in 1746,<sup>25</sup> and first successfully operated in 1894.<sup>26</sup> The prevalence of gastric and duodenal ulcers and the frequency of ulcers among men and women has vacillated over the years. The number of patients with ulcer disease has declined in the United States and the United Kingdom since 1950. The number of perforated ulcers, on the other hand, has changed very little,<sup>27,28</sup> and the death rate from perforated duodenal ulcers in older patients has increased,<sup>28-30</sup> particularly in women older than 65 years of age.<sup>31-33</sup> Circumstantial evidence<sup>33-36</sup> suggests that these increases are the result of increased use of nonsteroidal anti-inflammatory drugs. One must be vigilant and not overlook the diagnosis of a perforated ulcer, particularly in older hospitalized female patients.<sup>37</sup> The frequency of perforated ulcers has increased in Singapore, Hong Kong, and China,<sup>34,38</sup> and has been attributed to unknown racial differences and possibly the prevalence of *Helicobacter pylori*.

After the first successful treatment of a perforated duodenal ulcer by excision in 1894,<sup>26</sup> other methods of treatment included pylorotomy, pyloroplasty, and antrectomy. Also, it was recommended in 1894<sup>39</sup> that if the ulcer was very large, it could be filled with omentum, a concept subsequently modified by Graham.<sup>40</sup> Controversy has continued concerning the management best suited for treatment of perforated duodenal ulcers. Simple closure of the ulcer using an omental patch, as popularized by Graham in 1938, is the method most widely used today.<sup>40</sup>

The problem with simple closure of perforated duodenal ulcers has been the unpredictable but significant recurrent ulcer rate associated with the procedure. DeBakey reported in 1940 that subtotal gastric resection could be performed with a mortality rate similar to simple closure. The recurrent ulcer rate of 20%, however, did not justify the procedure, in his opinion.<sup>15</sup> Later, it was demonstrated by Jordan et al.<sup>41</sup> that subtotal gastric resection and gastric resection and truncal vagotomy could be performed in selected patients with a mortality rate of 1% to

2.2% and a recurrence rate of 6.9%. Thus, the need for a second operation in many patients was prevented. Nevertheless, controversy has continued over the merits of simple closure *versus* those of definitive therapy, which deals with the emergency and also attempts to prevent persistent or recurrent ulcers. Many surgeons do not accept definitive surgery as initial treatment for perforated pyloroduodenal because of their concern for increased morbidity and mortality in some patients who might never require definitive ulcer therapy.

The ideal operation, if definitive treatment of perforated pyloroduodenal ulcers is to be accepted, should have negligible mortality, provide protection against recurrent ulcer, and cause no morbidity for patients who would not have required definitive therapy for recurrent ulcers. The excellent results obtained with PCV for elective treatment of duodenal ulcer suggest that it might fulfill our requirements for the definitive treatment of perforated ulcers. Our experience with PCV in 107 patients with perforated pyloroduodenal ulcers demonstrates that it can be used in selected cases with minimal morbidity, mortality (0.9%) and recurrent ulcer rate (7.4%). This study confirms another report,<sup>42</sup> as well as our own,<sup>23</sup> that PCV can be performed equally well in emergency as in elective situations. It is our estimate that 75% of patients with perforated pyloroduodenal ulcers are potential candidates for this operation. We do not have the data to demonstrate that inhibition of preoperative acid secretion is as great when operation is performed under emergency conditions as when performed electively. Our acid secretory data do suggest that this is true because postoperatively, there is no statistical difference in peak acid output performed under the two conditions. This leads us to believe that PCV can be performed equally well under emergent and elective conditions.

The recidivism of ulcer in our study by life table analysis was 7.4%, and the reoperation rate for recurrent ulcers was 1.9%. Although the two patients who underwent reoperations for recurrent ulcer represent failures of PCV, the requirement for a second operation was no different than would have been the case if these patients had undergone simple closure initially. On the other hand, if all patients had been treated by simple closure, the number of recurrent ulcers and those requiring reoperation would have been greater. Unless treated with an H<sub>2</sub> antagonist after simple closure, the recurrent ulcer rate ranges from 63% to 85% and the reoperation rate changes from 17% to 33%.<sup>4,43</sup> In a summary of nine reports, the number of patients requiring reoperation after simple closure ranged from 35% to 50%.<sup>44</sup> In another study, 60% of those patients with chronic ulcers and 14% of those with acute ulcers required further ulcer surgery after simple closure.<sup>45</sup> It is reasonable to presume that we spared a significant number of our patients a second ul-

cer operation. At the same time, for those patients who might not have had subsequent ulcer symptoms, PCV inflicted virtually none of the morbidity customarily associated with other forms of definitive treatment. The only death occurred when the risk factor of long-standing perforation (45 hours) did not receive proper attention. Our study confirms those of others<sup>3,4,26</sup> who have shown that in the absence of risk factors, definitive operation using PCV is of no greater risk to the patient than a simple closure. Although we cannot justify performing a definitive operation in this case, it can be said that this patient might have died with simple closure as pointed out in a multifactorial analysis of mortality by Bodner et al.<sup>47</sup>

