Ultrasound guided saline enema for intussusception: Ourcome and clinical implications

Yannick Braun[1], Till-Martin Theilen[1], Henning C. Fiegel[1], Udo Rolle[1]

[1]Goethe-University Frankfurt, University Medicine, Department of Pediatric Surgery and Pediatric Urology, Frankfurt a.M., Germany

ABSTRACT

This 10-year retrospective study evaluated ultrasound-guided saline enema (USGSE) for ileocolic intussusception in 89 children (93 episodes of intussusception) treated at our tertiary pediatric surgical center. USGSE was performed in 97.8% of cases and achieved a 77% success rate without major complications; when cases with pathological lead points (PLPs) were excluded, success increased to 90%. Surgery was required in 21 cases after failed reduction, and PLPs were found in 14 patients. Symptom duration exceeding 24 hours and bloody stool predicted USGSE failure, while failed USGSE correlated with pathological lead points. Overall, USGSE proved to be a safe and effective first-line treatment for pediatric intussusception.

INTRODUCTION

Intussusception is a common cause of acute abdominal pain in children and can often be managed non-surgically. This study aimed to evaluate the safety and effectiveness of ultrasound-guided saline enema (USGSE) for ileocolic intussusception over a 10-year period in a tertiary pediatric surgical center, and to identify clinical predictors of treatment failure and pathological lead points.

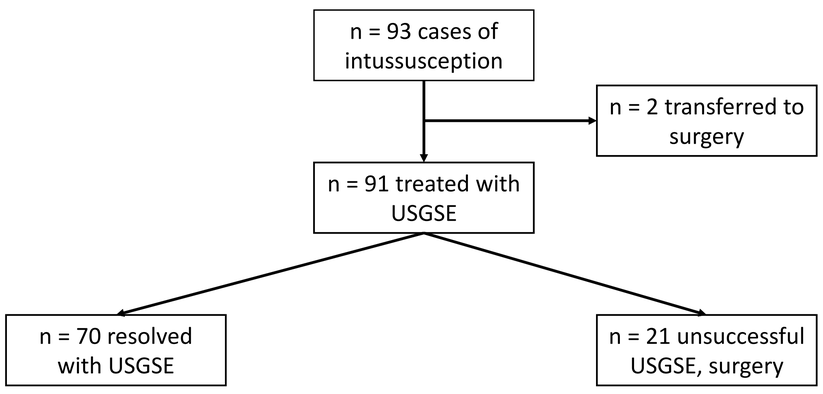
METHODS

We retrospectively analyzed data from pediatric patients treated for intussusception between January 2012 and December 2022. Only cases requiring intervention (USGSE or surgery) were included. Data on demographics, clinical presentation, treatment course, and outcomes were collected. Statistical analyses included Fisher's exact test, Student's t-test, and binomial logistic regression analysis, with significance set at $p < 0.05$.

RESULTS

During the study period, a total of 89 patients presented with 93 episodes of intussusception. USGSE was the first-line treatment in 91 of 93 cases (97.8%) and was successful in 70 cases (77%), with no major complications reported. Of the successful cases, 37.1% experienced short-term recurrence during hospitalization, which could also be managed with USGSE. Surgery was required in 21 cases after failed USGSE. Figure 1 illustrates the clinical course of all cases.

Figure 1 Case-based clinical course flowchart



Of the clinical parameters analyzed, the duration of symptoms exceeding 24 hours was the only clinical factor associated with the failure of USGSE in uni- and multivariable analysis (Table 1).

Table 1 USGSE failure by clinical parameters

USGSE cases (n=91)	Success, (n=70)	Failure (n=21)	p-Value	OR (95%-CI)
Male sex, n (%)	47 (67.14)	13 (61.9)	0.7935*	1.25 (0.39-3.83)
Duration of symptoms >24h, n (%)	22 (31.43)	14 (66.67)	[redacted]	*4.29 (1.39-14.46)*
Presence of bloody stools, n (%)	18 (25.71)	7 (33.34)	0.5791*	1.44 (0.42-4.58)
Presence of vomiting, n (%)	38 (54.29)	13 (61.9)	0.6208*	1.36 (0.46-4.31)
Oral vaccination for Rota-Virus, n (%)	3 (4.29)	1 (4.76)	1*	1.12 (0.02-14.79)
Age at diagnosis in months, mean (SD)	28.12 (24.2)	22.67 (27.1)	0.4127#	

*Fisher´s exact test, #Students t-test, CI = Confidence Interval

USGSE in cases without pathological lead points (PLP)

A total of 18 out of 89 (20.22%) patients had a PLP. In 14 patients, PLP was identified during surgery after failed USGSE. In 4 patients PLPs were suspected during successful USGSE and were scheduled for surgery (Fig. 2). When excluding patients with PLP, USGSE was successful in 65 of 72 cases (90.27%).

