■ *Original Article*

Intussusceptions in Adults: A Retrospective Interventional Series of Cases

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Abstract

Background: Intussusception is a different entity in adults than it is in children and is usually secondary to a definable pathology. **Objective:** To review adult intussusception: clinical features, diagnosis and their management. **Subjects and methods:** A retrospective review of 38 cases of intussusception in individuals older than 18 years of age presenting to BPKIHS Dharan, Nepal from January 2003 to December 2009 was done. **Results:** In six years, there were thirty-eight patients of surgically proven adult intussusception. The patients' mean age was 49.6 ± 16.2 years, M: F ratio was 1.3:1. Intestinal obstructions of various extents were the commonest presentation in twenty-seven patients (71%). There were 42% enteric, 32% ileocolic and 26% colonic AI. The diagnostic accuracy of the ultrasonography was 78.5%, CT scan was 90% and colonoscopy was 100%. The pathological lesions were found in 94% of AI. Among the pathological lesion, enteric have 62% benign, 38% malignant, ileocolic have 50% benign, 50% malignant, and in colocolic 70% malignant, 30% benign. In enteric AI, 68% were reduced successfully, 25% reduction was not attempted. Of ileocolic AI, 58.3% were reduced successfully, 41.6% had resection without reduction. Of colocolic AI, 30% of them were reduced successfully before resection, 70% had resection without reduction. **Conclusion:** CT scanning is the most useful diagnostic radiologic method in AI. Colonoscopy is the most accurate in ileocolic and colonic AI. Small-bowel intussusception should be reduced before resection if the underlying etiology is suspected to be benign or if the resection required without reduction is deemed to be massive. Large bowel should generally be resected without reduction because pathology is mostly malignant.

Keywords: Adult intussusception (AI), Bowel obstruction, CT scan

Introduction

A rare occurrence in adults, intussusception exists when a proximal segment of bowel (intussusceptum) telescopes into the lumen of the adjacent distal segment (intussuscipiens). Adult intussusception (AI) represents 1% of patients with bowel obstructions[1,2] and 5% of all intussusceptions.[3-5] In contrast to intussusceptions in children, a demonstrable etiology is found in 70% to 90% of cases in the adult population.[5-8] Intraluminal lesions alter normal bowel peristalsis and form leading edges for the intussusceptum.[9-10] Although intussusceptions present acutely in children, adults may present with acute, intermittent, or chronic reported problems.[11] The predominant symptoms usually are those of bowel obstruction, and consequently, intussusception often is misdiagnosed initially in the adult population.

Preoperative diagnosis remains difficult and the extent of resection, and whether the intussusception, should be reduced remains controversial.[12] The present study reviews our institutional experience of AI, and discusses the optimal preoperative diagnosis and surgical management, techniques and outcome.

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Subjects and Methods

The medical records of 38 adult patients (18 years of age and older) with a postoperative diagnosis of intussusception at the B. P. Koirala Institute of Health Sciences, from January 2003 to December 2009, were collected. The clinical presentation, physical signs, investigations, treatment and histopathology of all patients were reviewed.

The following definitions were used to classify intussusception. Enteric and colonic intussusceptions are those that are confined to the small intestine and large intestine, respectively. Ileocolic intussusceptions (IC) are defined as those with prolapse of the ileum through the ileocecal valve into the colon.

The patients were further divided into ones with benign enteric, malignant enteric, benign colonic and malignant colonic lesions based on the final pathology reports.

A proximal segment of the bowel telescoped into the lumen of the adjacent distal segment was defined as antegrade intussusception.

