

## Current Practice

### DISEASE OF THE DIGESTIVE SYSTEM

#### Perforated Peptic Ulcer

J. A. SHEPHERD,\* V.R.D., M.D., F.R.C.S.ED.

*Brit. med. J.*, 1968, 1, 625-628

Perforations of peptic ulcers account for between 5% and 8% of abdominal conditions submitted to urgent laparotomy. The general practitioner may see less than one case a year even though in an average-sized practice he has many patients with peptic ulcers. This relative rarity of the complication of perforation in the experience of the individual practitioner does not often lead to difficulty in diagnosis. For few other conditions is he more thoroughly indoctrinated as a student, textbook descriptions are vivid, and when one typical case has been seen the picture is not readily forgotten. This particular "classical" description—unlike many other classical descriptions of disease—is only rarely misleading.

Generalizations may be made that in females duodenal perforations are about twice as common as gastric perforations while in males the ratio is nearer eight to one. In the experience of the general practitioner perforation is a much less frequent acute complication of ulcer than haemorrhage. In a profile of the peptic ulcer problem as seen by the general practitioner Fry<sup>1</sup> records in a ten-year period 16 perforations, of which 14 were duodenal in the male, 1 duodenal in the female, and 1 gastric in the male. In all the peptic ulcer cases in his practice 14% developed the complication of bleeding and 6% perforated.

#### Aetiology

Despite much statistical study the causes of perforation remain obscure. The influence of psychological stimuli is perhaps exaggerated though traditionally popular, seasonal variations seem significant in some parts of the country but not in others, and "week-end" perforations are occasionally predominant in some series. The phenomenon seems to be due rather to a chance combination of many factors, and in an individual case one specific reason is not usually apparent.

The patient may have years of relapsing or chronic trouble with repeated positive x-rays showing an established ulcer crater, and at operation in such cases the indurated margin of the ulcer, its size, its local penetration, adhesions, and distortions are very obvious. Alternatively perforation may occur in a patient with no hint of previous trouble, and at operation there may be seen a very small leaking point with little more than hyperaemia in the immediate adjacent visceral wall. There are some cases, however, where even the appearance of the actual lesion is difficult to interpret; some acute perforations are associated with surrounding oedema which feels like the induration of a chronic ulcer. Often chronicity of peptic ulceration is defined only by careful review of the previous history, but a patient in extreme pain

at the time of his crisis may not volunteer much information about relatively mild symptoms of indigestion which have happened previously. The recognition of an acute as opposed to a chronic or relapsing ulcer must have considerable bearing on the choice of management.

It is easier to understand the sudden "blow-out" of the thin avascular floor of a chronic ulcer in the unsupported anterior wall of duodenum or stomach than to explain the rapid penetration of all coats of the viscus in relation to an acute ulcer. In the latter instance it can only be postulated that an acute vasospasm or even an embolic phenomenon renders a small area ischaemic and that autodigestion may be the final factor.

#### Pathology

Usually perforations are on the anterior wall of the stomach or duodenum and leakage of visceral contents is sudden. Almost inevitably air and fluid become spread widely throughout the peritoneal cavity with the immediate development of general peritonism. In a minority of cases the irritant effusion may pool locally. A classic example of this occurs when an ulcer perforates well along the first part of the duodenum and effusion is directed by the anatomical "gutters" to accumulate in the right iliac fossa and so mimic the local peritonitis of appendicitis.

Posterior perforations present deceptive clinical pictures but, fortunately, are rare. In general the posterior ulcer is a chronic penetrating lesion sealed effectively by adjacent serosal surfaces, and if it produces a crisis this is more likely to be due to erosion of blood vessels than to free perforation into a cavity such as the lesser sac.

What really matters about perforation is that once sudden leakage develops it is more likely to continue than to be effectively sealed off. That some undoubted examples of "spontaneous" cure of perforated peptic ulcer have been recorded is no real argument in favour of non-operative treatment. In the majority of cases continuous or intermittent leakage gives a cumulative effect, which may lead to infective peritonitis with increasing toxæmia and gross fluid loss. In the untreated case death may well follow from ileus and associated respiratory complications.