In one prospective, randomized study, recurrent ulcer symptoms occurred in 9% and reoperation was required in 6% of patients after truncal vagotomy and pyloroplasty, compared with 3% recurrence of symptoms and no reoperations after PCV.<sup>4</sup> In a second prospective study,<sup>6</sup> the recurrent ulcer rate after PCV was 5% compared with a 58% recurrence rate after simple closure. Other studies<sup>3,35,48</sup> with low recurrence rate, low mortality, and virtual absence of gastric morbidity support the use of PCV for treatment of perforated ulcer, rather than simple closure or other forms of definitive operation.

Simple closure probably is the most common method of treatment of perforated ulcers, but because the mortality rate in patients without risk factors is equal for simple closure and definitive therapy,<sup>46</sup> we prefer definitive therapy in the form of PCV and omental patch closure for all perforated pyloroduodenal ulcer patients without risk factors. Because of the long-term good results, this operation has become our operation of choice for all perforated pyloroduodenal ulcers where the operation is technically possible. Nonoperative treatment has only limited application, but may be applicable to a small group identified by the evaluation of prognostic risk factors.<sup>49</sup> Our previous observations suggest that certain patients may be too ill to survive even simple closure.<sup>49</sup> Although the mortality will be high, some patients with risk factors of shock, major medical illness, and long-standing perforation may be better treated by the nonoperative method outlined by Donovan et al.<sup>50</sup> Age is a contraindication to definitive operation only in the sense that coexisting severe disease that contraindicates such treatment occurs with increasing frequency with advancing age.

As mentioned previously, it is difficult at the time of operation to identify those individuals likely to have recurrent symptoms if definitive operation is not performed. The pathologic distinction between acute and chronic ulcers is imprecise at the operating table, and the duration of ulcer symptoms that qualify a patient for chronicity ranges in the literature from 1 month to 1 year

or longer. Thus, we are not convinced of the usefulness of selecting the method of operative treatment based on these criterion. Even if the distinction between acute and chronic ulcers could be made, chronic ulcers do not invariably recur, and acute ulcers are not completely immune from recurrence after simple closure. Because PCV provides treatment for perforated ulcer without significant postoperative sequelae and a mortality rate that is equal to that following simple closure,<sup>9,11</sup> we continue to support the use of this operation for all perforated, pyloroduodenal ulcer patients who are without risk factors. Whether one performs PCV should depend on the existence of risk factors, not on the basis of trying to ascertain whether the ulcer is acute or chronic.

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## Discussion

DR. MICHAEL E. DEBAKEY (Houston, Texas): Dr. McDonald, Dr. Copeland, Ladies and Gentlemen. I had the privilege of reading this paper because Dr. Jordan was kind enough to send it to me, and I want to commend him for the well-designed study and the excellent results he obtained.

We have been interested in this subject for a long time. As most of you know, there has been considerable controversy about the ideal management of this disease for more than 100 years. The surgical treatment has been divided into what might be called conservative methods, such as simple closure or closure with the omental plug, and the more radical procedures, which consist in gastric excisional therapy.

The Continental surgeons, particularly the German surgeons, were great proponents of excisional therapy, or what might be called radical surgery (a more definitive type of procedure), whereas most surgeons in the United States have preferred a more conservative approach. However, in 1952, my late colleague Dr. George Jordan and I established a policy for our department of doing excisional therapy for all except those types of perforated ulcers that had complications. Before this Association 21 years ago, we presented an analysis of our experience following that policy. We did modify it somewhat by adding vagotomy to excisional therapy. At the time, in our presentation before this Association 21 years ago, we were able to indicate that in the series of patients treated by excisional therapy alone, the mortality was a little over 2%, and for those treated with excisional therapy and vagotomy, it was 2.5%.

I am pleased that Dr. Paul Jordan has carried on our interest in this disease and has, as you see, brought it to a much more rational conclusion. The results he presented clearly indicate that this is the procedure of choice; and, except for those contraindications that he has pointed out in his paper but didn't indicate in his presentation, this is the procedure of choice for patients who have to be treated for perforation. Parietal vagotomy with omental closure is obviously the best procedure at this time. Thank you.

DR. DAVID V. FELICIANO (Atlanta, Georgia): Dr. McDonald, Dr. Copeland, Dr. Jordan was kind enough to send me a copy of the manuscript. I appreciated this because he helped