

urea below 250 mg/100 ml, with an increased protein intake. Hæmodialysis was most commonly used, not only because we found it satisfactory and reliable, but because it gave clinical support to research into disposable kidneys and fail-safe proportionating and monitoring equipment.

The patients were classified in five main surgical groups:

(1) *Obstetrics*: Thirty-eight patients have been treated, of whom 31 required dialysis. There were 10 deaths, 8 from nonrenal causes. Septic abortion was the commonest ætiological condition.

(2) *Trauma*: Only 27 patients were treated, 26 requiring dialysis. The small number referred is probably due to improved treatment, especially early and vigorous blood replacement. Sixteen patients died, all from nonrenal causes.

(3) *Burns*: Eight severe burns cases all died from their basic condition and its complications; 7 were dialysed, the other dying before dialysis could be started.

(4) *Obstructive uropathy*: Forty-seven patients had some form of obstruction, urinary calculi being the commonest. Only 28 required dialysis, function often returning when the obstruction was relieved. Twenty-two patients died, an equal number from renal and nonrenal causes, as there was often pre-existing renal disease.

(5) *Surgery*: This is the largest group, 110 cases mainly associated with post-operative complications; 85 were dialysed; 70 died, 65 from nonrenal causes; many patients died within 24 hours of admission.

Peritonitis was the common cause (35 patients and 29 deaths). Complications followed biliary surgery in 11 patients (10 deaths). Eleven cases followed cardiac surgery (8 deaths) and 16 vascular surgery (11 deaths). Septicæmic shock caused anuria in 10 patients (5 deaths) and, of 5 cases of acute pancreatitis, 4 died. Post-operative hypotension, associated with hæmorrhage and other causes, occurred in the remainder.

Patients were graded according to the degree of severity of the basic disease and its complications (Balsløv & Jørgensen 1963). Mortality was related to the severity of the basic disease. The overall mortality of this series was 55%, with no difference between the sexes.

Conclusions

(1) Early and vigorous blood replacement reduces the incidence of acute renal failure.

(2) Many patients died within 24 hours of admission and would have benefited by earlier referral.

(3) Surgical patients with acute renal failure are difficult problems of management; the mortality is high (55% in this series) and is related to the severity of the underlying disease. An artificial kidney unit dealing with such patients must have the support of other specialist units in managing these serious surgical complications.

REFERENCE

Balsløv J T & Jørgensen H E
(1963) *Amer. J. Med.* 34, 753

Malignant Tumours of the Small Intestine (A Ten-year Survey)

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In the ten-year period 1950-9, 168 cases with malignant lesions of the small intestine were reported to the Birmingham Regional Cancer Registry. In the same period 5,441 carcinomata of the stomach, and 8,966 carcinomata of the colon and rectum were reported to the Registry.

The 168 cases comprised 55 cases of carcinoma, 56 sarcoma, 32 carcinoid and 25 cases in which no definite histological diagnosis was available. Of the carcinomata, 18 were in the duodenum and their clinical course and results of treatment approximated to those of a series of pancreatic neoplasms similarly investigated. If only jejunal and ileal cases are considered the ratio of sarcoma to carcinoma is 3:2. In the stomach only 2% of lesions were sarcomatous, and the sarcoma: carcinoma ratio in the small intestine is probably an index of the rarity of carcinoma in this site.

The 56 cases of sarcoma consisted of 29 reticulosarcoma, 11 lymphosarcoma, 13 leiomyosarcoma and 3 unspecified. Four cases of reticulosarcoma had previously been diagnosed on X-ray as Crohn's disease. Some cases of carcinoid were reported as benign and others as malignant but the survival times were not greatly different; all cases of carcinoid tumours in the small intestine should be regarded as low-grade malignancies.

Distribution

Carcinoma shows no special preference for any particular site but is distributed evenly throughout the small intestine. Leiomyosarcoma shows perhaps a slight preference for the jejunum whilst reticulosarcoma and lymphosarcoma in-

creased in incidence in the lower regions of the intestine. Carcinoid tumours were chiefly in the ileum, particularly the terminal ileum.

