As time went on, however, results improved. Table II contains an analysis of the cases dealt with during the last six months of the year 1924, drawn up by my house-surgeons, Dr. J. I. Noble and Dr. W. F. Jones, at the Liverpool Stanley Hospital and Brownlow Hill Infirmary. The cases were treated by combined suture and gastro-enterostomy; 11 made uneventful recoveries, 1 died three weeks after operation from residual abdominal abscess; all were of the male sex.

TABLE II.—Analysis of 12 Cases Operated on during the last Six Months.

Age.	Hours between Perforation and Operation.	Site of Perforation.	Age.	Hours between Perforation and Operation.	Site of Perforation.
46	8½	Lesser curvature of stomach.	20	4½	Duodenum.
21	3½	Duodenum.	33	7½	Duodenum.
47	23½	Duodenum, death	38	3½	Duodenum.
40	25	Duodenum.	24	6	Duodenum.
22	3	Duodenum.	28	2	Posterior surface of stomach.
40	9	Pylorus.	59½	8	Duodenum.

Mortality = 8 per cent.

In conclusion, I do not in any way suggest that the combined operation should be the routine treatment; it depends entirely on opportunity and circumstances. If one is constantly undertaking gastric surgery, and the facilities are favourable, I think the combined operation is both an immediate and remote advantage to the patient, and should be done if the patient's condition will allow it. On the other hand, it should not be undertaken by the "occasional" operator, or in circumstances when warmth, light, skilled assistance, or suitable operative facilities are absent. Simple closure is then the safest method. The complication of bronchopneumonia undoubtedly increased mortality in my earlier cases, but it has latterly almost entirely become eliminated by suitable preparation of the theatre and patient and by careful after-treatment.

REFERENCES.

¹ H. J. Paterson: *Surgery of the Stomach*, p. 154. ² John B. Deaver and David B. Pfeiffer: *Annals of Surgery*, April, 1921, p. 441. ³ G. Percival Mills: *BRITISH MEDICAL JOURNAL*, January 3rd, 1925, p. 12. ⁴ H. J. Paterson: *Op. cit.*, p. 171. ⁵ Moynihan: *Lancet*, 1923, i, 631. ⁶ Zachary Cope: *BRITISH MEDICAL JOURNAL*, January 17th, 1925, p. 139.

TREATMENT OF THREATENED GANGRENE OF THE ARM DUE TO INJURY OF THE MAIN ARTERY.

BY

PETER McEWAN, M.A., M.B., F.R.C.S.Ed.,
HONORARY SURGEON, BRADFORD ROYAL INFIRMARY.

IN the following two cases, seen several days after the axillary or brachial artery had been torn across, the extent of the threatened gangrene was greatly minimized by a simple method of treatment.

A man, aged 39 years, was admitted to Bradford Royal Infirmary on July 11th, 1923. Five days previously he had been getting off the back of a moving motor lorry, and had been dragged by his left arm for some distance. On admission, the left hand and forearm and the lower third of the upper arm were cold, swollen, and very tense, and did not show any evidence of circulation. The left axilla was occupied by a large, tense, fluctuating swelling, obviously a haematoma, due to rupture of a large vessel, probably the axillary artery. There was no bone injury. It was clear that the collateral circulation had succeeded in reaching only the upper two-thirds of the upper arm, and it appeared possible that the tension under the deep fascia had determined its limit. I accordingly made free incisions through the deep fascia of the arm, down as far as the wrist, so as thoroughly to relieve all tension. During the following ten days warmth gradually returned to the part, extending about one and a half inches further down each day, until it eventually reached the level of the proximal phalanges. Gangrene, however, appeared in the fingers, and presently involved the whole of the hand. Amputation was performed on August 6th at the wrist-joint. He was discharged from hospital on August 20th, and his wounds were all soundly healed by December 6th, his forearm being quite useful and showing no trophic changes. The fluid swelling

in the axilla became gradually and completely organized, with free movement.

On July 19th, 1925, I was asked to see a similar case with a view to giving an opinion as to the site of amputation for impending gangrene.

