

these results are encouraging and that the operation is worth further trial.

All the earlier silicone rubber sutures were made in our own laboratory but the 3 or 4 mm silicone rubber rods commercially available are very satisfactory. The introducing aneurysm needle can be easily made from a Foley catheter introducer by sharpening the end a little, drilling an eye to take the atraumatic nylon suture and bending its end to form 270° of a 1½ inch (37 mm) diameter circle at 90° to the axis of the handle.

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Surgical Treatment of Obesity

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The long-term results of dietary treatment of obesity are poor, particularly in massively obese patients. This is because they appear able to subsist on a remarkably low daily calorie intake or lack the will power to adhere to dietary restrictions designed not only to lose weight but also to maintain it at a satisfactory level. The increased mortality and morbidity of refractory massive obesity is such as to justify use of more aggressive and radical measures, and small bowel short circuit operations have therefore been tried.

Jejuno-ileostomy for massive obesity was pioneered by Payne & DeWind (1969) who divided the jejunum 14 inches (36 cm) from the duodenojejunal flexure and anastomosed it to the terminal ileum 4 inches (10 cm) from the ileocaecal valve, after closure and anchorage of the free end of jejunum. Using this technique or modification of it, the author has operated upon 60 patients in 47 of whom follow up was completed in three months to three years. There were 39 women and 8 men whose ages ranged from 19 to 58 years. All were 75–150% above standard bodyweight

for age, height and sex. They had all undergone supervised dietary restriction during a minimum of five years but often the problem had been a lifetime one. Preoperative investigations were designed to exclude endocrine causes and establish a normal metabolic baseline.

Following the operation oral potassium and multivitamin supplements were given indefinitely. Lomotil and codeine phosphate were prescribed as required to control diarrhoea.

Results

The average weight loss at three months after operation was 20.7 kg, at six months 31.0 kg (39 patients) and at one year 44.0 kg (16 patients). Significant morbidity occurred due to troublesome and persistent diarrhoea in 4 patients. One of these has subsequently responded to cholestyramine but the remainder require massive doses of Lomotil and codeine phosphate. Vomiting during the first month was common but severe enough to merit hospital readmission in 3. In these patients the problem had largely resolved by three months. Abdominal pain of unexplained cause was prolonged in one patient but it resolved spontaneously after six weeks. Arthralgia of unexplained cause but requiring analgesia occurred in 2 patients. The most disconcerting side-effect was acute fatty enlargement of the liver in 3 cases. These patients became very weak, lethargic and hypotonic, and had hepatomegaly; they responded to high protein, high carbohydrate, low fat diets. A fourth patient operated upon subsequent to the above series died with profound metabolic abnormalities associated with severe vomiting and a large fatty liver.

Biochemical Changes

No abnormalities were noted in red blood count, haemoglobin and indices, serum vitamin B₁₂, sodium, urea, creatinine, protein-bound iodine or bilirubin levels and prothrombin time.

Serum folate: The most notable abnormality developing after operation was low serum folate levels. Six of 46 patients had values less than 3.0 ng/ml before the operation and after three months this figure had risen to 10. After six months a further 6 patients showed low values and another 3 did likewise after one year. Though asymptomatic and free of abnormalities in haematological profile, replacement with folic acid 5 mg daily was commenced.

Serum iron: Sixteen of 46 patients showed low serum iron values (less than 80 µg/100 ml) pre-operatively. This figure rose to 18 of 35 patients at three months, 11 of 23 patients at six months, but had fallen to 2 of 16 patients by one year.

ESR: It is notable that obese patients often have a raised ESR. Half the patients had an ESR of

more than 20 mm in 1 hour (Westergren) before the operation and this incidence persisted throughout the postoperative period.

Serum calcium and albumin: At three months, 6 of 46 patients exhibited mildly subnormal serum calcium levels, 4 of these having low serum albumin values. These abnormalities corrected spontaneously by six months.

Serum magnesium: Values less than 1.5 mEq/litre were seen in 6 patients at three months. This abnormality was corrected spontaneously and without treatment six months after operation.

Serum uric acid: Seventeen of 40 patients had raised serum uric acid values (>6.5 mg/100 ml) before operation but only one had overt gout symptoms. After operation the same incidence persisted (18 of 35 patients at three months, 11 of 23 patients at six months and 2 of 6 patients at one year).

Only 2 patients developed joint pains post-operatively and in both uric acid values were normal.

Serum cholesterol: Serum cholesterol uniformly fell dramatically following jejunio-ileostomy and by three months averaged 50% of the preoperative value. This reduction persisted thereafter.

Discussion

There is little doubt that jejunio-ileostomy is effective in reducing weight in massively obese patients. Social rehabilitation is most gratifying and correction of such obesity complications as hypertension, diabetes mellitus, hiatus hernia, breathlessness, backache and gravitational ulceration is very satisfactory. So far there have been no clinical indications to reverse the intestinal short-circuit, though whether this will hold good for the long term remains to be seen.

Though diarrhoea and vomiting are common in the early postoperative days only occasionally do they persist. Far more alarming is the occurrence of fatty liver with its accompanying marked lethargy and hypotonia. Liver biopsies show that all grossly obese patients have marked fatty infiltration of the liver but it would be expected that with starvation this would be reversed. There is no explanation for the increased fatty infiltration following jejunio-ileostomy but the depletion of lipotropic agents by reduced absorption could theoretically be significant.

Most patients do very well following jejunio-ileostomy and further long-term evaluation is justified. Because of the potential metabolic hazards there is need for close follow up of each patient and correction of abnormalities as they arise.

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Studies on Arterial Thrombosis: Techniques of Tissue Preparation for Scanning Electron Microscopy

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By virtue of continuing study throughout the surgical world a great deal is known about the clinical aspects of arterial embolism and embolectomy. Study of the most recent literature shows that in patients who survive embolism and embolectomy involving lower limb arteries, 9.0% of those operated upon during the first 24-hour period after embolism subsequently require amputation, whereas 19.6% of patients treated during the second 24-hour period eventually lose their limb.

Delayed embolectomy may be unsatisfactory for many reasons. Not only may removal of embolic material be incomplete, but secondary 'propagated' thrombosis may develop and may involve the peripheral arterial tree so extensively that a satisfactory blood flow through the proximal vessels cannot be achieved (Fogarty *et al.* 1971). In such cases there is adequate reason for poor results, but of considerable interest are cases dealt with in our vascular unit and described by others, in which postembolectomy arterial thrombosis takes place, for which no obvious cause can be found, often leading to severe ischaemia and amputation.

Jefferson (1925) suggested that contact between embolic material and the endothelial surface might lead to thrombogenic changes in the vessel wall, perhaps contributing to postembolectomy thrombosis. We have offered evidence in support of Jefferson's intuitive hypothesis (Hamer 1973) by demonstrating morphological changes in the intima and media of canine arteries, exposed to experimental embolism, and by means of scanning electron microscopy we have shown that surface deposits of fibrin remain after apparently complete embolectomy. There is some evidence that retained fibrin in its polymerized form may be associated with subsequent thrombosis.

Examination of vascular tissue by light and electron microscopy is usually carried out using material which has been removed surgically, and placed in fixative. Information obtained using such methods must be interpreted with caution, since artifacts are inevitably created by circumferential contracture produced by intrinsic muscular and elastic tissue. Detailed inspection of the endothelial surface of a 'contracted' artery is