

Intussusception: Postreduction Fasting Is Not Necessary to Prevent Complications and Recurrences in the Emergency Department Observation Unit

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Objectives: This study aimed to compare the incidence of complications and intussusception recurrences in patients in the pediatric emergency department observation unit (EDOU) who are fed early (<2 hours) versus late (≥ 2 hours) after radiologic intussusception reduction.

Methods: This is a retrospective cohort study of children observed in the Texas Children's Hospital EDOU after radiologic intussusception reduction between April 1, 2003, and August 31, 2009. Complications were defined as the postreduction occurrence of intestinal perforation, shock, or sepsis.

Results: There were 149 patients included in the study (median age, 16 months; range, 3–95 months). Oral refeeding was started early in 61 patients (41%) and late in 88 patients (59%). The median length of EDOU stay was 15.6 hours in early refeeders and 16.1 hours in late refeeders ($P = 0.58$). None of the patients developed any complications. There was no difference in the frequency of postreduction fever, abdominal pain, or vomiting (13% early vs 16% late, $P = 0.65$); imaging to assess for intussusception recurrence (20% early vs 22% late, $P = 0.79$); and subsequent hospitalization (3% early vs 8% late, $P = 0.31$) between the groups. The frequency of intussusception recurrence was higher, but not significantly so ($P = 0.31$), in the late refeeders (15%) compared with the early refeeders (8%).

Conclusions: There is no evidence for a difference in complication frequency, intussusception recurrence, or EDOU length of stay between patients who are fed early (<2 hours) or late (≥ 2 hours) after radiologic intussusception reduction. This indicates that there is no need to withhold feeds from patients after intussusception reduction.

Key Words: intussusception, radiologic reduction, postreduction fasting, recurrences, complications, emergency department observation unit

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Intussusception is the most common cause of intestinal obstruction in infancy, and radiologic (air- or water-soluble contrast enema) reduction is the standard of care for nonsurgical management.^{1–9} Postreduction complications include intestinal perforation, shock, or sepsis.^{8,10} In addition, intussusception may recur after successful reduction.^{1–3,7,9–12}

Increasingly, patients are observed for complications and recurrences in the emergency department observation units

(EDOUs) after radiologic intussusception reduction. However, there is variability in practice even within our institution in the postreduction care of children with intussusception with regard to when to resume feeds. Some patients are rapidly advanced to full feeds, whereas others have feeds withheld for periods ranging from 2 to 12 hours. It is assumed that these patients are fasted to rest the bowel and to reduce the incidence of complications. However, there is little evidence that postreduction fasting affects the incidence of complications and recurrences, although it is likely that delayed feeding increases EDOU length of stay (LOS).

It was the objective of this study to compare patients who are rapidly advanced to full feeds and those who had their feeds withheld after radiologic reduction. We propose that the complication and recurrence rate in both group of patients are similar, and that postreduction fasting is unwarranted.

METHODS

Design and Setting

A retrospective cohort of all children admitted to the Texas Children's Hospital EDOU (February 2003 to March 1, 2009) with a diagnosis of intussusception. Texas Children's Hospital is a freestanding pediatric hospital located in Houston, Texas, with an annual ED census of 80,000 patients. The ED is a 12-bed unit opened in February 2003 and is located close to the ED. The study was approved by the Baylor College of Medicine Institutional Review Board.

Inclusion Criteria

Included in the study are patients observed in the EDOU after successful radiologic reduction of intussusception. Successful reduction by air or contrast enema was defined as the free and massive reflux of air- or water-soluble contrast to the small bowel after initial obstruction.

Exclusion Criteria

Excluded from the study are patients in whom radiologic intussusception reduction was not successful or in whom spontaneous reduction occurred without need for radiologic intervention. Spontaneous reduction was defined as patients with an initial diagnostic study demonstrating intussusception who either had spontaneous reduction demonstrated during the initial imaging modality or had no intussusception noted during enema. Patients were also excluded if their medical records did not contain information about the timing of their oral intake post-intussusception reduction.

