[3] Miller and Matthews, "A Study of the Mechanical Factors in Experimental Acute Pulmonary Œdema," *Archives of Internal Medicine*, 1909, vol. iv. p. 356.

[4] Tripier, *Etudes Anatomo-cliniques*, Paris, 1909.

[5] Hess, "Künstliche Plethora und Herzarbeit," *Deutsch. Arch. f. klin. Med.*, 1909, Bd. xcv. S. 482.

[6] Tigerstedt, "Zur Kenntnis der von dem linken Herzen herausgetriebenen Blutmenge in ihrer Abhängigkeit von verschiedenen Variabeln," *Skandin. Arch. f. Physiol.*, 1909, Bd. xxii. S. 115.

[7] Aschoff and Tawara, *Die heutige Lehre von den pathol.-anatom. Grundlagen der Herzschwäche*, Jena, 1906.

[8] Geipel, *Münch. med. Wochenschr.*, 1907, Bd. liv. p. 1057.

[9] Carey Coombs, "Rheumatic Myocarditis," *Quart. Journ. of Med.*, 1908, vol. ii. p. 26.

[10] Bracht and Wächter, "Beitrag zur Atiologie und pathologischen Anatomie der Myocarditis Rheumatica," *Deutsch. Arch. f. klin. Med.*, 1909, Bd. xcvi. S. 493.

[11] Stewart, *Bull. of the Johns Hopkins Hosp.*, 1909, vol. xx. p. 209.

[12] Anders, "Relative Aortic Incompetency of Muscular Origin," *Ibid.*, 1909, vol. xx. p. 205.

[13] Bard, "Les insuffisances aortiques sans souffle," *Semaine méd.*, 1909, tome xxix. p. 253.

SURGERY.

By HENRY WADE, M.D., F.R.C.S.,
Assistant-Surgeon, Royal Infirmary, Edinburgh; Assistant-Surgeon, Leith Hospital.

Jejunal and Gastro-Jejunal Ulcer following Gastro-Jejunostomy.

According to Paterson (*Annals of Surgery*, vol. 50, No. 2) the risk of jejunal ulcer following the operation of gastro-jejunostomy is probably under 2 per cent. In his own practice he has encountered 2 such cases, and in one of these, analyses of the stomach content were made before and after the operative treatment carried out for the relief of the jejunal ulcer. He has been able to collect records of 61 other cases, and in certain of these the after-history of the patient since the case was put on record has been obtained by him. By this means there has been produced an original memoir containing information of the utmost value, both to the operating surgeon and the physician.

Of the cases recorded, 52 can be considered as undoubted illustrations of jejunal or gastro-jejunal ulceration following gastro-jejunostomy. In 19 of these the progress of the pathological lesion resulted in perforation and the escape of bowel content into the general peritoneal cavity. In 33, limiting adhesions localised the process to the site of the disease.

Etiology.—Paterson is of opinion that jejunal ulcer following gastro-jejunostomy is the result of a toxic agent, which injures or kills the cells of the mucous membrane so that they are readily digested by the gastric juices. The toxic agent usually present is free hydrochloric acid, but possibly other toxic substances may act in the same way. The circumstances under which free hydrochloric acid may be present in the jejunum are :—(1) Hyperacidity of the stomach content so that the bile and pancreatic secretions, although normal in amount, are unable to neutralise completely all the acid entering the jejunum. This hyperacidity may be present in a patient upon whom the operation of gastro-jejunostomy has been performed, owing to the persistence of a condition of extreme hyperacidity which existed prior to the operation, the customary reduction which follows operation (amounting to one-third of the total acidity of the gastric content) being insufficient. If before operation the total acidity is over a hundred, the diminution following operation is sometimes insufficient to reduce the acidity of the gastric juice to normal, unless a special diet has been adopted for months. On the other hand, hyperacidity may be present owing to a recurrence of the condition as a result of a dietetic error. Too small an opening is probably the cause in certain cases.

(2) A normal percentage of hydrochloric acid may be present in the gastric juice, but associated with excessive secretion, so that the amount of hydrochloric acid discharged into the jejunum is greater than can be neutralised.

(3) Diversion of the course of the alkaline duodenal secretion, so that part of the jejunum is exposed to the action of the gastric content unmixed with bile and pancreatic juice, as, for example, where the operation of gastro-jejunostomy has been performed by the "Y" method of Roux, or has been combined with an entero-anastomosis.

(4) Normal acidity and normal amount of gastric secretion, but incomplete neutralisation in the jejunum owing to a temporary diminution in the amount of the alkaline duodenal secretion.

In a few cases the ulcers may be infective in origin. When these occur they appear soon after operation and are usually multiple.

