

Original Article

Adult Intussusception

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Key Words

Adults;
Enterocolic intussusception

Purpose. Intussusception is relatively common in children, but clinically rare in adults. The condition is usually secondary to an intrinsic lesion of the intestine, which is different from the cause of children's intussusception.

Methods. A total of 30 cases of enterocolic intussusception had been diagnosed in adult at Veterans General Hospital-Taipei in the past 38 years.

Results. Eighty-six percent of adult intussusceptions were associated with definable lesions. The etiology of adult enterocolic intussusception could be categorized into three groups: (1) tumor-related (67.7%); (2) miscellaneous, including Meckel's diverticulum (6.7%), diverticulitis (6.7%), foreign body granuloma (3.3%), and ischemic necrosis (3.3%); and (3) idiopathic (13.3%). Twenty-three percent of enteric lesions were malignant, whereas 40% of colonic lesions were malignant. The 30 cases were simply classified as enteric (40%), ileocecal (23.3%), ileo-colic (16.7%), or colocolic (20%) type.

Conclusions. When an colonic intussusception is encountered in adults, an underlying pathologic lesion is very likely present. En bloc resection without reduction is recommended for adult intussusceptions due to the possibility of malignancy.

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Intussusception can be described as a proximal segment of bowel (intussusceptum) telescoping into the lumen of the adjacent distal segment (intussusciens). On the other hand, a distal segment of the bowel telescoping into the lumen of the adjacent proximal segment is known as retrograde intussusception.² Usually the proximal segment invaginates into the distal segment or folds itself inside another portion. Intussusception is the leading cause of bowel obstruction in children¹ and second only to acute appendicitis as a cause of acute abdominal emergency in children. However, intussusception is rare in adults, accounting for less than 0.1% of all adult hospital admissions.⁴⁻⁶

Approximately 90% of adult intussusceptions occur in the small or large intestine, and the remaining 10% involve the stomach or surgically created stoma.^{9,10} About 95% of childhood-type intussusceptions are idiopathic.¹ However, idiopathic or primary intussusceptions only account for 10% of adults' cases and idiopathic adult intussusceptions are more likely to occur in the small intestine than the colon.¹¹

Materials and Methods

Thirty cases were included in this retrospective

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study from 1974 to 2012 at the Veteran General Hospital-Taipei. These cases could be categorized according to the type, etiology, and associated processes. Intussusceptions occurring secondary to prior surgery (stomal type), gastroduodenal intussusceptions, and rectal prolapses were excluded from this study. In the present study, intussusceptions were divided into 4 common types according to the site of origin: 1) enteric type (small bowel invaginating into small bowel), 2) ileocecal type (the ileocecal valve being the leading point of the intussusception), 3) ileocolic type (ileum protruding through the ileocecal valve with the cecum remaining stationary), and 4) colocolic type (colon invaginating into the colon).

Results

In the distribution of cases, a slight tendency toward more intussusceptions was seen in the older population (Table 1). There were 22 males and 8 females in this series. The symptoms of intussusception varied considerably (Table 2). Cramping or steady abdominal pain was the most common complaint, occurring

Table 1. Age distribution of patients

Age	Number of cases
18-20	1
21-30	1
31-40	5
41-50	2
51-60	8
61-70	6
71-80	5
81-90 and 90 above	2
Total	30

Table 2. Symptoms of intussusception

Symptoms	Number (%)
Abdominal pain	29 (96.6)
Nausea	10 (33.3)
Vomiting	11 (36.6)
Changed bowel habit	5 (16.7)
Body weight loss	4 (13.3)
Bloody stool	2 (6.6)
Asymptomatic	1 (3.3)

in 96.6% of the patients. About one-third of the patients, more often of the enteric type, experienced symptoms of nausea and vomiting. Change in bowel habits occurred in 16.7% of the patients and included diarrhea and constipation, the latter of which occurred in three-fifth of the patients with changed bowel habits. However, approximately 3.3% of cases were asymptomatic and seemed to be diagnosed by incidental image studies.

Retrospectively, it was possible to trace symptoms back for a considerable period as shown in Table 3. A longer period of symptoms was usually associated with malignant tumors, but 6 patients with benign tumors had experienced symptoms for 1 week or more. The signs of intussusception are listed in Table 4. Abdominal tenderness was the most frequent sign, occurring in 96.6% of the patients and more than one-third of the patients had a palpable mass. However, all of these signs were non-specific and did not allow definitive diagnoses of intussusception.