A distal segment of the bowel telescoped into the lumen of the adjacent proximal segment was defined as retrograde intussusception.[13]

Acute symptoms were defined as of duration of < 4 days, subacute symptoms of 4-14 days, and chronic symptoms of as > 14 days.[14]

Intussusception was preoperatively diagnosed by abdominal ultrasonography with the target and doughnut signs on transverse view and the pseudo kidney sign in the longitudinal view.[12] Intussusception as preoperatively diagnosed by computed tomography (CT) scans with the characteristic target or sausage sign, and mesentery in the lumen.[14, 15, 25]

Results

Of all the thirty-eight patients, there were twenty-four males with an average (range) age of 49.3 ±17.7 (19-87) years and fourteen females with an average (range) age of 50.2 ± 13.2 (28-70) years. The male: female ratio was 1.3:1. Of all, 38 intussusceptions, sixteen were enteric intussusceptions (42%), twelve were ileocolic intussusceptions (32%) and ten were colocolonic intussusceptions (26%). Thirty-seven intussusceptions were antegrade (97.3%) and only one enteric intussusception was retrograde (2.7%) (Table 1).

Table 1: Preoperative diagnosis and treatment of 38 cases of adult intussusception

Age	Sex	USG1	Type	Surgery	Reduction2	HPE
19	M	Y	Enteric	SI segmental resection	Y	Small intestine polyp
23	M	Y	Enteric	SI segmental resection	Y	Small intestine lipoma
64	F	Y	Enteric	SI segmental resection	N	Small intestine lipoma
50	M	Y	Enteric	SI segmental resection	Y	GIST of Small Intestine
55	F	y	Enteric	SI segmental resection	Y	SI malignant mesothelioma
45	M	Y	Enteric	SI segmental resection	N	SI malignant mesothelioma
70	F	Y	Enteric	SI segmental resection	N	GIST of Small Intestine
68	F	Y	Enteric	SI segmental resection	F	GIST of Small Intestine
57	M	Y	Enteric	SI segmental resection	Y	Small intestine lipoma
44	M	Y	Enteric	SI segmental resection	Y	Malignant lymphoma
39	M	Y	Enteric	Retrograde	Y	
55	F	Y	Enteric		Y	
59	M	N	Enteric	SI segmental resection	Y	Post-operative adhesion
66	M	N	Enteric	SI segmental resection	Y	Post-operative adhesion
35	F	N	Enteric		Y	Post-operative adhesion
63	M	N	Enteric	SI segmental resection	N	Post-operative adhesion
28	F	N	IC	SI segmental resection	N	Small intestine polyp
33	F	Y	IC	Right hemicolectomy	N	GIST of small intestine
38	M	Y	IC	Right hemicolectomy	N	Carcinoma caecum
42	M	N	IC	SI segmental resection	Y	Small intestine lipoma
48	M	N	IC	Right hemicolectomy	Y	Suppurative appendicitis
46	M	Y	IC	Right hemicolectomy	N	GIST of small intestine

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52	F	Y	IC	Right hemicolectomy	N	Ileum adenoma, necrosis and bleeding
20	M	Y	IC	Right hemicolectomy	Y	Mesenteric Lymphadenitis
64	M	Y	IC	Right hemicolectomy	Y	Ileum B Cell Malignant Lymphoma
49	M	Y	IC	Right hemicolectomy	Y	Carcinoma caecum
23	M	Y	IC	SI segmental resection	Y	SI hamartoma
40	F	Y	IC	Right hemicolectomy	Y	necrosis and ulcer of cecum
54	M	N	CC	Right hemicolectomy	N	Ascending colon adenocarcinoma
48	F	Y	CC	Right hemicolectomy	N	Carcinoma caecum
38	M	Y	CC	Right hemicolectomy	Y	Colon Lipoma
56	M	Y	CC	Left hemicolectomy	N	Descending colon adenocarcinoma
43	F	Y	CC	Left hemicolectomy	Y	Colon Lipoma
82	M	Y	CC	proctosigmoidectomy	N	Sigmoid colon adenocarcinoma
71	M	Y	CC	Left hemicolectomy	N	Necrosis and Bleeding
87	M	N	CC	Right hemicolectomy	N	Ascending colon adenocarcinoma
67	F	Y	CC	Right hemicolectomy	N	Transverse colon adenocarcinoma
45	F	N	CC	Left hemicolectomy	Y	Colon Lipoma

SI: Small intestine; GIST: Gastrointestinal stromal tumor. [1]Y: Done; N: Not done; [2] Y: Reduction succeeded; F: Reduction failed; N: Reduction not attempted.