Pathology.—Jejunal ulcers may be looked upon as the result of conditions produced by operation; gastro-jejunal ulcers at the anastomotic ring are probably the direct result of operation. The former occur most commonly where the acidity of the intestinal content is greatest; the latter at the site of the trauma, and they persist owing to a relative or a total hyperacidity. The jejunal ulcer proper has an appearance very similar to the ordinary punched-out round ulcer of the stomach or duodenum; the gastro-jejunal shows as an irregular ulceration around the site of anastomosis. The thin-walled jejunal ulcer perforates more readily into the peritoneal cavity.

In 36 cases this occurred 16 times. In 14 cases of gastro-jejunal ulceration perforation occurred in 3 cases. In cases in which the progress of the ulceration is slower, adhesions may form, shutting off the peritoneal cavity. In the majority of recorded cases these have been found uniting the jejunum to the anterior abdominal wall, and have been associated with an inflammatory swelling in the abdominal parietes, and in certain cases have led to the development of a jejunal fistula opening on the anterior abdominal wall. Such an inflammatory swelling was present in 28 out of 35 cases. The ulcer may erode into the colon; in 5 cases this occurred.

Persistence of a gastro-jejunal ulcer may result in a cicatricial narrowing of the gastro-jejunal opening so that complete closure of the opening may be produced. This state of affairs was present in 4 cases, and has been attributed to the persistent patency of the pylorus, obliteration of the artificial opening resulting from disuse. Paterson offers the more likely explanation that it is due to cicatricial stenosis caused by the absence of primary union of the gastric and intestinal mucosa, and delayed healing of the same owing to persistent hyperacidity. He supports his contention by the evidence of 19 cases in which obliteration of the gastro-jejunal opening took place; in 17 of these the method employed—for example the use of a Murphy's button—left a granulating surface at the site of union.

Clinical Features.—In more than half the cases in which the occurrence of jejunal ulceration has been recorded as following gastro-jejunostomy the operation has been of the "anterior" type. So far there is no case on record which has developed after the "no loop" operation. In the cases in which perforation took place, this occurred most commonly without there having been any prior indication of the presence of an ulcer. It is therefore difficult to determine accurately the duration of the interval between the operation and the development of the ulcer. In the recorded cases the time given has varied from 2 days to 8 years.

In 56 per cent. the symptoms of ulcer appeared within a year, the average time being 20 months. The indication of ulceration where perforation has not resulted is usually pain varying in intensity and not appearing to have any relationship to the ingestion of food. Vomiting is an inconstant symptom. An important sign is the existence of an indurated swelling in the abdominal wall. This was present in 19 of the 28 cases, and is the result of the direct extension of the ulcer; the usual situation is in the left rectus abdominalis muscle above the level of the umbilicus. In all the cases in which this localising sign was present the anterior operation had been performed. Stomach content with a fæcal odour is strongly suggestive of the presence of a fistulous opening into the colon. Another most important symptom which would point to the presence

of ulceration is hyperacidity; it was present in 13 of the 18 cases in which the gastric content was analysed.

Every case in which there is recrudescent pain of a constant character after gastro-jejunostomy Paterson considers should be regarded as a potential case of jejunal or gastro-jejunal ulceration, and treated accordingly.

Treatment.—It is advisable at first to treat the patient on medical lines, by rest in bed, and a diet of milk and eggs, the administration of bismuth and hydrocyanic acid to allay the pain, and of alkalies to combat the hyperacidity.

The *indications for surgical treatment* are persistence of pain and hyperacidity in spite of medical treatment, or evidence of hypersecretion or gastric stasis. If, in the early morning, after 10 hours' abstention from food, an acid fluid can be obtained from the stomach, this is a sufficient indication of the necessity for surgical treatment. This may consist of the separation of the adhesions and closure of the perforation. The results obtained so far indicate that the less extensive the surgical treatment the better the result.

If the gastro-jejunostomy opening is small it should be enlarged.

When recurrence takes place after surgical treatment, Paterson recommends that a gastro-enterostomy "en Y" be performed, but with the implantation of the proximal limb of the jejunum into the stomach, so that the bile and pancreatic secretions are carried directly into the stomach.

Mortality.—The mortality rate of all cases of jejunal or gastro-jejunal ulceration is 42 per cent. That of the cases operated on 21 per cent., and it is of interest that the death-rate of the cases of localised ulceration is slightly higher than in the cases in which acute perforation had occurred.

OBSTETRICS AND GYNECOLOGY.

By A. H. F. BARBOUR, M.D., LL.D.,
Lecturer in Gynecology,
and
B. P. WATSON, M.D., F.R.C.S.,
Gynecological Tutor, Edinburgh University.

Post-Operative Separation of Laparotomy Wounds.

Emil Ries (*Amer. Journ. of Obstet.*, October 1909) discusses this question in the light of several cases which have come under his own observation. It is an accident which occurs oftener than the number of cases recorded in the literature would lead us to suppose, and as Ries believes that its method of production is the same as that which leads