

Original Research Article

Fistula-in-ano in children under three: patterns, outcomes and imaging insights

Mariëlle J. Roskam^{1*}, Bobbie Lebbink², Joost van Schuppen³, Tim G. J. De Meij⁴, Roel Bakx², Joep P. M. Derikx², Ernst L. W. E. van Heurn², Ramon R. Gorter², Dominique C. Olthof⁵

¹Department of Pediatrics, Emma Children's Hospital, Amsterdam UMC, Amsterdam Medical Centre (AMC), Amsterdam South-East, Netherlands

²Department of Pediatrics Surgery, Emma Children's Hospital, Amsterdam UMC, Amsterdam Medical Centre (AMC), Amsterdam South-East, Netherlands

³Department of Radiology and Nuclear Medicine, Amsterdam UMC, Amsterdam Medical Centre (AMC), Amsterdam South-East, Netherlands

⁴Department of Pediatric Gastroenterology, Emma Children's Hospital, Amsterdam UMC, Amsterdam Medical Centre (AMC), Amsterdam South-East, Netherlands

⁵Department of Surgery, Emma Children's Hospital, Amsterdam UMC, Amsterdam Medical Centre (AMC), Amsterdam South-East, Netherlands

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*Correspondence:

Mariëlle J. Roskam,

E-mail: marielle.roskam@amsterdamumc.nl

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ABSTRACT

Background: The incidence of fistula-in-ano (FIA) in the pediatric population is not well established, despite its relatively common occurrence as a perianal disease. The aim of this study is to describe the proportions of simple and complex FIA in young children and to evaluate the treatment strategies applied.

Methods: Children under 3 years of age who were treated for FIA at Amsterdam UMC between January 2012 until April 2021 were included in this retrospective study. The primary endpoints were the proportions simple and complex FIA and the applied treatment strategies. Secondary endpoints were postoperative complications, recurrences, and the diagnostic value of imaging studies performed.

Results: Eighty-one patients were included, all male, with a median age of 9.2 months (range 1-36 months). Spontaneous resolution occurred in 19 patients (23.5%) prior to surgery. Sixty-two patients (76.5%) underwent surgical exploration: simple FIA in 85.5% (53/62), complex FIA in 8.1% (5/62), and healed fistula in 6.5% (4/62). No postoperative complications were observed. Recurrence occurred in 10 patients (16.1%).

Conclusions: Spontaneous resolution occurred in 23.5% of children under 3 years with FIA. Among those undergoing surgery, more than 85% had simple FIA, with a recurrence rate of 16%. These findings highlight that conservative management may be appropriate in a subset of young children with FIA, while surgery is effective for the majority of cases. Routine preoperative imaging and follow-up for inflammatory bowel disease (IBD) appear unnecessary in this age group, except in cases of recurrent or persistent symptoms.

Keywords: Child, Preschool, Rectal fistula, Diagnostic imaging, Surgical procedures, Operative, Therapeutics

INTRODUCTION

The exact incidence of fistula-in-ano (FIA) in the pediatric population is not well established, despite its relatively common occurrence as perianal disease. Mostly young children are affected, with a male predominance of 90-100%.¹⁻⁴ A FIA is in 75-92% of the cases preceded by a perianal abscess.^{5,6} The majority of FIA in children are simple, superficial, low trans- or intersphincteric, and involve less than one-third of the external sphincter; these can usually be treated with fistulotomy or fistulectomy.⁷⁻⁹ Complex FIA are trans-, supra- or extrasphincteric or horseshoe shaped and may require preoperative evaluation with magnetic resonance imaging (MRI), endorectal ultrasonography (EUS), or transperineal ultrasound (TP-US) to delineate the fistula tract and assess sphincter involvement.⁸⁻¹⁰ Imaging can also help identify underlying conditions, such as Crohn's disease.¹⁰ Though recent studies suggest no association between isolated perianal suppuration in young infants and IBD.¹¹

Although preoperative MRI scan has the highest sensitivity (0.87) among imaging modalities for detecting FIA, false negative can occur (specificity 0.69), and young children require general anesthesia for MRI which may carry potential risks.¹²⁻¹⁴

It remains unclear what proportion of FIAs in young children are simple versus complex and what additional value preoperative imaging studies provides in guiding the treatment strategy.^{3,15,16}

The aim of this study is to provide an overview of FIA management in children under 3 years at a tertiary center, focusing on distribution of simple and complex FIA and treatment strategies. Furthermore, we describe postop complications, recurrence rates and the diagnostic value of preoperative imaging studies (TP-US and MRI).