Of the 38 patients, 94.7% (35/38) had abdominal pain, 28.9% (11/38) had bloody stool, and 39.4% (15/38) had a palpable abdominal mass. This classic pediatric presentation triad was only seen in 15.7% (6/38). Seventy one percent (27/38) presented with intestinal obstructions of various extents. The duration of the symptoms varied from 6 hours to 3 years; 26.3% (10/38) with acute symptoms, 21% (8/38) with sub-acute symptoms, and 52.6% (20/38) with chronic symptoms.

Of the thirty-eight patients, 65.8% (25/38) were preoperatively diagnosed as intussusception. Patients with acute and subacute symptoms had plain abdominal x-ray. Twenty eight patients had ultrasonography, of which 22 were diagnosed as intussusception (78.5% accuracy) **(Figure1)**. However, the preoperative diagnostic accuracy of the patients who had palpable abdominal masses was 86.6% (13/15).
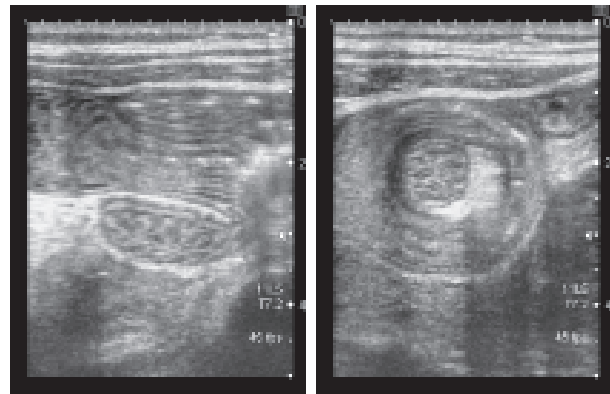

(a)   (b)

Figure 1(a, b): 23 year old male patient presented with abdominal pain. Ultrasonography of the abdomen, axial image (a) shows concentric rings of bowel with echogenic fat trapped in the center s/o intussusception. Longitudinal image (b) of the same patient clearly shows the telescoping of a bowel segment into the distal segment.

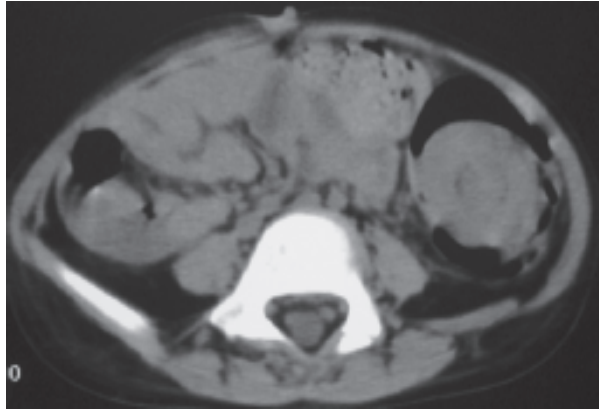Twenty patients had CT scans, of which 18 were diagnosed as intussusception (90% accuracy)**.**

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Figure 2 A 56-year-old man with an colocolic intussusception due to descending colon adenocarcinoma. Non contrast CT scan of abdomen shows typical appearance of a large bowel intussusception. The intussusceptum (black arrow) is surrounded by a thick walled intussuscipiens (white arrow).