Refeeding Categorization

Patients were categorized based on the timing of first oral intake after intussusception. Patients who fed or drank within 2 hours of reduction were classified as early refeeders, and patients

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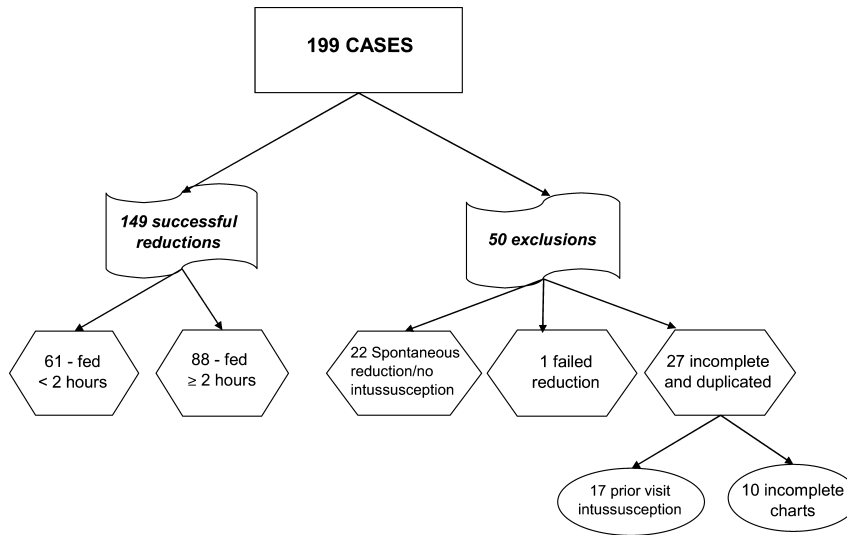


FIGURE 1. Distribution of patients based on eligibility.

who went without food or drink for 2 or more hours are classified as late refeeders.

Outcome Measures

The primary outcome was postreduction intussusception complication, defined as the occurrence of intestinal perforation, shock, or sepsis. Secondary outcomes included (1) intussusception recurrence, defined as the occurrence of intussusception after the initial reduction; (2) use of radiologic imaging to assess for recurrence; (3) postreduction fever, abdominal pain, or vomiting; (3) hospitalization from the EDOU; and (4) EDOU LOS.

Data Analysis

Baseline characteristics of patients in the early and late refeeding groups were described. The frequencies of the primary and categorical secondary outcomes were calculated and compared statistically using χ^2 tests. EDOU LOS was compared using Mann-Whitney *U* tests.

RESULTS

There were 199 patients with intussusceptions who were observed in the EDOU during the study period. Fifty patients were excluded because of incomplete records, spontaneous reduction, and failed initial enema reduction, leaving 149 patients eligible for this study (Fig. 1).

Among the 149 patients included in the study, the median age was 16 months (range, 3–95 months), and 56% were male. All but 2 of the patients had ileocolic intussusception and the remaining 2 had small bowel intussusception. All 149 patients had undergone radiologic intussusception reduction: 62% with air enema, 34% with water-soluble contrast enema, and 4% with both air- and water-soluble contrast enema.

Oral feeds were started early in 61 (41%) and late in 88 (59%) of the patients. The groups were similar in the presenting symptoms, duration of illness, and the number of reduction attempts. Of the 149 of the patients, 111 (74.5%) presented within 48 hours of onset of symptoms, and 26 (17.5%) presented after 72 hours. A total of 133 patients had a single and successful reduction attempt, and 1 patient had 5 attempts at reduction before becoming successful (Table 1). None of the patients in either group developed bowel perforations, shock, or sepsis during ob-

servation at the EDOU. There was no difference in the frequency of fever, abdominal pain, or vomiting after reduction between the feeding groups (13% early vs 16% late, *P* = 0.65). The refeeding groups were similar in the frequency of postreduction intussusception recurrence, radiologic evaluation for recurrence, EDOU LOS, and need for hospitalization from the EDOU (Table 2). Overall intussusception recurrence occurred in 12% of patients. Seven patients (39%) had recurrences that occurred within the first 24 hours after intussusception reduction and 61% occurred within the first week after reduction.

DISCUSSION

This study found no evidence for a difference in complications (of the disease process or procedure), intussusception recurrence, or EDOU LOS between patients who were fed less than 2 hours after radiologic intussusception reduction and those who were fed 2 or more hours after reduction.

