Introduction

Perforation of an ulcer of the first part of the duodenum is not an infrequent surgical emergency. The escape of gastric contents, bile and pancreatic secretions into the peritoneal cavity usually results in peritonitis requiring emergency surgical toilet and closure of the perforation. In selected patients, with radiological evidence of sealed perforation, conservative treatment by nasogastric drainage, intravenous fluids, antibiotics and repeated careful observation may be indicated, especially in high-risk patients.

The majority of patients managed surgically undergo either simple closure of the duodenal perforation with omental patching alone, or in combination with definitive surgical treatment involving some form of vagotomy. The benefits in reduced long-term ulcer morbidity and mortality resulting from the latter approach must be balanced with the increased early morbidity and mortality due to the larger emergency procedure and the distinct possibility for the development of long-term sequelae such as dumping and diarrhoea, especially if a truncal vagotomy and drainage is performed.

The reduction of the trauma of access by the emergency laparoscopic approach has certain advantages. It allows definite confirmation of the diagnosis which is incorrect in 8% of patients managed conservatively. In addition, it carries the potential for accelerated postoperative recovery with decreased pain, earlier mobilization and more rapid return to normal daily activities compared to conventional laparotomy. The laparoscopic approach may well lead to a reduction in the incidence of postoperative respiratory morbidity and overall mortality. Most of these advantages are perceived, however, and require confirmation by reports of large numbers of patients treated laparoscopically.

The laparoscopic approach does not alter the underlying principles for surgery of perforated ulcers. These include good exposure, approximation of tissue without tension, and thorough peritoneal toilet. The limitations of instrumental access using laparoscopic ports entail, however, the use of alternative techniques to achieve these objectives.

Indications and Patient Selection

Laparoscopic treatment of perforated duodenal ulcer should only be entertained by those with experience of laparoscopic suturing and knotting techniques and with the proviso that the necessary equipment is available (see below). In all other respects, the indications are identical to those for conventional open surgical intervention. Specifically, emergency laparoscopic toilet and suture closure for perforated duodenal ulcer is indicated if there is:

1. Clinical evidence for duodenal ulcer perforation.
2. Peritonitis of less than 48-h duration.
3. No history of previous gastric surgery as this is liable to result in extensive dense adhesions in the supracolic compartment particularly around the stomach and duodenum.

In those patients in whom some uncertainty exists as to the suitability for the laparoscopic approach, it is reasonable to commence the operation 'by this route and convert to a laparotomy as required. No disadvantage to the outcome of the patient is incurred by the adoption of this sequence.

Preoperative Preparation

The preoperative diagnosis is usually clear-cut on clinical grounds and is confirmed by scout chest films taken in the erect position which outline the presence of free air under the right diaphragm. Nasogastric aspiration through an indwelling Ryle’s tube is commenced and an intravenous line is set up. Opiate analgesia is started to relieve the pain once the diagnosis is established. Antibiotic therapy is commenced, usually with
a broad-spectrum antibiotic such as a second-generation cephalosporin or aminoglycoside.

In all patients informed consent must be obtained with regard to the possible need for conversion to an open operation during the course of the procedure.

**Anaesthesia**

The procedure is undertaken under general endotracheal anaesthesia with muscle relaxation and controlled ventilation. Prior to induction, the Ryle’s tube is aspirated to ensure that the gastric reservoir is empty and thus prevent inhalation. The urinary bladder is catheterized but the catheter is removed at the end of the operation.

**Patient Positioning and Skin Preparation**

The patient is operated on in the supine position with a head-up tilt. As the position of the table will require to be changed, particularly during the aspiration and saline irrigation of the peritoneal gutters and pelvis, it is wise to strap the patient to the operating table. The entire anterior abdominal wall is cleaned with medicated soap and skin antiseptic applied. The operative field is isolated with sterile drapes in a manner identical to that used in open surgical treatment of perforated duodenal ulcer.

**Layout of Ancillary Instrumentation and Positioning of Staff**

The surgeon operates from the left side of the patient with the assistant and scrub nurse on the opposite side. The exact layout of the ancillary instrumentation depends on the configuration of the operating theatre, but, if possible, the electronic insufflator, telescope warmer, light source, diathermy, suction and irrigating systems should be stacked behind the surgeon.

**Details of Specific Instrumentation and Consumables**

In addition to the standard laparoscopic equipment, the following instruments are needed:

1. Suture applicator
2. Semm’s needle holders (3.0 and 5.0 mm)
3. Cook’s curved needle driver (5.0 mm)
4. Expanding retractor

The suturing is performed with either polydioxanone or polyglactin or 3/0 atraumatic sutures (polysorb endoski needle).

**Operative Steps**

**Exposure**

Peritoneal insufflation is performed using a Veress needle inserted for this purpose. CO₂ is insufflated using an electronic insufflator with automatic high-flow capability. The presence of scarring in the area of the umbilicus may indicate the use of other techniques for safe induction of the pneumoperitoneum (see Chap. 13). The cut-off pressure for the insufflator should be set at 12.0 mm Hg.

The positions of the cannulae through the anterior abdominal wall are shown in Fig. 22.1. The technique for insertion of the initial cannula is dependent on the surgeon’s suspicion of the presence of underlying peritoneal adhesions. In the unscarred abdomen, the ini-

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Fig. 22.1. Optimal sites for the cannulae. One of the lateral 5.5-mm cannulae may need to be replaced by an 11.0-mm during the course of the operation.