METHODS

Patient selection and data collection

A retrospective cohort study was performed at tertiary referral center (Amsterdam UMC). Pediatric patients under 3 years of age with FIA, presenting at the outpatient or emergency department of Amsterdam UMC between January 2012 and April 2021, were eligible for inclusion. Patients were identified based on the diagnosis code (DBC) FIA from the hospital electronic system. Patients were excluded if they had a fistula located outside the perianal region or had only a perianal abscess.

Data collected included: gender, relevant medical history, perianal symptoms at presentation, preoperative imaging studies such as TP-US and/or MRI scan and their results (in case an MRI scan was performed the Parks classification (9) was applied for reporting), the applied surgical strategy and perioperative findings, (number of) recurrences, and whether or not the patient was

complaint-free at last outpatient visit. All data were collected from medical records by an independent researcher (BL). Two researchers scored the data (BL and MJR). A data check was performed by a third researcher (DCO) and in case of inconsistencies, data were checked at the source and discussed until agreement was reached.

The Medical Research Involving Human Subjects Act (WMO) does not apply to this study and an official judgement by our institutions' ethical committee was therefore not required (reference W21_016 # 21.018). An opt-out option was provided to all parents.

Endpoints and definitions

The primary endpoints included proportion of children with a simple and complex FIA and the treatment strategies applied. Simple FIA was defined as (low) intersphincteric FIA with less than 1/3 involvement of the sphincter complex. Complex FIA was defined as trans-, supra/extrasphincteric or horseshoe shaped FIA or intersphincteric FIA with more than 1/3 involvement of sphincter complex.⁸ The classification of FIA as simple or complex was based on surgical report. If classification was not specified by surgeon, 3rd team member (pediatric surgeon/surgical resident) reviewed report using defined criteria. Surgical treatments included fistulotomy, seton placement and/or fistula tract curettage.

Conservative treatment consisted of a wait and see approach allowing for spontaneous resolution before surgery. Inspection under anesthesia was planned for all patients. Patients whose symptoms resolved spontaneously before surgery were classified as having conservative treatment.

Secondary endpoints were postoperative complications, recurrences and the diagnostic value of imaging studies. Recurrences were defined as the development of a FIA on physical examination at the same location as the prior FIA, after a symptom-free period. Moreover, we investigated the number of patients who received preoperative imaging (TP-US or MRI scan). All imaging studies were re-evaluated and the type of FIA was classified by a pediatric radiologist, specialized in perianal disease imaging.

Statistical analysis

PASW Statistics (IBM SPSS) version 26 (2019) was used for the statistical analysis. Categorical data were expressed as a number (percentage) and continuous data as median and/or range.

RESULTS

A total of 81 patients with at least one FIA (90 in total) were included in this study. The total study population consisted entirely of males, and the majority of patients were below two years of age (Table 1).

Table 1: Overview of patient characteristics, preoperative imaging and number and type of FIA.

Variables		N [% or median (range)]
Sex	Male	81 (100%)
Age at diagnosis (in months)		9 (1-36)
Medical history	Perianal abscess	61 (75%)
	Prior FIA	6 (7.4%)
	Crohn's disease	0 (0%) ^a
	Pyridoxal phosphate depending epilepsy	1 (1.2%)
Symptoms	Pus outflow	55 (68.8%)
	Swelling	32 (40%)
	Pain	12 (15%)
	Redness	9 (11.3%)
	Blood loss, mucus stool, itchiness	4 (5%)
Preoperative imaging at diagnosis	TP-US*	8 (9.9%)
	MRI-scan [†]	3 (3.7%)
Type of FIA [‡]	Simple	53 (85.5%)
	Complex	5 (8.1%)
Follow-up		14 weeks (1-229 weeks) ^b