Laboratory examinations were of little contribution to the diagnosis while image studies were. Fourteen cases of intussusception were demonstrated by computed tomography (CT) (82.4%) and 4 were shown by Barium enema study (57.1%) (Table 5). The plain abdominal film or kidney-ureter-bladder film sometimes showed partial and/or complete intestinal obstruction involving the large or small bowel.

Table 3. Duration of symptoms before treatment of intussusception

Cause	Duration	Benign lesion	Malignancy	Idiopathic	Total
1-2 days		5		2	7
3-7 days		9		2	9
1-2 weeks		4	5		7
1 month and more		2	2		4
Total		19	7	6	30

Table 4. Signs of intussusception

Signs	Number (%)
Tenderness	29 (96.6)
Distension	11 (36.6)
Fever	10 (33.3)
Mass	12 (40)

Table 5. Image studies for diagnosing intussusception

Images signs	Intussusception No. (%)	Mass No. (%)	Total
Barium enema study	4 (57.1)	3 (42.9)	7
Abdomen sonography	3 (50)	3 (50)	6
CT scan of abdomen	14 (82.4)	3 (17.6)	17

The sites of intussusception found in these 30 cases are summarized in Table 6. Operative treatments were performed in all patients and the types of the operative procedure are listed in Table 7. Resection, with or without reduction, was the procedure most frequently performed. It was carried out in many instances when at the time of operation, manual reduction was impossible, viability of the bowel was compromised, or malignant tumor was present. In the present series, reduction was performed on 12 patients involving the small intestine. Due to the possibility of short bowel syndrome after operation, reduction was performed before resection. Reduction alone was conducted in idiopathic cases. Gangrenous bowel was encountered in 5 cases. There was no operative mortality and only a few minor post-operative complications occurred in this study, despite the fact that most of the operations were emergency procedures with little time for bowel cleansing.

The lesions are summarized according to the pathological features in Table 8. Malignant tumors caused intussusception more frequently in the large bowel (6 in 15 patients) than in the small bowel (1 in 15 patients). On the contrary, benign lesions accounted for 14 of the 15 small bowel intussusceptions and 9 of the 15 large bowel intussusceptions. In addition, the so-called idiopathic type was found in only 2 of the 15 small bowel intussusceptions.

Discussion

Adult intussusception is rare and accounts for only 5% of all intussusceptions. Adult intussusception causes approximately 1-5% of all adult intestinal obstructions.^{7,8} There is usually a pathologic lead point, which might be malignant in up to 50% of the cases of adult intussusception. On the contrary, pediatric intus-

Table 6. Types of intussusception

Location	Number (%)
Enteric	
Jejunojejunal	5
Jejuno-ileal	1
Ileo-ileal	6
Subtotal	12 (40)
Ileocecal	7 (23.3)
Ileocolic	5 (16.7)
Colocolic	6 (20)
Total	30 (100)

Table 7. Treatment procedure for intussusception

Operative procedure	Number (%)
Resection	
Traditional exploratory laparotomy	17 (56.7)
Laparoscopic approach	1 (3.3)
Reduction	3 (10)
Resection + Reduction	9 (30)
Total	30 (100)

Table 8. Etiologies of adult intussusception

Small bowel	No. of cases	Large bowel	No. of cases	Total
Benign tumors				
Lipoma	4	Lipoma	2	6
Neurofibroma	1			1
Leiomyoma	1			1
Hypertrophic polyp	1			1
Hamartomatous polyp	1	Tubular adenoma	1	2
Inflammatory fibroid polyp	1	Inflammatory polyps	1	2
Subtotal	9		4	13
Malignant tumors				
Malignant lymphoma	1	Adenocarcinoma	6	7
Subtotal	1		6	7
Idiopathic	2		2	4
Miscellaneous				
Meckel's diverticulum	2		2	4
Ischemic necrosis	1		1	2
Subtotal	3		3	6
Total	15		15	30

susceptions are usually idiopathic.¹ The most common sites in the gastrointestinal tract for intussusception are the junctions between freely moving seg-

ments and those fixed by adhesions or to the retroperitoneum. The mechanism of intussusception is usually a proximal area of contraction invaginating or folding into a distal area of relaxation. Any lesion in the bowel wall or within the lumen that alters normal peristaltic activity is capable of initiating the invagination. Once the bowel is trapped into intussusception, edema can develop and the jeopardized segment may become irreducible, resulting in ischemia, necrosis, gangrene, perforation, and peritonitis if untreated.