The degree of involvement of the peritoneal cavity by bacteria is always uncertain. To suggest that at first the visceral contents are sterile and that infective peritonitis in the early case is unlikely is optimistic. Swallowed oral and upper respiratory tract secretions may be highly infective and food particles are seldom sterile. It is right, therefore, to

\* Consultant Surgeon, Broadgreen Hospital, Liverpool.

assume that peritoneal contamination with pathogenic organisms may occur immediately. Undoubtedly the peritoneum has an astonishing capacity to deal with infection, but with continued leakage the total infection may become too much for the natural defences and even too much for the most expensive wide-spectrum antibiotics. This is the main argument in favour of urgent operative intervention to stop the leak. If substantiation of this argument is required it is given in the dramatic difference of the results following early treatment (within 10 hours) and of those following late treatment, not only in terms of mortality but also in morbidity.

### Diagnosis

More than half of patients whose ulcer perforates admit to an ulcer history and often they have been proved to have chronic or relapsing peptic ulcer by radiography. Some patients have an exacerbation of symptoms in the days or weeks prior to perforation, but this is by no means the rule. More than 90% of patients can give the exact time of onset of acute symptoms—in few other acute abdominal conditions does this happen. It is this immediate prostration with severe generalized and unremitting pain which is so characteristic. If on clinical examination it is found that, as Moynihan so aptly wrote, "Every part offers the most inflexible opposition to pressure, the rigidity is obdurate, persistent and unyielding," there is seldom doubt about the diagnosis.

Generalized extreme abdominal rigidity is the finding in three out of four cases of free perforation. In the remaining quarter of cases one or both lower quadrants may be rather less rigid, or rarely—in the aged, in late cases, or in those who have had a vagotomy—true rigidity is absent. With lesser degrees of rigidity there is nevertheless widespread tenderness. While in doubtful cases the detection of resonance over the liver area, the absence of intestinal sounds on auscultation, the discovery of tenderness in the recto-vesical or recto-uterine pouch by rectal palpation, and the elicitation of shoulder pain may all help towards diagnosis, in most instances these niceties are only confirmatory.

The practitioner by his own unaided clinical sense is likely to be correct in the diagnosis of perforated peptic ulcer in about seven cases out of ten. The emergency surgeon with a more concentrated clinical experience, more sophisticated procedures such as radiography to prove the presence of free air under the diaphragm, biochemical tests to exclude conditions such as pancreatitis, and the advantages of examination in favourable environment, is likely to be correct in his diagnosis almost every time. The small number of errors in diagnosis usually arise from conditions for which urgent operation is necessary.

### Differential Diagnosis

There are remarkably few conditions which simulate perforated ulcer and for which operation would be disastrous. A much quoted example is the abdominal crisis of tabes with root pain and rigidity. Such a presentation of tabes is extraordinarily rare today, and perhaps the risk of missing an ulcer perforation in a known case of tabes is greater than the risk of operating in error for a tabetic crisis. Coronary thrombosis is very unlikely to produce a widespread abdominal rigidity and tenderness without very clear signs of a cardiac disaster. The referred abdominal rigidity and tenderness from pleuritic or pneumonic inflammations are unlikely to be confused.

It is perhaps less easy to distinguish the generalized acute peritonitis of pancreatitis, cholecystitis with perforation, and primary peritonitis. All of these conditions may develop as suddenly as a perforated peptic ulcer. In two of these con-

ditions there is a choice between non-operative and operative management, but if operation is done in the expectation of finding a perforated peptic ulcer the exploration need not be harmful and often may be beneficial. In hospital with repeated opportunities for examination, with the help of radiography and, for pancreatitis, with the serum amylase test, such cases can usually be distinguished. It is worth remembering, however, that in a few late perforations the serum amylase is markedly raised. Pancreatitis is discussed in detail elsewhere in this series.

Every practitioner and surgeon has at some time in his career diagnosed perforated ulcer and subsequent operation has revealed acute perforated appendicitis. An appendicitis severe enough to mimic the general peritonitis of perforated peptic ulcer certainly requires exploration, and the only real disadvantage is the necessity of extending the original upper abdominal incision. A perforated ulcer which gives a localized peritonitis in the right iliac fossa presents a similar problem in that the approach may have been made by a local iliac incision; when the effusion is recognized to be coming from the upper abdomen the first incision must be closed and an upper epigastric incision substituted. Occasionally rarities such as non-traumatic or pathological ruptures of viscera, tumours, or diverticula will be misdiagnosed as perforation. Very rarely intraperitoneal haemorrhages, various torsions, and small bowel obstructions will mislead. Such surprises, in total, form a small but appreciable percentage of cases and all demand surgical intervention.

