

# Intussusception in children: Experience with 105 patients in a department of paediatric surgery, Turkey

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## Summary

**Aim.** The aim of this study was to present our experience in patients with intussusception (IN).

**Materials and methods.** One hundred and five cases of IN treated between 1991 and 2007 were analysed. Age, gender, symptoms, signs, diagnostic and treatment methods, types of IN including leading point, and postoperative complications were evaluated.

**Results.** The mean age of the patients was 2.5 years (range 1 month - 15 years). Fifty-nine per cent (62/105) were under 1 year of age, and of these 28% were receiving therapy for upper respiratory tract infection. The most common symptom was colicky abdominal pain. Rectal bleeding was present in all patients under 2 years of age. In 23 children (21.9%) leading points were detected. Thirty per cent of the patients were older than 4 years, and 76.6% of these had leading points. Ultrasonography demonstrated the invaginated segment in 93 patients. Hydrostatic reduction was attempted in 71.4% (75) of the patients and was successful in 48% (36), 70% of whom were under 1 year of age. Of the patients with unsuccessful hydrostatic reduction, 11 required intestinal resection and primary anastomosis and 35 manual reduction. Twenty-four patients were diagnosed by means of ultrasonography and were operated on immediately. Ten of these patients had signs of peritonitis on admission and were treated by resection-primary anastomosis.

**Conclusion.** In patients with IN under 2 years of age, hydrostatic or pneumatic reduction may be successful. Considering the high incidence of leading points in older children, one should not persist with reduction but should rather design a treatment plan accordingly, i.e. laparotomy with manual reduction or resection.

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Intussusception (IN) is a common cause of bowel obstruction in infants and children. Usually a combination of one symptom and two signs are noted: colicky pain, bloody stools, and a mass in the abdominal area.<sup>1,2</sup>

The diagnosis of IN is established by means of physical examination, a plain abdominal radiograph, and ultrasonography (USG). Treatment modalities are both non-operative and operative. Non-operative methods can often fail if the diagnosis has been delayed or the patient has presented late.<sup>3</sup> This study aimed to evaluate the presenting symptoms, IN types and

causation, treatment methods and complications of patients diagnosed with IN who were treated in our clinic in the past 17 years and to report our experience with IN.

## Materials and methods

Data on patients treated for IN between January 1991 and December 2007 were studied retrospectively, looking at patient ages, symptomatology, diagnostic and treatment methods used, and operative findings. Abdominal USG and barium enema examination were the primary diagnostic tools. After fluid resuscitation, barium enema reduction was attempted applying a pressure of 90 cm H<sub>2</sub>O. Patients in whom two consecutive attempts at reduction failed underwent laparotomy. Nasogastric drainage was done in each patient and a third-generation cephalosporin was administered prophylactically before barium reduction and after 12 hours.

## Results

One hundred and five children with IN (72 males, 33 females) were treated. The mean age of the patients was 2.5 years (range 1 month - 15 years); 62 (59%) were younger than 1 year, and of these 28% were receiving treatment for upper respiratory tract infection. Thirty-two (30%) patients were older than 4 years of age. The most common symptoms were crampy abdominal pain ( $n=87$ ), vomiting ( $n=86$ ) and bloody stools ( $n=25$ ). Clinical examination revealed a palpable intra-abdominal mass ( $n=57$ ) and rectal blood in all patients aged under 2 years. Diarrhoea was noted in 80 patients, and convulsions were present in 1 (Table 1).

Leading points were detected in 23 patients (21.9%). The most common leading points were Meckel's diverticulum and Henoch-Schönlein purpura (HSP) (Table 2). Ninety-three patients were evaluated by USG, and in all of them an invaginated intestinal segment was seen.

The treatment modality of choice was barium enema in 75 patients (71.4%), and this was successful in 36. Twenty-six (70%) of these patients were under 1 year of age. Hydrostatic barium enema reduction failed in 39 of 75 patients, and in 30 of them reduction could be achieved manually. Re-intussusception developed in 2 of the patients who underwent manual reduction. Recurrence was recorded in a total of 6 patients (8%), and intestinal perforation in 1 (Table 3).

Twenty-four patients with IN diagnosed by USG underwent laparotomy. Most of these patients had signs of peritonitis at admission and the rest had various underlying conditions (Table 3). Only 1 death occurred.