In this study, the enteric intussusceptions (40%) showed the most anatomic variety, with 86% of the patients having a specific underlying lesion as the cause of the intussusception. The lesions were malignant in 23% of the cases. Felix et al. reviewed 1214 reported cases of intussusception in adults from 11 series and estimated that 63% of all intussusceptions in adults were tumor-related.¹⁰ Of those, 45% involved the colon and 55% the small bowel. Among the colonic intussusceptions, 48% resulted from malignant tumors and 21% from benign lesions. Begos et al. analyzed 1048 cases of adult intussusception and reported that benign lesions caused only 29% of adult colonic intussusceptions.⁸ It might be simply concluded that in adults, intussusceptions involving the colon were more often related to a primary carcinoma of the colon and intussusceptions involving the small bowel were usually related to a benign tumor as opposed to a malignant tumor.¹² In the present series, 21 patients (70%) had tumor-related intussusceptions, including 7 malignant (33.3%) and 14 benign (66.7%). Compared with previous reports, 6 cases of primary adenocarcinoma of colon (28.6%) were diagnosed and only 1 patient had malignant lymphoma of ileum (4.8%). Figures from this series compared with those from previous literature show a high incidence of malignancy in colon lesion as an etiological factor of adult intussusception, which emphasizes the need for surgical intervention.

Meckel's diverticulum is a common cause of childhood intussusception but is rarely associated with intussusception in adults.^{4,13} In the present series, only 2 patients were found to have Meckel's diverticula that definitely caused intussusception. Donhauser and Kelly reported that 10%-15% of the adult intussus-

ceptions were idiopathic. In the present series, only 2 cases (6.7%) were considered idiopathic intussusceptions.

A number of different techniques have been reported for the diagnosis of intussusception. Plain abdominal films are typically the first diagnostic tool in acute abdominal problems and may provide information regarding the site of obstruction, with a sensitivity for intussusception of only about 25%.¹⁸ Although used in the pediatric population, contrast barium enema study is rarely used in adults and is not utilized to reduce the intussusception. Target (doughnut) signs and pseudo-kidney sign can be revealed on the abdominal sonography study, which has a sensitivity of about 35%.¹⁸ Several reports have suggested that abdominal CT is a useful radiologic method for diagnosing intestinal intussusception with a sensitivity of 83%.¹⁸ The CT appearance of an intussusception is often a complex target-shaped or sausage-shaped inhomogeneous soft tissue mass with an eccentric area of fat density contained within, which represents the mesenteric fat.

It is widely agreed that surgical intervention is the only approach to treat intussusception in adults whereas, in children, many surgeons advocate barium enema reduction of an ileocolic intussusception. In easily reducible cases of intussusception of the small bowel and right colon, an attempt may be made to determine whether the lesion is benign or malignant. The reason for surgical intervention in adult with colonic lesion is obvious since the majority of lesions result from an underlying pathologic factor. Therefore, lesions not diagnosed as benign before the operation should be interpreted as cancerous and treated based on surgical oncological principles with an oncologic en bloc resection.¹¹ Besides, en bloc resection eliminates the possibility of recurrence and is beneficial to at-risk patients for avoiding anastomosis in edematous or compromised bowel. In addition, the reduction of intussusception increases the risk of anastomotic complications and the potential for bowel perforation because the bowel wall may be weakened during manipulation. After exposing and handling the ischemic, friable, and edematous bowel tissue, the theoretical risks of perforation, the seeding of colonic microor-

ganisms or tumor to the peritoneal cavity, and venous embolization in regions of ulcerated bowel mucosa could occur during the exploratory reduction procedure. For these reasons, en bloc resections of all intussusception should be considered in adults regardless of location (enteric or colonic) or cause (benign or malignant). Nevertheless, the limitation of the surgical treatment of small bowel intussusception is the length of the remaining bowel (Fig. 1). Gangrenous bowel in 2 of the 30 cases indicates the importance of early operation. Most often, surgical operations are emergency procedures, making proper preparation of the bowel impossible. Resection with primary anastomosis can be achieved on right-side intussusceptions in unprepared bowels but the construction of colostomies should be performed on left-side or rectosigmoid lesions.¹⁴

