Discussion

Dr. Richard T. Shackelford (Baltimore, Maryland): Dr. Hubbard, I am particularly interested in your successful results with the use of an isoperistaltic Koch type valve to prevent reflux. At the Loch Raven Veterans Hospital in Baltimore Dr. Kieffer and his staff perform many jejunoileal bypasses for obesity and prefer to use this nipple-type valve to prevent reflux.

Recently a complication, that was new to our experience, occurred three years following a jejunoileal bypass operation for morbid obesity.

In 1974 a 52-year-old morbidly obese man was admitted to the Veterans Hospital. He weighed 400 lbs. Dr. Kieffer performed a 14 and four inch standard jejunoileal bypass procedure. The blind end of the isolated jejunoileal segment was sutured to the transverse mesocolon in order to fix it in its normal position. Recovery from the operation was uncomplicated. During the following two and one-half years he lost 200 pounds, went from 400 down to 200 pounds, at which weight he stabilized and felt fine. However, in 1977, three years after the operation, he reentered the hospital with the complaint of steady abdominal pain and one mild vomit. Examinations revealed no distention, only moderate abdominal tenderness, no abnormal radiologic, laboratory, hematologic or other findings. After several days observation an exploratory laparotomy was performed by Dr. Ricotta, the senior surgical resident, and Dr. Kieffer. An intussusception of the distal portion of the isolated segment of jejunoileum was found. The middle third of the segment had intussuscepted antegrade into the distal blind-end-third. The proximal third of the isolated segment, which opened into the functioning ileum, was not involved and its value-like stoma was patent.

The intussuscepted distal two-thirds of the isolated segment was resected. The remaining proximal remnant was left in place and its cut end was closed with sutures.

(Slide) This is the specimen before it had been opened.

(Slide) This is the opened specimen, showing the middle third intussuscepted into the distal third.

The patient's recovery was uneventful. During the following nine months his weight was stationary, he was asymptomatic and seemed well. At the end of nine months he reentered the hospital with exactly the same symptoms as on his previous admission: A steady, severe abdominal pain; no other detectable signs. As before, x-ray and laboratory studies provided no clue to the diagnosis. Because of the similarity to his previous intussusception, reoperation was performed. The remaining proximal remnant of isolated bowel was found to be intussuscepted antegrade into itself. Since his weight had remained stationary, he was feeling well, and had been very happy until the present attack, the remaining isolated bowel was removed and the opening in the ileum was closed with sutures.

Again he recovered rapidly and completely, has maintained his 200 pound weight loss and is very happy with the results.

In the past week he has developed a lesion in the rectum which is suspected, but not proven, to be carcinoma which seems to be unrelated to his previous procedures. Despite these complications he remains happy.

The important point I want to emphasize is that in both of these episodes we were unable to establish a preoperative diagnosis. He had severe abdominal pain but x-ray examination showed no distention, blood studies and temperature were normal. I suggest that if a patient with a jejunoileal bypass for obesity has an unexplainable steady abdominal pain, remember that it may be advisable to perform an exploratory laparotomy.

The final point is that in Sir Ashley Cooper's *Book of Surgery*, published in 1814, or thereabout, he mentions that "An empty segment of bowel invites intussusception." I offer that for you all to think about.

Dr. M. Bert Myers (New Orleans, Louisiana): I rise only to confirm that an intussuscepted bowel is a leakproof valve, and that it is permanent, at least in the dog.

About 20 years ago we attempted to make a leakproof gastrostomy, using a segment of jejunem which had such an intussuscepted loop in it, and it worked very well.

(Slide) This shows a stomach with a loop of jejunem here at one end that was hooked to the skin. This shows the stomach at a year. It was removed, both ends were tied, and it was filled with water. This shows that pressure on it fails to cause leakage. And during this time you could feed the dog at any time through the jejunal look, since the valve was pointed toward the stomach.

(Slide) This shows the length involved. The only technical points we found were that the valve had to be at least 5 cm long, and had to be scarified, or it would come undone. But it is a satisfactory method, and it is leakproof, and it will last at least a year in the dog.

Dr. H. William Scott, Jr. (Nashville, Tennessee): I'd like to congratulate Dr. Brannon Hubbard and his associates on this approach to the problem of so-called bypass enteritis. Before entering into this, let me point out to you a very fundamental fact about jejunoileal bypass; and that is, it interferes profoundly with fat absorption. And if the patient continues to ingest freely large amounts of fat, he will develop, characteristically, a syndrome of bloating, foul-smelling flatus, and exacerbation of diarrhea, which is fundamentally steatorrhea. I think it's important to differentiate this "normal" response to intestinal bypass from some kind of mechanical abnormality or other changes in the bypassed segment of bowel.

If you can convince these patients to stay away from fat in the diet and avoid milk, a great majority of the bloating, flatulent, postprandial problems can be eliminated, and I don't think you need to make a nipple valve.

We have been interested very much in the problems, the complications, of jejunoileal bypass; and certainly there are many.

(Slide) In a series of over 200 massively obese patients that have been submitted to jejunoileal bypass, we have had no instance of intussusception. The upper segment of the bypassed bowel must be securely sutured to the fibrous mesocolon, or mesentery, or to the wall of the bowel itself, to prevent jejunoileal intussusception. I think Dr. Shackelford's case of retrograde intussusception must be extraordinarily rare.

