The Influence of Laparoscopy on the Management of Pediatric Colorectal Disorders

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The application of laparoscopic assisted techniques to infants and children with colon diseases needing surgical therapy has led to dramatic improvements in perioperative morbidity. The colon lends itself to laparoscopic approaches due to its excellent collateral blood supply, ease of mobilization, the potential for removing specimens transanally and the use of transanal stapled anastomoses. This paper describes the author’s experience with laparoscopic assisted procedures for intussusception, Hirschsprung’s disease, ulcerative colitis, Crohn’s disease and high imperforate anus.

Intussusception is usually diagnosed and treated by contrast enemas. Surgical reduction is necessary in 15.40% of the cases. Laparoscopy provides a minimally invasive method for evaluating the completion of reduction when in doubt and for reducing most patients with intussusception when the contrast enema has failed.

Three trocar sites are used to explore and reduce the ileocolic intussusception when the intussusception is identified; the bowel is gently compressed just distal to the intussusception, slowly reducing the intussusception.

Frequently, countertraction on the small bowel is needed to obtain complete reduction of the intussusception. If a gangrenous segment of bowel is identified or if the intussusception is irreducible, a small vertical incision is made in the umbilicus or right lower quadrant to complete the necessary surgical procedure using an open technique. As skill is acquired, the bowel resection can be performed laparoscopically with the specimen removed in a bag through a small umbilical incision. The anastomosis may also be completed laparoscopically using a combination of sutures and staples. Six ileocolic intussusception have been treated so far and all have been reduced without open surgery. No complications have been seen in these patients.

The laparoscopic assisted colon pull-through for Hirschsprung’s disease was developed about six years ago and is performed in a single-stage. The technique requires three or four small abdominal ports. The transition zone is initially identified by seromuscular biopsies obtained laparoscopically. The intraabdominal aganglionic colon is devascularized very close to the colon and rectum down to a point just below the peritoneal reflection. A colon pedicle preserving the marginal artery is fashioned endoscopically. The remainder of the rectal mobilization is performed transanally using an endorectal sleeve technique. The intact rectum and colon is pulled out through the anus to a point 10-20 ccs proximal
to the ganglionic transition zone. The anastomosis is performed transanally 1 cm above the dentate line.

The author has recently evaluated the outcome of primary laparoscopic pull-through in eighty patients performed at six pediatric surgery centers over the past five years. Most of the children were operated immediately after the diagnosis was made by suction rectal biopsy. The age at operation was three days to 96 months. The average length of operation is 2.7 hours. Only one patient required a perioperative blood transfusion. Most of the patients passed stool and flatus within 24-hours of surgery. The average time for discharge after surgery was 3.7 days. One of the patients required subsequent diversion for enterocolitis. All 80 patients are currently alive and well. Most of the children are too young to evaluate for fecal continence, but 18 of the older children have been reported to be continent.

Total proctocolectomy with J-pouch pull-through can also be performed laparoscopically. The initial dissection is performed as for Hirschsprung's disease except that the entire colon is mobilized laparoscopically. Dividing the mesocolon close to the colon with the ultrasonic scalpel is quick and bloodless. The endorectal dissection is performed in a fashion similar to the dissection for Hirschsprung's disease. The entire mobilized colon is then pulled out through the anus. A J-pouch is developed laparoscopically using tacking sutures to line up the pouch intraperitoneally. The apex of the J-pouch is pulled down through the endorectal sleeve. An opening is made in the apex of the pouch and an anastomosis is formed between the mucosa of the J-pouch and the transitional epithelium of the rectum just above the dentate line. The spur is ablated by transanal application of a 10 cm. GIA stapler under laparoscopic surveillance. The redundant portion of the spur is excised laparoscopically using an endoscopic gastrointestinal stapler. The ileal specimen is removed in a specimen bag. Patients on high doses of steroids are diverted with a proximal loop ileostomy. Frequent liquid stooling may occur for 2-4 months and is managed with dietary manipulation and loperamide hydrochloride. Discharge 35 days after surgery is the usual rule. We have performed ten total colectomies for ulcerative colitis with excellent early and long-term results. Two patients developed a minor wound infection and one developed a partial bowel obstruction at the protective ileostomy site.

Ileocolectomy for Crohn's disease is performed for obstruction, fistula formation and failure to thrive. The margins for resection are selected and marked with sutures. Small mesenteric windows are developed at each end of the resection site. Endoscopic staples are fired at each end of the proposed specimen. The mesentery of the bowel to be resected is divided close to the intestine with an ultrasonic scalpel. The resected bowel is placed in a specimen bag for later removal. A stapled ileocolic anastomosis is performed laparoscopically or the bowel is brought through a small, vertical incision in the umbilicus.
for open anastomosis. We have performed three ileocolic resections for Crohn's disease. Bowel function returned rapidly and discharge was 2-4 days postoperatively. There were no significant complications in these three patients.

Infants with high imperforate anus have been classically treated in three stages with an initial diverting colostomy, subsequent posterior sagittal anorectoplasty followed three to six months later by colostomy closure. There are obvious advantages to an approach that would allow a single stage procedure in the neonatal period. The author has treated five infants with high imperforate anus using a laparoscopic assisted approach. Multiple stages were utilized but the technique can also be performed in a single stage in infancy. Mobilization of the rectum and division of the fistula is performed laparoscopically. The external sphincter muscles are identified visually using electrical stimulation. The central sphincter plane is carefully dissected transanally assisted by laparoscopic surveillance from above. In this way, the central external sphincter plane can be clearly defined without injury to the urethra or vagina without a large perineal incision. The central sphincter plane is then dilated to an appropriate size. The rectum is grasped transanally using laparoscopic surveillance to assist this maneuver and is pulled down to the perineum. Absorbable sutures are used to approximate the rectum to the anus. The rectum is tethered to presacral fascia under moderate tension to develop a deep anal dimple and promote a skin-lined anal canal.

Five patients have been treated with multi-stage laparoscopic assisted colon pull-through for imperforate anus. They have all had an excellent early result. None of the patients are old enough to evaluate for continence.

Laparoscopic assisted surgery for colon disease appears to dramatically reduce perioperative morbidity and recovery time. The techniques are quickly learned for surgeons experienced in endoscopic surgical procedures.

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