Symptoms lasting longer than 24 hours, bloody stools and younger patient age correlated significantly with USGSE failure (Table 2).

Table 2 USGSE failure without PLP by clinical parameters

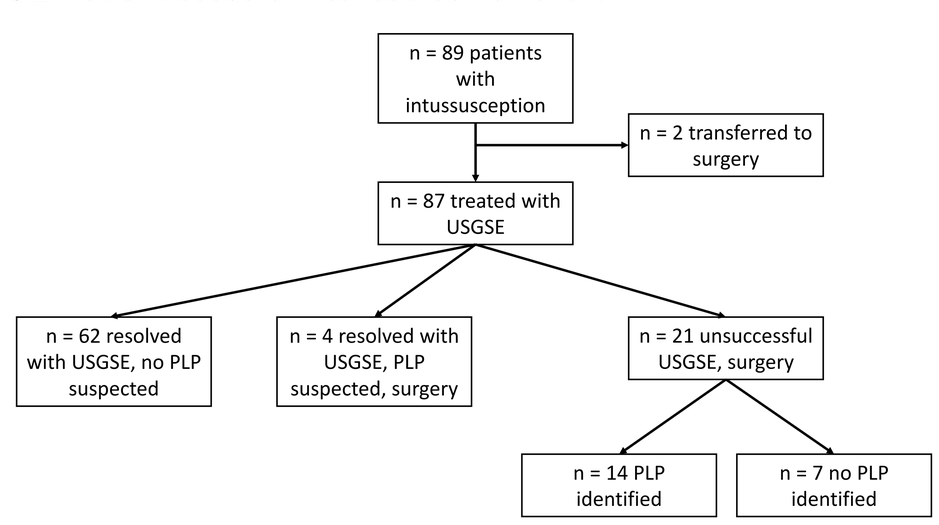
USGSE cases without pathological lead point (n=72)	Success (n=65)	Failure (n=7)	p-Value	OR (95%-CI)
Male sex, n (%)	43 (66.15)	5 (71.43)	1*	0.78 (0.06-5.28)
Duration of symptoms >24h, n (%)	19 (29.23)	6(85.71)	[redacted]	*13.97 (1.54-679.6)*
Presence of bloody stools, n (%)	17 (26.15)	5 (71.43)		*6.83 (1.01 -78.01)*
Presence of vomiting, n (%)	35 (53.85)	5 (71.43)	0.4511*	2.12 (0.32-23.81)
Oral vaccination for Rota-Virus, n (%)	3 (4.62)	0	1*	0 (0-24.58)
Age at diagnosis in months, mean (SD)	26.71 (24.2)	11.29 (10.9)	*0.0094#*	

*Fisher´s exact test, #Students t-test, CI = Confidence Interval

Failed USGSE correlates with PLPs

To identify predictors of PLPs we performed our cohort on a patient-based analysis (n=89). Figure 2 illustrates the clinical course of all patients.

Figure 2 Patient-based clinical course flowchart



A failed USGSE-attempt was the only clinical parameter associated with the presence of a PLP in uni- and multivariable analysis (Table 3).

Table 3 PLP presence by clinical parameters

Patients treated with USGSE (n = 87)	PLP (n = 18)	No PLP (n = 69)	p-Value	OR (95%-CI)
Male sex, n (%)	11 (61.11)	45 (65.22)	0.7863*	1.19 (0.34-3.89)
Duration of symptoms >24h, n (%)	10 (55.56)	24 (34.78)	0.1738*	2.32 (0.72-7.77)
Presence of bloody stools, n (%)	3 (16.67)	22(31.88)	0.2535	0.43 (0.07-1.75)
Presence of vomiting, n (%)	11 (61.11)	38 (55.07)	0.7911*	1.28 (0.39-4.38)
Oral vaccination for Rota-Virus, n (%)	1 (5.55)	3 (95.65)	1*	1.29 (0.02-17.26)
Age at diagnosis in months, mean (SD)	33.67 (29.6)	24.14 (23.1)	0.2179*	
Failed USGSE, n (%)	14 (77.78)	7 (10.14)	[redacted]	28.84(6.84-156.9)

*Fisher´s exact test, #Students t-test, CI = Confidence Interval

CONCLUSION

USGSE is a safe and effective treatment for ileocolic intussusception in children, with high success rates and no major adverse events. Symptoms exceeding 24 hours, bloody stools, and younger patient age are predictors for USGSE failure. Vice versa, failed USGSE and younger age strongly correlate with pathological lead points. A thorough clinical investigation is essential following unsuccessful USGSE to rule out underlying pathology.

GOETHE UNIVERSITÄT FRANKFURT AM MAIN

Contact:
Yannick Braun
yannick.braun@unimedizin-ffm.de
Theodor-Stern-Kai 7
60590 Frankfurt
Germany