### First-aid Treatment

The natural and understandable reaction of the practitioner on diagnosing a perforated ulcer is to summon the ambulance and get the patient off to the nearest hospital as quickly as possible. To the best of my knowledge no one has suggested as a routine the insertion of a gastric tube in an immediate attempt to decompress the stomach and so diminish the leakage of visceral contents into the peritoneal cavity. The benefits of late gastric suction—often begun some hours after perforation—are well known. It seems reasonable to suppose that gastric suction instituted by the practitioner immediately the diagnosis is made and continued with a syringe by the ambulance attendant (particularly on a long journey) would have a marked influence in diminishing the serious consequences of leakage and in controlling pain and shock. By this means the hazards of a long interval between the perforation and operation might be lessened. Here is an opportunity for a simple clinical trial which requires only that a group of practitioners working in close liaison with a co-operative surgical division of one hospital should have gastric tubes always available and should develop the simple skill of passing such tubes.

The tradition dies hard that the practitioner should not mask symptoms and signs by giving to a patient with an acute abdomen some pain-relieving injection. Are we perhaps rather inhumane in withholding such relief in clear-cut cases of perforated ulcer? There is surely justification for giving 100 mg. of pethidine intravenously before transporting a patient in the standard uncomfortable British ambulance. Provided the practitioner records the dosage and time of administration and has discussed such a procedure with the surgeon who receives his cases there can be little risk of confusing the issue. Such a dosage will mask signs and symptoms only temporarily and the gain to the patient may be considerable.

### Management

While the majority of surgeons in this country are in favour of urgent operative treatment for perforated peptic ulcer the

experience on non-operative treatment initiated by Hermon Taylor and others in 1946 should not pass unnoticed.

### Non-operative Treatment

The advocates of non-operative management of perforated ulcer make the following assumptions. With radiographic methods accuracy of diagnosis is near perfect. Effective gastric suction, if it does not control it completely, greatly diminishes leakage. If infection of the peritoneum occurs this can be dealt with by antibiotics. An *acute* ulcer may heal more rapidly when treated conservatively than when sutured.

Those who do not favour non-operative treatment question some of these assumptions. They recognize the small group of conditions which may mimic perforation exactly and for which operative delay may prove disastrous. They appreciate that it is not always easy to achieve adequate gastric suction—especially if the patient is a habitual air-swallower. They have limited faith in the ability to choose an antibiotic which can deal with all the potential pathogens which may spill into the peritoneal cavity. They deny the possibility of differentiating, without operation, an acute and a chronic ulcer.

Non-operative treatment was introduced at a time when the mortality after operation for perforated ulcer was deplorably high. Even allowing for a degree of selection of cases in series treated without operation the results were better than those which followed contemporary operative management. In the 20 years which have elapsed since non-operative treatment was strongly advocated the mortality and morbidity rates following operative methods have been so much improved that the case for non-operative treatment is weakened. A factor in this improvement is the routine preoperative and postoperative use of gastric suction, and this is, of course, a legacy from the non-interventionists.

There are some circumstances in which non-operative treatment is invaluable. Some patients may refuse operation. In a ship at sea or in similar circumstances without adequate equipment or surgical skill the technique is not only well justified but may present the only solution to a difficult problem.

Non-operative treatment, even with the elaborate radiographic control which is an essential adjunct, is now seldom advocated as a routine. It is true, however, that in some cases where the signs and symptoms are minimal the regimen, conducted in all its details, is of great value. Early and rapid improvement of signs and symptoms may justify its continued application especially if the history strongly suggests perforation of an acute ulcer. Thus the rather unfortunately named "leaking ulcer," or "forme fruste," may settle down rapidly. By judicious application of the non-operative technique a laparotomy which would reveal an acutely inflamed ulcer with local peritonitis, but no perforation, may be avoided.

