SIMPLE LOW SMALL BOWEL OBSTRUCTION*

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This experimental work, designed for clinical application, was prompted by our poor results in the treatment of jejuno-ileal atresias. Of the 50 cases treated during the years 1947 to 1961 we had only 12 survivals (Table). Our failures have mainly been due to anastomotic dysfunction, peritoneal adhesions, nutritional difficulties and complicating infection.

TABLE
RESULTS OF TREATMENT OF JEJUNO-ILEAL ATRESIAS

Five-year Periods	No. of Cases	Survivals	
		No.	%
1947-51	6	0	0
1952-56	20	6	30
1957-61	24	6	25
Total	50	12	25

I examined the motility and contents of the small bowel of normal rabbits on their normal diet through an abdominal window and compared the findings with those seen at autopsies (Parkkulainen, 1962). In the upper part of the mesenteric small bowel (jejunum) the chyme was scanty and liquid (Fig. 1). In this part peristalsis was short, rapid and continuous, and conveyed the liquid chyme (dry matter 3 to 5%) in small spurts swiftly distad. The liquid chyme accumulated in the lower small bowel (ileum) where its consistency changed to semisolid and solid during the intervals of 10 to 15 minutes between the intermittent contractions. The successive contractions in the lower small bowel were progressively longer and more forceful. In rabbits the dry matter of the solid contents of the lower ileum was between 9 and 15%. In guinea-pigs it was between 5.5 and 9.5%.

In simple obstruction and stenosis of the lower small bowel in rabbits and guinea-pigs a solid plug above the obstruction was sometimes seen at autopsy. In 10 rabbits with an enterostomy below

stenosis a plug was encountered in five cases from the third day onwards (Fig. 2). In rabbits with simple stenosis the plug was not encountered until from the fifth day onwards. In rabbits with total obstruction the plug was present only once, on the ninth day. The plug formation in animals with stenosis was probably the result of sieving, because liquid chyme emptied from the enterostomy during the obstruction, and of dehydration because the weight loss of enterostomy animals was relatively rapid and the plug was present early. In animals with total obstruction sieving was certainly quite impossible. Besides dehydration, the plug formation in these animals was probably due to simple stagnation of the normally solid contents of the ileum above the obstruction.

In appearance and in dry matter content the plug was mostly similar to the solid contents of the normal ileum. On a few occasions, however, in both rabbits and guinea-pigs the plug was hard, black and sticky, like ileac meconium, the dry matter being about 20%. In these cases absorption from the stagnated contents had probably taken place. In 50 rats on a fine granular farinaceous diet, such a plug was never seen. Even in advanced dehydration the rat was apparently able to keep the bowel contents liquid.

The cause of death of the animals, excluding the cases complicated by peritonitis or strangulation,

FIG. 1.—Schematic presentation of differences of bowel contents and motility in the ileum and jejunum.

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FIG. 2.—Schematic presentation of the distribution of 23 rabbits according to the type and duration of the obstruction.

was probably dehydration and starvation. The weight loss, approximately 35% after seven days' obstruction, was about the same as causes death from mere dehydration or fasting.

From these experiments it is apparent that even normally the intestinal contents tend to stagnate and thicken in the lower half of the small bowel. This also takes place sometimes above a simple experimental obstruction and anastomosis (Hoppu, 1951) in this area. Even an atresia or stenosis may be complicated by a sticky meconial plug (Emery, 1954) apart from the typical meconium ileus in connexion with pancreatic fibrosis. Post-operatively, after more or less extensive resection, the

continuance of the peristalsis into the distal segment may be delayed.

To avoid plugging of the anastomosis and to keep the bowel contents liquid after operation the sticky meconium should be milked and washed out and pancreatic enzymes should be injected into the bowel lumen; in addition an ileocaecal or a jejuno-caecal anastomosis should be done instead of an ileo-ileal or a jejuno-ileal anastomosis (Benson, 1955).

Finally, there should be adequate post-operative hydration.

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