Table 2: preoperative diagnostic studies

Examination	% (number) of patients	Diagnostic accuracy (%)
Abdominal X-ray	90 (34)	0
Abdominal ultrasound	73 (28)	78.5
Abdominal CT	52 (20)	90
Colonoscopy	18 (7)	100

Colonoscopy was performed in seven patients, with diagnostic accuracy of 100% (Table2).In one patient, colonoscopy was performed with the intention of reducing the intussusception. Sixteen patients underwent segmental resection of the small bowel, 14 underwent a right hemicolectomy, 4 underwent a left hemicolectomy, and 1 patient with a sigmoidorectal intussusception underwent a proctosigmoidectomy. Of the thirty-eight patients, 17 underwent resection after primary reduction (Table 1).

Of the 16 enteric intussusceptions, three patients (18.7%) underwent a simple reduction, eight patients (50%) had a segmental resection with primary reduction, one patient (6.2%) failed in reduction, and four patients (25%) had segmental resection without reduction (Table 1).

Of the 12 ileocolic intussusceptions, seven (58.3%) were reduced successfully. Due to the reduction, five patients had limited resection with preservation of the antireflux ileocecal valve. Five patients (41.6%) had a right hemicolectomy without reduction (Table 1).

Of the 10 colocolic intussusceptions, three patients (30%) were reduced successfully before resection. The other seven patients (70%) had resection without reduction. The sigmoidorectal intussusception underwent proctosigmoidectomy (Table 1).

There was no perioperative mortality. There were two minor anastomosis leakage in colocolic intussusception, which was managed conservatively. There was no recurrence within 1 year follow up.The pathologic cause of intussusception was identified in 36 cases (Table 3).

Table 3: Lesions Associated With Adult Intussusception

Causes	No. of cases (%)	Enteric	Ileocolic	colonic
Benign				
Adhesion	4(10.5)	4		
Idiopathic	2(5.26)	2		
Lipoma	7(18.4)	3	1	3
Polyp	2(5.26)	1	1	
Necrosis and ulcer	2(5.26)		1	1
Suppurative appendicitis	1(2.63)		1	
Mesenteric lymphadenitis	1(2.63)		1	
Hamartoma	1(2.63)		1	
Malignant				
Primary adenocarcinoma	8(21.05)		2	6
Malignant mesothelioma	2(5.26)	2		
GIST	5(13.2)	3	2	
Ileal adenoma	1(2.63)		1	
Secondary Lymphoma	2(5.26)	1	1	
Total	38(100)	16	12	10

(Data are numbers with percentages in parentheses)

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Benign pathologies were seen in eighteen patients (50%) and malignant in eighteen patients (50%). Of enteric intussusceptions, 8 were secondary to a benign process, including submucosal lipoma, polyp, and postoperative adhesions. No pathology could be demonstrated in 2 cases, of which one had retrograde intussusception. Of the malignant causes, 3 were caused by gastro-intestinal stromal tumor (GIST), 2 were small intestine malignant mesothelioma, and one was secondary to a malignant lymphoma.

Fifty percent of ileocolic intussusceptions were a result of benign lesion and 50% due to malignant lesion. Benign pathology included one patient each of small intestine polyp, small intestine lipoma, Suppurative appendicitis, mesenteric lymphadenitis, small intestine hamartoma, inflammation / ulcer of cecum. Of the malignant causes, 2 were caused by GIST, 2 were carcinoma caecum, one was secondary to Ileum adenoma and one had malignant lymphoma.

Sixty percent of large-bowel intussusceptions were a result of a malignant lesion. Cases of colonic intussusception were secondary to primary adenocarcinoma (6 cases), lipoma (3 cases), Necrosis and bleeding (1 case). One sigmoidorectal intussusception case was identified in this study which was secondary to primary adenocarcinoma of sigmoid colon.