### Operative Treatment

If a patient is admitted to hospital with a positive diagnosis of perforated ulcer a short period of rest and warmth, treatment with morphine, and the immediate institution of gastric suction usually improve the general condition and lead to some diminution of pain, tenderness, and rigidity. Unless this improvement is exceptional urgent operation is necessary, and the surgeon should not be deceived by a phase three or four hours after perforation when signs and symptoms may quieten down to some extent. Operation is usually undertaken within two hours of admission. Radiographic examination of the abdomen is worth while in every case and at the same time the chest should be x-rayed. In a few cases basal atelectasis can be recognized before operation, and the

anaesthetist should know of this so that he may take appropriate action.

The surgeon must consider for the individual case whether he is going to do a quick closure of the perforation or whether he is justified in performing a definitive procedure which may cure the underlying peptic ulceration. Cure of the chronic disease, however, must be a secondary consideration, and in many instances the emergency procedure should be regarded as life-saving and should be executed as quickly and as simply as possible. There is much to be said for routine simple closure of a perforation. The indications for more elaborate procedures aimed at curing ulceration are relatively few and fairly definite. This rather conservative and cautious outlook must, however, be tempered by a recognition of changes which have taken place in the elective surgery of peptic ulcer. When partial gastrectomy was the operation of choice for duodenal ulcer as well as for gastric ulcer there was some hesitation in doing this operation routinely as an emergency procedure for perforation despite many remarkably successful series. Now that vagotomy and a drainage procedure are advocated for duodenal ulcer consideration must be given to the possibility of doing this lesser procedure in emergency. Surgeons are at present giving a full trial to the ideal of closure combined with a curative operation, and, provided the more elaborate procedures are done by those with full experience, such developments are well justified. As long as the majority of perforated ulcers are dealt with by relatively inexperienced surgical registrars there is a strong case for simple closure in most instances.

*Simple Closure.*—This is a rapid and usually an easy procedure. In most cases the perforation is anterior and is readily accessible and easily sutured. As much as possible of the spilled visceral contents in the vicinity should be sucked or mopped clear. Drainage is required only in the late case. Recovery is usually rapid, and in most cases there is a dramatic improvement in the patient's condition a few hours after operation. The mortality rate is now less than 5% in most series even with the inclusion of a large proportion of elderly patients. Inevitably in the postoperative period there are, particularly with the aged, occasional deaths from coronary thrombosis, cerebral haemorrhage, or pulmonary embolus. With modern anaesthetic methods postoperative gastric suction, and intelligent control of electrolytes the risks of ileus, peritonitis, and chest lesions—formerly so largely contributory to a high morbidity and mortality—are now greatly lessened. Subphrenic abscess is still an occasional complication but now is seldom unrecognized or mismanaged.

Rarely haemorrhage occurs from a sutured ulcer (though it may occasionally develop in the postoperative period from an associated posterior penetrating ulcer). Acute duodenal obstruction after suture of an ulcer situated near an already narrowed pylorus is most unusual. Reperforation in the early stages is very rare.

The long-term follow-up is of great importance, and it is often difficult to get the patient to understand that he has not necessarily been cured after a perforation has been treated by simple closure. In a small proportion of cases where a genuine acute ulcer has perforated absolute cure may be obtained. In the majority, however, there is a recurrence of peptic ulceration either as a chronic disease or by a further acute complication such as reperforation, haemorrhage, or pyloric stenosis. It may be assumed that in any large series less than 25% of patients remain free from troublesome symptoms while 75% have persistent or recurrent trouble, and of these at least a third come to elective or to further emergency surgery within five years.

*Simple Closure with Gastroenterostomy and Vagotomy for Duodenal Ulcer.*—If vagotomy with a drainage procedure is accepted as a treatment of choice for chronic duodenal ulcer it should be considered for regular use in emergency operations. There are now many series of cases published from which clear

indications can be given for its use. Rarely, when a duodenal perforation is associated with extreme stenosis, an immediate gastroenterostomy is absolutely necessary and this must be combined with vagotomy (with gastroenterostomy alone the risk of early acute or chronic trouble is exceptionally high). In straightforward cases of perforation of duodenal ulcers which are undoubtedly chronic, as shown by the history and the operative findings, vagotomy and gastroenterostomy (or occasionally pyloroplasty) does not seem to increase the mortality or morbidity rate as compared with simple closure provided that the patient is in good general condition and that the perforation-operation interval is not excessive.<sup>2,3</sup> Fears that have been expressed that manipulations at the hiatus in isolating the vagal branches might lead to a risk of mediastinal infection have not been substantiated. Needless to say this emergency procedure is only for the experienced vagotomist. The long-term prognosis with regard to cure of chronic ulceration is as good as in the elective case.