A child, aged 5 years, had, three and a half days before, sustained a severe fracture-dislocation of the right elbow. This was reduced and put up on a rectangular splint. Two days later the fingers were observed to be blue and cold, and the splint was removed and the arm watched. The condition was not due to tight bandaging. When I saw the child the hand and forearm up to beyond the elbow were quite cold, with some blebs on the skin below the elbow. The forearm up to beyond the elbow was very tense. There was a good deal of ecchymosis over the lower part of the brachial artery, which we presumed was torn. On the analogy of the previous case, I made very free incisions in the deep fascia over the whole area of tension. The flexor sublimis digitorum was found to be already gangrenous. Within twelve hours normal warmth had been restored as far as the wrist, and partial warmth, which soon became complete, in the hand and fingers. Both the flexor sublimis and the flexor profundus sloughed down to the radius, after which the wound healed. Suppuration occurred in the wrist-joint, in which, on October 31st, the date when a note was last made, sinuses still persisted. No amputation was necessary.

It may be deduced that a slight collateral arterial circulation existed after the accident in both cases, but that the tension obstructed the venous return, and thus there was a further increase of tension which inhibited the feeble arterial flow. The tissues bulged freely after the incision of the fascia, and this, together with the rapid improvement in the case of the child, justifies the inference that relief of tension was the essential point in treatment. The absence of interference with the actual lesion of the artery, leaving the collateral circulation as intact as possible, no doubt contributed to the successful result. In the case of the man the recovery of vitality after the limb had been practically or entirely devoid of circulation for days is remarkable.

Memoranda :

MEDICAL, SURGICAL, OBSTETRICAL.

NOVASUROL AND OTHER DIURETICS IN CARDIAC OEDEMA.

THE article in the issue of the *JOURNAL* of January 16th (p. 80) by Dr. C. G. Lambie on the diuretic action of novasurol interested me greatly. Following the lines suggested by Keith,¹ Rowntree,² and others I have, so far, treated two cases with striking results, the method employed only differing from that of Dr. Lambie in that ammonium chloride was used, both as a preliminary diuretic and also during the administration of the novasurol itself.

Case I was a woman, aged 67, with myocardial degeneration but no valvular disease. Extra-systoles were present. The lower limbs were enormously oedematous; the dropsical effusion extended to the subcutaneous tissues of the back and abdomen, and also slightly to the hands. A moderate degree of ascites was present, and there was also slight jaundice. Rest in bed over a period of some weeks, Karel diet, the administration of digitalis alternatively with other cardiac tonics, and the use of diuretics such as theobromine sodium salicylate and theocin all failed, the oedema growing steadily worse. Ammonium chloride was then administered in capsules, to a daily total of 5 grams, in divided doses. Low salt fluid diet alone was allowed, and the daily intake restricted to 800 c.cm. By this means a slight diuresis was induced. Novasurol was then given on four occasions at intervals of three days, by the intramuscular route, each dose consisting of 0.5 c.cm. Following each injection the urine increased markedly in amount, with a corresponding decrease in oedema, but unfortunately the attendants could not be prevailed upon to preserve the total for measurement. At the end of thirteen days all oedema had completely disappeared, to the relief of distressing symptoms formerly present. Gradual myocardial failure, however, supervened, and the patient died some days later, without, however, a return of the dropsy.

Case II was that of a man, aged 46, suffering from chronic nephritis with salt retention, albumin being present in the urine to the extent of 4 per cent. The legs were greatly swollen, with severe ascites and oedema of both lung bases. Treatment was adopted on similar lines with fluid intake restriction to 28 oz., and the urine, which before treatment amounted to 25 oz. a day,

¹ Keith, Barrier, and Whelan: The Diuretic Action of Ammonium Chloride and Novasurol in Cases of Nephritis with Oedema, *Journ. Amer. Med. Assoc.*, September 12th, 1925.

² Rowntree, Keith, and Barrier: Novasurol in the Treatment of Ascites with Hepatic Disease, *Ibid.*, October 17th, 1925.