Laparoscopy is valuable and widely used in the diagnosis and management of abdominal emergencies. Laparoscopy is an excellent evaluation tool allowing for the identification of the location, the nature of the lead point, and the presence of compromised bowel when intussusception is suspected in a patient

with bowel obstruction.^{15,16} Laparoscopic colectomy for curable cancers is not inferior to open surgery in terms of the long-term oncologic results.¹⁷ Laparoscopic surgery requires smaller incisions and causes less severe postoperative pain than open surgery. However, abdominal distension with intestinal obstruction limits the use of laparoscopic colon resection surgery.

Conclusion

Although rare, adult intussusception requires a high index of suspicion due to the possible underlying pathology. Small-bowel intussusception should be reduced before resection and large bowel intussusception should generally be resected without reduction because the pathology is most likely malignant.

References

1. Kimberly E. Applegate; Intussusception in children: evidence-based diagnosis and treatment. *Pediatric Radiology* 2009;39:140-3. doi: 10.1007/s00247-009-1178-9
2. Chand M, Bradford L, Nash GF. Intussusception in colorectal cancer. *Clinical Colorectal Cancer* 2008;7:204-5. doi: 10.3816/CCC.2008.n.028
3. Dean DL, Ellis FH Jr, Sauer WG. Intussusception in adults. *Arch Surg* 1956;73:6-11. doi: 10.1001/archsurg.1956.01280010008002
4. Donhauser DL, Kelly EC. Intussusception in the adult. *Am J Surg* 1950;79:673-7. doi: 10.1016/0002-9610(50)90333-3
5. Deter RA Jr, O'Malley RD, Knox W. Intussusception in adult with emphasis on retrograde type. *Arch Surg* 1953;67:854-64. doi: 10.1001/archsurg.1953.01260040867007
6. Brayton D, Norris WJ. Intussusception in adults. *Am J Surg* 1954;88:32-43. doi: 10.1016/0002-9610(54)90328-1
7. Wang N, Cui XY, Liu Y, et al. Adult intussusception: a retrospective review of 41 cases. *World J Gastroenterol* 2009;15:3303-8. doi: 10.3748/wjg.15.3303
8. Begos DG, Sandor A, Modlin IM. The diagnosis and management of adult intussusception. *Am J Surg* 1997;173:88-9. doi: 10.1016/S0002-9610(96)00419-9
9. Stubenord WT, Thorblamerson B. Intussusception in adults. *Ann Surg* 1970;172:306-10.
10. Felix EL, Cohen MH, Bernstein AD, et al. Adult intussusception: case report of recurrent intussusception and review of the literature. *Am J Surg* 1976;131:758-61. doi: 10.1016/0002-9610(76)90196-3

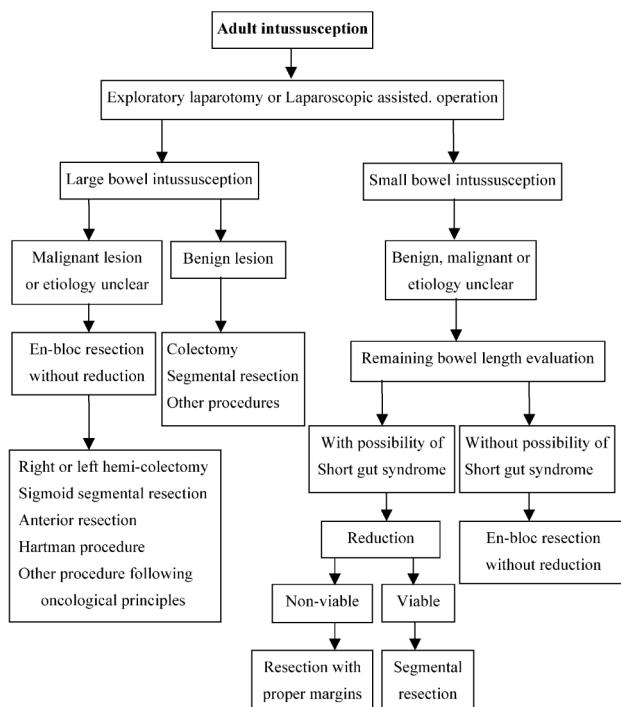


Fig. 1. Algorithm of Surgical Management of Adult Intussusception.

