Intussusception

Baird Mallory, MD,1 and Yale Popowich, MD2

In children 3 months to 3 years of age intussusception is one of the most common causes of a distal small bowel obstruction. It is often associated with intermittent pain accompanied by a characteristic knees-to-chest position, vomiting, and passage of bloody “currant jelly” stools. A “sausage shaped mass in the right upper quadrant” is more often described than palpated (Fig 1). In this age group, intussusception is thought to occur secondary to viral infection inflaming Peyer’s patches or, perhaps, the appendix—either of which may then act as the “lead point” of the intussusceptum that invaginates or “telescopes” downstream into the intussuscipiens. It is literally as though the downstream bowel has mistaken the upstream bowel for stool and is trying to propel it forward toward the anus. This typically occurs just proximal to the ileo-cecal valve and so is called “ileo-cecal” intussusception.

When intussusception occurs outside of this age group, in most cases there will be a pathologic lead point including:

- lymphoma
- carcinoid tumor
- adenocarcinoma
- Meckel’s diverticulum
- mural hematoma from Henoch-Schonlein purpura or trauma
- polyp
- duplication

Intussusception may also occur after operations, particularly those involving the retroperitoneum, although in this circumstance it may occur further up in the small bowel. At this location these intussusceptions, called “ileo-ileoal,” are difficult to diagnose or treat with contrast enemas. They are best diagnosed by a computed tomography (CT) scan (ultrasonography may be successful in very experienced hands) and treated by operation. Experienced laparoscopists will note that intussusceptions occur in nonpathologic states: during operations for problems nonenteric, small bowel may be observed to transiently intussuscept into itself and then return to a normal anatomic state without causing postoperative symptoms.

Diagnosis of ileo-cecal intussusception is ideally done by ultrasound but is also possible by CT scan or water soluble contrast enema. In the latter case the procedure may also be therapeutic: a bag of contrast is hung 3 feet above the patient and a catheter (with or without balloon—the author prefers) is securely taped into the child’s rectum. Nothing is more important than the combination of catheter and taping—if this is not hermetic it will be impossible to apply sufficient pressure via any of the nonsurgical reduction techniques. It is probably wise to give one dose of antibiotics with Gram-negative and anaerobic coverage (Cefotetan®). All nonoperative attempts should be aborted and the patient transferred to the operating room (after resuscitation) if he or she has or develops an acute abdomen.

Water soluble contrast (in other cases either water or air may be used) is infused under radiologic visualization with which one can watch the intussusceptum being reduced back out of the intussuscipiens. Although the intussusceptum may actually start physically coming out the anus, it is more usually found in the ascending, transverse or descending colon from which it reduces in a left to right direction. When air is used this may take as much as 130 to 140 Torr for periods of 5 minutes at a time. There is always swelling at the ileo-cecal valve but only fluid/air refluxing back up into the small bowel (through an incompetent ileo-cecal valve) is proof positive of success.

When successful, the patient may soon begin fluids and then solids followed by discharge in about 24 hours. Although fever during the first 24 hours after reduction is not uncommon (thought to occur secondary to bacterial translocation), there is experience in Sweden with actual patient dismissal directly from the radiology suite. Occasionally high reduction pressures expose an inguinal hernia. Rarely these pressures cause bowel rupture—either in the cecum (because of transmitted pressure) or rectum (because of catheter balloon pressure). As long as air or water soluble fluid has been used there is typically little contamination of the abdomen during the operation that occurs rapidly after patient stabilization. Barium, in this circumstance, is disastrous and may be associated with life-threatening infection.

From the 1Department of Pediatric Surgery, Packard Children’s Hospital at Stanford, Stanford, CA, and 2Department of General Surgery, Stanford University Medical Center, Stanford, CA.

Address reprint requests to Baird Mallory, MD, 780 Welch Rd, Suite 206, Stanford, CA 94305-5733.

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Nonoperative reduction fails in 40% to 50% of patients, depending on the timing of presentation and aggressiveness of the radiologists. Unsuccessful reductions may relate to inadequate taping of the buttocks to establish sufficient intraluminal pressure. When skilled radiologists are unsuccessful, commonly the intussusceptum will be partially dead and resection will be required. When less aggressive efforts have been made, operative reduction without need for small bowel resection will be more common. The approach may be open or laparoscopic although the former may enable one to more effectively “squeeze” the distal bowel (often compared with squeezing a tube of toothpaste) while pulling on the proximal bowel.

**SURGICAL TECHNIQUE**

The open approach is performed through an R-transverse incision just above or below the umbilicus. The bowel is exteriorized, demonstrating an engorged colon containing intussuscepted ileum (Fig 2). Squeezing on the colon while pulling on the ileum has been found more successful than pulling alone (Fig 3). A successful reduction is usually possible with viable bowel, although erythema and edema, and occasional discoloration, may indicate a period of warming and waiting before assuming viability (Fig 4). This is a good time to remove the appendix (Fig 5), which is usually done because of the possibility it served as a lead point and to prevent future confusion about a scar near McBurney’s point. The incision is primarily closed (Fig 6).

If the intussusceptum is dead it will be difficult, if not impossible, to reduce, indicating that resection is necessary. At this point it is very important to realize the intussuscipiens is alive and some of the intussusceptum may be as well. Therefore, after aggressive manual reduction attempts, one makes a circular incision around the most proximal portion of colon available; this enables exteriorization of the intussusceptum and estimation of its viability and usually there is a portion which can be preserved for anastomosis. More than one operator has mistakenly excised the entire sausage of ileum-containing colon, sac-
The combined method of squeezing the distal bowel (colon) while pulling on the proximal bowel (ileum) is demonstrated.
4 Reduced bowel demonstrates hyperemia and edema; this is mild compared with many other cases.

5 Appendectomy is performed in case the appendix has served as a “lead point.”
When the operation is complete, the skin is primarily closed.

The laparoscopic approach involves ports (3) placed through the umbilicus, right lower quadrant and suprapubic region, after the usual precautions. One attempts to duplicate the maneuvers used in the open operation. One additional maneuver includes pulling the colon intussusceptum over the surface of the intussusceptum (distally) as surrogate for squeezing the colon like a tube of toothpaste. If resection is necessary, the subsequent anastomosis may be performed intracorporeally or extra-corporeally through an enlarged umbilical incision, depending on surgeon preference. Laparoscopic reduction may be augmented by rectally applied reduction pressure although the subsequent swelling of the colon with air may obscure the surgeon’s view.

There are few long-term complications other than recurrence (<10% following nonoperative reduction), adhesive small bowel obstruction (more common following open reduction) and stenosis when ischemic bowel is not resected.

REFERENCES