*Emergency Partial Gastrectomy for Perforated Gastric Ulcer.*—Before vagotomy was developed some remarkably successful series were reported in which immediate partial gastrectomy was done for both gastric and duodenal ulcer perforations, but results comparable with those following simple closure were obtained only by experienced gastrectomists. While emergency gastrectomy is usually considered inapplicable at present for perforated duodenal ulcer the operation has an important place in some cases of perforated gastric ulcer. Provided the patient's general condition is fairly good and the perforation-operation interval not excessive partial gastrectomy should be done in the following circumstances for gastric ulcer.

- (1) Association of bleeding and perforation.
- (2) Recurrent gastric perforation.
- (3) Suspicion of malignancy in a gastric ulcer.
- (4) Extreme difficulty in closing a large gastric ulcer.
- (5) Association of gross pyloric stenosis.

Even accepting that following simple closure perforated gastric ulcer is associated with a higher mortality than perforated duodenal ulcer there are good reasons for restricting partial gastrectomy to selected cases. The hazards which present after simple closure of a gastric ulcer—unrecognized malignancy, early recurrence by further acute complications, and disabling chronicity—can be avoided firstly by taking a biopsy of the edge of the ulcer crater in every case and secondly by very careful follow-up with either gastroscopy or radiography. Almost all chronic gastric ulcers which perforate persist and will come to early elective surgery if treated by simple closure alone. It is probably right to accept a two-stage operative management in most cases.

#### Aftercare

If a patient has a perforation closed and at the same time some additional curative procedure is done the management is the same as for elective vagotomy and drainage or partial

gastrectomy. A gradual return to a fairly full and regular diet is usually possible, vitamin supplements may be necessary, and the risks of iron deficiency and calcium deficiency should be recognized. Presumably the incidence of postvagotomy or post-gastrectomy symptoms is the same as follows elective surgery.

The patient who has simple closure alone for a gastric ulcer perforation needs careful watching. There is a good case for radiographic examination six to eight weeks after operation even if the patient is symptom-free—large persistent ulcers may be remarkably silent.

If a duodenal ulcer has been dealt with by simple closure the patient should be advised to continue on alkalis with a moderately controlled and regular diet for several months. In these cases there is little to be learned from early check radiography unless stenosis is suspected. Following suture of an ulcer there is almost always some irregularity in the area and this may be reported erroneously as an active ulcer. Where closure is done for perforation of a chronic ulcer there are good grounds for arranging an estimation of acid secretion about six weeks after the emergency. The high acid secretor is the most likely to run into trouble.

#### Summary

Thirty years ago the mortality rate of perforated ulcer treated operatively was often over 20%. Now with simple closure, or in selected cases with the addition of definitive surgery for the chronic lesion, the mortality rate should be below 5%. For few surgical conditions have modern anaesthesia and intelligent pre- and postoperative management paid greater dividends. For the patient perforation is one of the most frightening and painful experiences, but with prompt diagnosis and rapid but thoughtful planning the surgeon can give remarkably complete reassurance that treatment by operation will be successful.

#### REFERENCES

- <sup>1</sup> Fry, J., *Brit. med. J.*, 1964, 2, 809.
- <sup>2</sup> Hadfield, J. I. H., and Watkin, D. F. L., *Brit. med. J.*, 1964, 2, 12.
- <sup>3</sup> Hamilton, J. E., and Harbrecht, P. J., *Surg. Gynec. Obstet.*, 1967, 124, 61.

#### B.M.J. Publications

The following are available from the Publishing Manager, B.M.A. House, Tavistock Square, London W.C.1. The prices include postage.

<i>Porphyria—a Royal Malady</i> ... ..	Price 13s. 6d.
<i>Is There an Alternative?</i> ... ..	Price 7s. 6d.
<i>Treatment of Common Skin Diseases</i> ... ..	Price 10s.
<i>Obstetrics in General Practice</i> ... ..	Price 32s. 6d.
<i>Child Care</i> ... ..	Price 32s. 6d.
<i>Charles Hastings and Worcester</i> ... ..	Price 3s. 6d.