In these 200 patients, the overall good results have been in the usage of 66%, and in those individuals who have had the more recent dimensions of end-to-end jejunoileostomy, in which 18 to 20 inches of short bowel are produced, the results have been good in the range of 75%.

We have been greatly interested in the enterohepatic syndrome, as we prefer to call it, following intestinal bypass. (Slide) This comes, almost certainly, *not* from the shortened bowel, which does not contribute greatly to this, except by inducing, temporarily, in the first few months after bypass protein-calorie malabsorption, but from the anastomosis of the bypassed segment of bowel to the colon that sets the stage for colonization of the bypassed ileum by colonic bacteria.

About 15% of the patients who have had this type of anastomosis will develop the problem of the so-called enterohepatic syndrome of clinical significance. What is it? How do you recognize it?

First of all, the patient develops a flu-like syndrome with nausea, anorexia, myalgias, bad taste in the mouth, a tendency to vomiting, and will have elevation of liver enzymes. On a technitium scan, the uptake of the isotope is diminished. And this syndrome will respond in the majority of patients, as Dr. Hubbard has brought out, to oral broad spectrum antibiotics; and Flagyl, we believe, is the antibiotic of choice.

(Slide) What we have done in the laboratory to try to get at the cause of the problem can be summarized briefly as follows: this slide illustrates a model in the dog of extreme shortening of the small bowel from pylorus to cecum of only ten inches of the duodenojejunal dimension, and six inches of ileum with end-to-end anastomosis; the bypassed bowel is anastomosed to the colon. Dogs with this preparation will uniformly develop cellular necrosis within the liver in a period of about six months.

(Slide) If one does exactly the same thing, but excises the by-

passed segment of bowel, leaving no anastomosis of the bypassed bowel to the colon, dogs with an identical degree of bowel shortening do not develop cellular necrosis in the liver.

This confirms the work of Bonder and Pisesky, who have done a similar study.

(Slide) In lieu of excising the bypassed segment, which would be clinically radical, we have studied another variation; this is to close the upper end of bypassed jejunum, retain the bypassed jejunoileum within the abdomen, but exteriorize the distal end of the ileum as a mucous fistula. In animals with this preparation in studies still under way with exactly the same dimensions of bowel shortening, hepatic cellular necrosis has been seen at six months in only one of six dogs.

Although quantitative bacterial studies of the flora in bypassed bowel are underway, it is very difficult at this point to identify qualitative bacterial differences between these two preparations. We're not sure at the moment whether the hepatocellular injury is due to the absorption of toxic bacterial metabolites from the bypassed segment of ileum or from other effects of bacterial growth such as deconjugation of bile acids to a known hepatotoxic substance, such as lithocholic acid.

(Slide) I think we're getting at the same problem in a little bit different way than Dr. Hubbard has approached it, but in several patients who have failed to respond to broad spectrum antibiotics with the enterohepatic syndrome following jejunoileal bypass, we have now exteriorized—taken down the ileocolic anastomosis and exteriorized the ileum as a mucous fistula; and this has been accompanied by the elimination of the enterohepatic syndrome, with restoration of well-being and good health, in three patients in our series. Dr. Fred Preston in Santa Barbara first did this exteriorization procedure on a patient of ours about 18 months ago with a very good result.

Another approach to the problem, of course, is the more radical procedure of eliminating the bypassed segment totally, either primarily or secondarily, which I do not advocate.

I believe that Dr. Hubbard's approach is most commendable, but the thing that worries me (and I want to ask him about this) if he makes a really good nipple valve to prevent reflux, similar to the Kock valve continent ileostomy, will this valve be able to permit the passage of mucus from in the bypassed segment of bowel?

In the Kock valve, as all of you know, with the Koch ileal pouch, the valve has to be catheterized; otherwise, it is really continent, and does not permit passage of intestinal contents from the pouch. I'd like to hear Dr. Hubbard's comments on this.

DR. T. BRANNON HUBBARD, JR. (Closing discussion): Dr. Schackelford, that's a fascinating case. I cannot explain it, but in view of the reflux and retention of intestinal contents into the bypassed bowel, one wonders if the motility of this intestine might not somehow be disturbed. Your patient is, of course, a serendipitous clinical example of the most radical way of doing away with bypass enteritis.

Dr. Myers, I appreciated your confirmation of our valve. I think, though, I would like to emphasize again that the so-called Zheng valve worked beautifully in the dog but it does not work in the human and we cannot extrapolate everything from the experimental animal to man.

I particularly appreciate Dr. Scott's discussion about the, to me, enigmatic problem of the so-called enterohepatic syndrome. We have had one patient with such a problem in whom we brought out the distal end of the bypassed intestine as an ileostomy. However, this patient showed no improvement over a six weeks' period so we finally went in and reconstituted her normal intestinal continuity with rapid improvement in her nutrition and liver status.

As far as the patency of the valve is concerned, the one patient whom we have re-explored, the patient with liver failure, showed a bypassed intestine that was collapsed and empty with no evidence of stasis. In the dog, when the valve is made in continuity with the intact intestinal tract, there is no evidence of obstruction and the animal is able to eat and the intestinal contents go through the valve without apparent obstruction.