Discussion

Intussusception is one of the leading causes of intestinal obstruction in children and ranks second after appendicitis as the most common cause of acute abdominal emergency in children. Adult Intussusception is distinct from pediatric intussusception in that it is rare, accounting for only 1% of patients with bowel obstructions[1,2] and 5% of all intussusceptions.[3-5] In contrast to intussusceptions in children, a demonstrable etiology is found in 70% to 90% of cases in the adult population.[5-8] The exact mechanism is still unknown. However, it is believed that any lesion in the bowel wall or irritant within the lumen that alters normal peristaltic activity, form leading edges for the intussusceptum, is able to initiate an invagination.[9-10] Ingested food and subsequent peristaltic activity of the bowel produces an area of constriction above the stimulus and relaxation below, thus telescoping the lead point

(intussusceptum) through the distal bowel lumen (intussuscipiens).[12, 14, 15, 16, 17] The most common locations are at the junctions between freely moving segments and retroperitoneally or adhesionally fixed segments. [14, 18]

The clinical presentation in adult intussusception is often chronic, and most patients present with non-specific symptoms that are suggestive of intestinal obstruction. Abdominal pain is the most common symptom followed by vomiting and nausea. [16,17] Abdominal masses are palpable in 24%-42% of patients, and identification of a shifting mass or one that is palpable only when symptoms are present is suggestive of intussusception or volvulus.[16, 17,19] In our series, an abdominal mass was palpable in fifteen patient (39.4%).

Similar to the results of Zubadiet al [12] enteric type intussusception was the most common type in our series. However, in the report of 60 cases by AI Goh et al [15], ileocolic (25ÿ) and ileocecal-colic (13.3%) types were the most common. Their enteric type occupied 26.7%. Similar to our results, their colocolic and sigmoidorectal types were the least common types.

A number of different radiologic methods have been described as useful in the diagnosis of intussusception: CT scan, barium studies, abdominal ultrasound, plain film, angiography, and radionucleotide studies.[31-35] Angiographic[34] and radionucleide[35] studies have shown diagnostic efficacy but were not used in this series.

Plain abdominal X-rays are typically the first diagnostic tool and show signs of intestinal obstruction, and may provide information regarding the site of obstruction.[18, 19]

Ultrasonography has been used to evaluate suspected intussusception. The classic features include the "target and doughnut sign" on transverse view and the "pseudokidney sign" in longitudinal view. The major disadvantage of ultrasound is masking by gas-filled loops of bowel, operator dependency and most AIs present with intestinal obstruction .[21-24, 26] Therefore, the preoperative diagnostic accuracy of ultrasonography (78.5%) is satisfying. However, the preoperative diagnostic accuracy of the 15 patients who had palpable abdominal mass was 86.6%, indicating that in cases of palpable abdominal mass, the diagnostic accuracy of ultrasonography would increase significantly.

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Recently, with the signs of target or sausage, mesenteric fat and vessels, abdominal CT scan has been reported to be the most useful imaging technique; with a diagnostic accuracy of 58%-100%. [14,15,25,27,28] Recent studies have demonstrated the superiority of CT in revealing the site, level, and cause of intestinal obstructions and in demonstrating threatening signs of bowel nonviability.[29,30] As was shown in our study, the majority of AIs presented with partial or complete intestinal obstruction. Moreover, 90% (18/20) of AIs were diagnosed by CT in our series. Two case of AI that was not diagnosed by CT, however, was correctly diagnosed as having an intestinal occupying lesion. In contrast to ultrasound, CT is not affected by the presence of gas in the bowel and clearly demonstrates the intussusception, whether in the small bowel or in the colon. Additional valuable information, such as metastasis or lymphadenopathy, is readily obtained by CT and may point to an underlying pathology.[16] Therefore, we suggest that all patients presenting with an intestinal obstruction should have an abdominal CT scan as a regular diagnostic test.

It is reported that 8%-20% of AIs are idiopathic and are more likely to occur in the small intestine.[17] In our series, there were two patients (5.26%) whose etiology was not found by surgical exploration. Both of them occurred in the enteric intussusception. These patients underwent simple reduction. The only retrograde intussusception found in our patients was cured by simple reduction.