**Table 1. The symptoms of 53 patients with intussusception**

Symptoms and findings	Incidence rate (n (%))
Abdominal pain	87 (82.8)
Vomiting	86 (81.9)
Abdominal mass	57 (54.2)
Bloody stool	25 (23.8)
Blood in rectal examination	83 (79)
Diarrhoea	18 (17.1)
Convulsions	1 (0.9)

**Table 2. Pathological leading points in patients with intussusception**

Leading point	n
Intestinal polyps	4
Intestinal lymphoma	3
Meckel's diverticulum	6
Henoch-Schönlein purpura	6
Intestinal duplication	1
Intestinal haemangioma	2
Intestinal haematoma	1
Total	23

**Table 3. Treatment procedures performed**

Procedure	n
<b>Barium reduction</b>	75
Successful	36
Unsuccessful	39
<b>Laparotomy</b>	
Manual reduction	35
Unsuccessful hydrostatic reduction	30
Postoperative invagination	5
Resection-anastomosis	27
Unsuccessful reduction	11
Peritonitis	10
Henoch-Schönlein purpura	2
Meckel's diverticulum	1
Haemangioma	2
Duplication	1
Wedge resection for Meckel's diverticulum	5
Enterotomy for polyposis	2
<b>Intra-operative spontaneous reduction</b>	4
Henoch-Schönlein purpura	1
Idiopathic	3

## Discussion

The incidence of IN in children is 1 - 4/1 000, and infants aged 3 - 18 months of age are the most commonly affected group.<sup>1,3,4</sup> The mean age of the patients in our series was 2.5 years, which is older than generally reported. In our series 68.5% were males, which is a higher proportion than reported in the literature (60%).<sup>1,4</sup> A history of viral infection of the upper respiratory tract has been

reported in 20 - 50% of patients with IN.<sup>5,6</sup> In this series, 28% of the patients under 1 year of age ( $n=35$ ) were on treatment for upper respiratory tract infection.

IN has been reported to be ileocolic in more than 80% of cases.<sup>1,3,4</sup> In our series, 79 patients (76.1%) had ileocolic IN. This rate is lower than those reported by others, and the difference may be due to a high number of leading points and postoperative cases of IN. The incidence of leading points in the literature in paediatric cases is nearly 2 - 12%.<sup>3</sup> A leading point was detected in 23 (21.9%) of our patients, and 76.6% of these were older than 4 years. In the literature, the presence of one leading point has been reported in 57% of patients with IN over 4 years of age.<sup>7</sup> Meckel's diverticulum, polyps and tumours have been listed as the most common reasons for a leading point.<sup>8</sup> In our series, the most common leading points were Meckel's diverticulum and HSP. The high rate of leading points may have been due to the facilities offered to these patients by a tertiary hospital (Table 2).

The main complaint on presentation was cramping abdominal pain, the prevalence of which was 82.8% ( $n=87$ ); in the literature it has been reported to be 70 - 85%.<sup>1,9</sup> Other findings were vomiting (81.9%), diarrhoea (17.1%) and convulsions (0.9%). The incidence of these findings is consistent with the rates reported in earlier studies (Table 1). The prevalence of bleeding determined by rectal examination (83 patients, 79%) is higher than the rates in other reported series.<sup>3,10</sup> This high rate may have been due to delayed presentation and/or the high rate of leading points in our series. A palpable abdominal mass was detected in 57 of our patients (54.2%), the prevalence reported in the literature being 22 - 80%.<sup>1,3</sup>

Barium examination of the rectum and USG are among the imaging methods used in diagnosing IN. A plain abdominal radiograph aids in differentiating between a soft-tissue mass and colonic gas.<sup>11</sup> In a clinical study the sensitivity and specificity of USG were found to be 100% and 98.5%, respectively.<sup>12</sup>

Barium or pneumatic reduction is a method of treating IN in cases with no acute abdominal and septic findings. The success rate of these methods ranges between 19% and 85%.<sup>4</sup> The perforation rate with both methods has been reported to be 2 - 3%, some series reporting higher rates of perforation with reduction with air.<sup>14</sup> The passage of barium or air to the terminal ileum has been considered a criterion for a successful reduction. Barium reduction was performed in 75 patients in our series and was successful in 36 (48%). Of these patients, 70% were under 1 year of age.

According to Ein *et al.*,<sup>1</sup> surgery is required in 19% of children with IN, and 30% of these need resection.<sup>3</sup> In an African study on IN, there was a relatively low overall rate (19%) of hydrostatic reduction of IN. Forty per cent of patients submitted to surgery underwent intestinal resection because of perforation, peritonitis, gangrenous bowel, or failure to reduce even at surgery.<sup>14</sup> In our series, 39 patients with failed barium reduction were operated on. Twenty-four patients were operated on immediately they were diagnosed. This incidence of surgery and bowel resection is much higher than those in some international settings and is representative of the situation in developing countries. Another explanation for the high rate of surgical intervention in our series may be late presentation and/or delayed diagnosis. If elective USG is performed in paediatric patients with vomiting and colicky abdominal pain, the success rate of barium reduction would increase as a result of earlier diagnosis of IN.

## Conclusion

In conclusion, we recommend hydrostatic or pneumatic reduction for patients with IN under 2 years of age when no acute abdominal and/or septic findings are present. In patients over 4 - 5 years of age, the presence of an underlying leading point should be kept in mind even if barium reduction is successful. It should also be remembered that the rate of leading points may be higher in tertiary hospitals and in developing countries.

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