Operability and Survival Times

Carcinoma: The five-year survival rate of all cases was 16% (9 patients) but the difference between duodenal lesions and those in the rest of the small intestine is interesting. Only one duodenal case survived five years (5%) whilst 8 patients (23%) with lesions in the jejunum or ileum were alive in five years. Of the 55 cases, radical surgery was possible in 28 patients with a five-year survival rate of 32%. This 50% resection rate compared with the 25% resection rate in carcinoma of the stomach and the five-year survival rate of 32% compares with 18% for the resected stomach lesions (i.e. resection rate and survival were almost twice as good in the small intestine as in the stomach).

Sarcoma: The five-year survival rate over-all was 23%, the worst group being lymphosarcoma with a rate of 9%. Radical treatment was possible in 55% (31 cases), consisting of excision in 17 with a five-year survival rate of 41% and excision followed by radiotherapy in 14 with a survival rate of 43%. During the first three years after treatment the addition of radiotherapy to surgery seemed to have been of value but at five years the difference between surgery and surgery plus radiotherapy was insignificant. A point also noticed in other series is that most of the cases that die in this group do so in the first 2-3 years, and thereafter there is little appreciable increase in the mortality rate.

Carcinoid: Of the 31 cases followed up in this group, the five-year survival rate was 42% and of 16 cases receiving radical surgery 56% survived five years. (Note: During the period under review there were 47 cases of carcinoid tumour of the appendix and the five-year survival rate of these was 92%, i.e. 43 cases.)

No histology: Of 25 patients only one received radical surgery and this patient survived five years. Palliative surgery was carried out in 13 cases and one of these survived five years.

Factors affecting prognosis and operability: We attempted to find out if duration of symptoms, age, sex, &c. had any influence on prognosis but the groups of cases were too small. The effect of the histological variations on prognosis has already been pointed out. The mean duration of symptoms before treatment was 7.2 months in carcinoid, 2.7 months in carcinoma and 1.7 months in sarcoma.

An Elastic Vascular Prosthesis

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Arterial prosthetics at present available made of Dacron and Teflon appear satisfactory in regions where high blood flow and little flexion occur. In regions such as the thigh, where main arterial blood flow may fall to extremely low levels, they clot and have been abandoned. Alternative procedures using autogenous vein or long endarterectomies, either open or closed, are in use at the moment and, while satisfactory in many cases, their use is limited by the material the patient provides. Thus 25% of the patients do not have an adequately wide (5 mm or more) saphenous vein and endarterectomy, satisfactory for short blocks, has a high failure rate for long blocks.

After our experience with homografts (Ashton *et al.* 1962), where a long-term failure rate of up to 60% was found, subsequent follow up has shown 100% aneurysm formation and all our homografts, although many were still patent, have had to be removed lest they burst. Certainly these vigorously pulsating aneurysmal homografts appeared to conduct blood in the femoral region satisfactorily, even though they were lined with degenerating clot through which wound a tortuous blood channel.

It appears that a blood conduit should be pulsatile and elastic; also it should be incorporated into the tissues. Synthetic tubes have usually been made porous to allow tissue ingrowth and the anchoring of any fibrin deposition which forms on the walls. We have attempted to develop an elastic porous tube simulating the elastic properties of homografts, without their tendency to aneurysm formation.

Method of manufacture: Raw silicone rubber was extruded through a fine hole from the end of a cylinder. Pressure was generated by a screw clamp driving a plunger into the cylinder. The thread of rubber was wound on to a rotating mandrel which was made to oscillate about its length by a sliding sheath driven by a wiper motor; this resulted in a helical deposit of thread and, after many passes, a porous tube could be built up. Since the speed of the wiper motor could not be altered if threads of a different obliquity were desired, it was necessary to mount the mandrel in a lathe and to use the screw-cutting mechanism of the lathe to drive the extruder along the mandrel. Later this was obviated by using a machine in which the longitudinal oscillation of the mandrel was controlled by the alternate inflation and deflation of bellows. This machine could not produce tubes of greater