Most AIs have underlying pathological lesions; therefore, most authors agree that laparotomy is mandatory. In 20% to 50% of cases of adult intussusception, the etiologic agent is a malignancy.[3, 36-38] In general; the majority of lead points in the small intestine consist of benign lesions, such as benign neoplasms, inflammatory lesions, Meckel's diverticuli, appendix, adhesions, and intestinal tubes. However, whether or not the intussusception should be reduced before resection remains controversial. The theoretical objections to reductions are intraluminal seeding and venous dissemination of malignant cells, possible perforation during manipulation and increased risk of anastomotic complications in the face of edematous and inflamed bowel.[12]

Malignant lesions (either primary or metastatic) account for up to 30% of cases of intussusception in the small intestine. [17, 19] In our series 37.5% (6/16) of the etiologies of enteric intussusceptions were malignant. Therefore, reduction before resection would be more prudent. We suggest that if the underlying etiology and/or the lead point is suspected to be malignant, or if resected area required without reduction is not massive, an en bloc resection of the intussusception should be considered.

Fifty percent of the etiologies of ileocolic intussusceptions were malignant in our series. 58.3% were reduced successfully. Due to the reduction, 5 patients had limited resection with preservation of the antireflux ileocecal valve. Five of them (41.6%) had a right hemicolectomy without reduction.Wang et al[14] reported 41% (5/12) patients had malignant lesions in this type of intussusception. They thought intraoperative colonoscopy might help to distinguish benign from malignant lesions before reduction. This technique can identify benign lesions of the ileum and be used to perform limited resection with preservation of the antireflux ileocecal valve.

There were 60% of colocolic intussusceptions caused by a malignant tumor adenocarcinoma in our series, but most authors report presence of malignant pathology in 50%-100%.[8, 14, 15, 17,18,19,23] Sometime it is difficult to distinguish between colonic intussusceptions, which harbour a benign or a malignant lesion.[8, 9] Our colonoscopies found all (7/7) of the lead point lesions and diagnosed all of the adenoma and adenocarcinomas of non-enteric intussusceptions. In our study, the lesions of appendicitis, benign tumors and polyps might have been diagnosed by colonoscopy; organic lesion might have been excluded in the patient who had undergone appendectomy before exploration for intussusception. If colonoscopy had been undertaken, unnecessary surgery could have been avoided. Therefore, we consider that in ileocolic, colocolic and sigmoidorectal intussusceptions, colonoscopy is necessary, either preoperatively or intraoperatively. A formal resection along lymphatic drainage should be performed for all malignant colonic intussusceptions. Fortunately, most colonic lesions are on the right side, and resection with primary anastomosis can be achieved in unprepared bowels. Lesions in the left colon or the rectosigmoid should be resected with construction of a colostomy and a Hartmann pouch with reanastomosis at a later operation date.

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Recently, minimally invasive techniques have been applied to the treatment of small or large bowel obstructions, specifically to the diagnosis and treatment of adult intussusception. There are several case reports about laparoscopic small bowel resection because of intussusception. [39, 40] The choice of using a laparoscopic or open approach depends on the clinical condition of the patient, the location and extent of intussusception, the possibility of underlying disease, and the availability of surgeons with sufficient laparoscopic expertise. [41, 42] In the present study, we did not use laparoscopy for diagnosis or treatment.

Conclusion

Most AIs present with subacute and chronic symptoms have intestinal obstructions to various extents. CT is the most effective and accurate diagnostic technique. In the case of a palpable abdominal mass, accuracy of the ultrasonography increased significantly. The treatment of adult intussusception is surgical. The small-bowel intussusception should be reduced before resection if the underlying etiology is suspected to be benign or if the resection required without reduction is deemed to be massive. Large bowel should generally be resected without reduction because pathology is mostly malignant. Colonoscopy can find most lead point lesions of the ileocolic, colocolic or sigmoidorectal intussusceptions. For these types of intussusceptions, colonoscopy might provide information allowing the avoidance of unnecessary surgery.

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