Al-Jazaeri et al² suggested that patients who successfully underwent radiologic intussusception reduction should be fasted overnight and then fed if they remained without pain. Herwig et al³ found that 6 of the 45 patients who were fed within 2 hours after reduction and managed as outpatients (discharged after a 4- to 6-hour stay in the ED) had no recurrence. Our study looked at the incidence of recurrence and complications in patients who were fed early within 2 hours after radiologic reduction versus those fed more than 2 hours after radiologic reduction. We found that early feeding did not predispose a patient to complication or recurrence, supporting nonhospital management of intussusception.¹⁻³

Recurrent intussusception is a well-recognized entity occurring in approximately 8% to 10% of cases, with a third occurring in the first 24 hours after the reduction.^{1-4,7} Findings in the present study are comparable with other studies in showing the overall recurrence rate of 12%, with 39% of these recurrences occurring in the first 24 hours.²⁻⁴ The recurrence rate based on the method of reduction (air- versus water-soluble contrast) seems to be the same (11.8% and 12%, respectively, *P* = 0.8831) as previously noted by Daneman et al.⁵ The recurrence rate based on the method of reduction (air/water-soluble contrast) seem to be the same (11.8% and 12%, respectively, *P* = 0.8831) as previously noted by Daneman et al.⁵

Patients with recurrent intussusceptions are successfully managed using the radiologic (air enema) reduction.¹² Of the 18 patients with recurrence, 16 patients were managed by radiologic reduction. The presence of a lead point, which only occurs in 4% to 8% of children with intussusception, is higher in children with multiple recurrences.^{1–5,12} A pathologic lead point (Meckel diverticulum) was identified in 1 of the 2 patients who had surgical reduction. This patient showed an unusual persistent filling defect in the midtransverse colon despite reduction of the intussusception. The fact that only 1 patient in our cohort had a lead point does not give a true incidence of lead points in these patients because a successful reduction does not rule out a lead point.

This is a retrospective study with all the inherent limitations of the study design. Most importantly, the reason for the duration without oral intake could confound any associations with post-

TABLE 1. Comparison of Patient Demographics, Symptoms, and Duration of Illness of Feeding Groups

	Early <2 h (n = 61)	Late ≥2 h (n = 88)	P
Sex			0.89
Male	34	50	
Female	27	38	
Age, mo			0.07
<6	10	11	
6–11	23	24	
12–23	15	21	
24–35	9	22	
36–48	2	7	
>48	2	3	
Ethnicity			0.895
White	15	18	
African American	13	15	
Asian	2	3	
Hispanic	27	46	
Others	4	6	
Symptoms, n (%)			
Abdominal pain	49 (80)	76 (86)	0.3
Vomiting	45 (74)	69 (78)	0.5
Bloody stools	22 (36)	26 (30)	0.4
Abdominal mass	2 (3)	2 (2)	1.0
Prior history of intussusception	0	2 (2)	0.51
Fever	7 (11.5)	6 (6.7)	0.51
Lethargy	8 (13.1)	6 (6.7)	0.20
Diarrhea	5 (8)	7 (8)	0.82
Duration of illness, h			0.56
<6	1	7	
6–12	9	12	
12–24	21	26	
25–48	13	22	
49–72	7	5	
>72	10	16	
No. reduction attempts			0.15
1	54	79	
2	5	4	
3	1	2	
≥4	1	3	

TABLE 2. Comparison of Intussusception Recurrence, Imaging to Evaluate for Recurrence, EDOU LOS, and Hospitalization From the EDOU by Timing of Postreduction Feeding

	Time to Postreduction Feeding		P
	Early <2 h (n = 61)	Late ≥2 h (n = 88)	
Intussusception recurrence, %	8	15	0.31
Imaging required after reduction, %	20	22	0.79
EDOU LOS, h	15.6	16.1	0.58
Hospitalized from EDOU, %	3	8	0.31

reduction outcomes. In this study, no associations were found between the duration without oral intake and postreduction complications or intussusception recurrence. For this reason, it is unlikely that the timing of postreduction oral intake was delayed in sicker patients because this would have been associated with poorer outcomes in the late refeeding group compared with the early refeeding group.

In conclusion, based on the study results, there seems to be no difference in clinical outcomes between patients who are fed early or late after radiologic intussusception reduction. This indicates that there is no need to withhold feeds from patients after intussusception reduction and that early refeeding is safe.

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