11. Wang LT, Wu CC, Yu JC, Hsiao CW, Hsu CC, Jao SW. Clinical entity and treatment strategies for adult intussusceptions: 20 years' experience. *Dis Colon Rec-Tum* 2007;50:1941-9. doi: [10.1007/s10350-007-9048-8](https://doi.org/10.1007/s10350-007-9048-8)
12. Barussaud M, Regenet N, Briennon X, de Kerviler B, Pessaux P, Kohneh-Sharhi N, Lehur PA, Hamy A, Leborgne J, le Neel JC, Mirallie E. Clinical spectrum and surgical approach of adult intussusceptions: a multicentric study. *Int J Colorectal Dis* 2005;21:834-9. doi: [10.1007/s00384-005-0789-3](https://doi.org/10.1007/s00384-005-0789-3)
13. BurMeister RW. Intussusception in adult; an elusive case of recurrent abdominal pain. *Am J Dig Dis* 1962;7:360-74. doi: [10.1007/BF02231861](https://doi.org/10.1007/BF02231861)
14. Azar T, Berger DL. Adult intussusception. *Ann Surg* 1997; 226:134-8. doi: [10.1097/0000658-199708000-00003](https://doi.org/10.1097/0000658-199708000-00003)
15. Agresta F, Ciardo LF, Mazzarolo G, Michelet I, Orsi G, Trentin G, Bedin N. Peritonitis: laparoscopic approach. *World J Emerg Surg* 2006;1:9. doi: [10.1186/1749-7922-1-9](https://doi.org/10.1186/1749-7922-1-9)
16. Ates M, Coban S, Sevil S, Terzi A. The efficacy of laparoscopic surgery in patients with peritonitis. *Surg Laparosc Endosc Percutan Tech* 2008;18:453-6. doi: [10.1097/SLE.0b013e31817f4624](https://doi.org/10.1097/SLE.0b013e31817f4624)
17. Jayne DG, Thorpe HC, Copeland J, et al. Five-year follow-up of the medical research council CLASICC trial of laparoscopically assisted versus open surgery for colorectal cancer. *British J Surg* 2010;97:1638-48. doi: [10.1002/bjs.7160](https://doi.org/10.1002/bjs.7160)
18. Yakan S, Caliskan C, Makay O, et al. Intussusception in adults: clinical characteristics, diagnosis and operative strategies. *World J Gastroenterol* 2009;28:1985-9. doi: [10.3748/wjg.15.1985](https://doi.org/10.3748/wjg.15.1985)

原 著

成人腸套疊

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目的 腸套疊常見於幼童，成人比較少見，成人發生腸套疊通常是肇因於腸道本身內在的病變不同於幼童。

方法 本研究收集自 1974 至 2012 年共 38 年間，在台北榮民總醫院共 30 位腸道型腸套疊病患，分析其臨床表徵，型態，治療方式結果，做了完整的病歷分析。

結果 分析 30 位腸道型腸套疊病患，有 26 位有腸道本身的病理性肇因約佔 86%，成人腸道型腸套疊肇因大致分為三類，第一類是與腫瘤相關 (tumor-related) 有 20 位約佔 66.7%，第二類是不同病變性質的 (Miscellaneous) 有 6 位約佔 20%，分別如梅克爾氏憩室 (Meckel's diverticulum) 有 2 位約佔 6.7%，異物性肉芽腫有 1 位約佔 3.3%，大腸憩室炎有 2 位約佔 6.7%，大腸缺血性壞死有 1 位約佔 3.3%，第三類是自發性 (Idiopathic) 有 4 位約佔 13.3%。在 20 位與腫瘤相關 (tumor-related) 的成人腸道型腸套疊中，惡性腫瘤有 7 位，良性腫瘤有 13 位。成人腸道型腸套疊臨床上有四種型式：第一種小腸套小腸型有 12 位約佔 40%，第二種是迴腸套盲腸型有 7 位約佔 23.3%，第三種是迴腸套大腸型有 5 位約佔 16.7%，第四種是大腸套大腸型有 6 位約佔 20%。

結論 當成人腸套疊被確定診斷時，其個人多有腸道本身的病理性肇因，必須做積極適當的完整切除手術。

關鍵詞 成人、腸道型腸套疊。