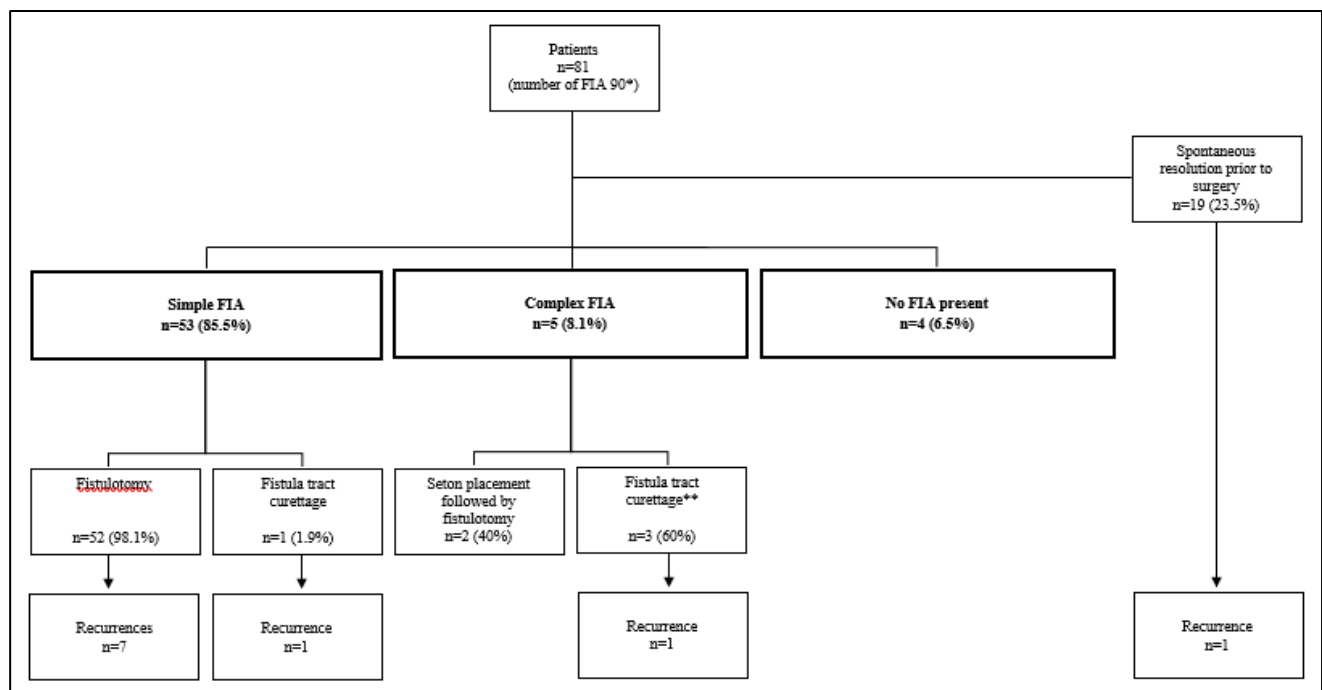
*TP-US, transperineal ultrasound; [†]MRI, magnetic resonance imaging; [‡]FIA, fistula-in-ano; a) 3 missing; b) 4 missing

Detailed information of the medical history was missing in 3 (5.8%) patients. A history of perianal abscesses and/or FIA was described in 61 out of 81 patients (75.3%). Of those 61 patients, 12 patients (19.7%) resolved spontaneously, 21 patients (34.4%) were treated with a puncture and/or antibiotics, 13 patients (21.3%) were treated exclusively with incision and drainage (I&D), 6 patients (9.8%) were treated with I and D and/or puncture and/or antibiotics, while data of 9 patients (14.8%) was missing. Follow-up data of 73/81 (90.1%)

patients could be obtained. Median follow-up was 14 weeks (range 1-229 weeks).

Primary endpoint

Of 81 included patients, 19 patients (23.5%) showed spontaneous recovery prior to surgery. 62 patients (76.5%) underwent surgical exploration under general anesthesia (Figure 1) after a median time frame of 5 weeks (range 0-74 weeks).

**Figure 1: Type of FIA, type of surgical treatment executed and FIA recurrences.**

*7 patients had more than 1 FIA. **1 FIA was only partially opened and curated, leaving the part connected with the sphincter complex untouched.

In children younger than 1 year of age and without complaints a wait-and-see policy was followed, to allow for possible spontaneous recovery up to the age of 1 year. 85.5% (53/62) of the patients had one or more simple FIA, and 8.1% (5/62) had a complex FIA and in 4/62 patients (6.5%) the FIA could not be identified anymore perioperatively and it was assumed that it healed spontaneously. Of the patients with a simple FIA 52 out of 53 (98.1%) underwent a fistulotomy and in one patient (1.9%) a curettage of the fistula tract was performed. In the group of patients with a complex FIA, in 2/5 (40%) patients a seton was placed per-operatively followed by a new exploration respectively 3 and 6 months later. In 3/5 (60%) patients curettage of the fistula tract was performed. Of the latter group, in one patient the FIA was only partially opened and curated, leaving the part connected with the sphincter complex untouched.

Secondary endpoints

No postoperative complications, besides recurrences, were observed. Ten patients (16.1%) had one or more recurrences (total number of recurrences 12) and were (re-)operated. Eight of the patients with a simple FIA had a recurrence (in 1 patient the recurrence consisted of a complex fistula, in 1 patient there was no recurrence observed during reoperation and 6 had a simple FIA as recurrence), 1 patient with a complex FIA (recurrence was a simple FIA) and 1 patient who was not operated initially (simple FIA as recurrence).

Overall, 64/81 (79%) of the patients were recovered at their last outpatient visit. The remaining patients experienced relatively mild (wound) symptoms which resolved without intervention e.g. an irritated wound that did not heal completely (yet), scar tissue, fibrous yellow tissue on the wound, pus outflow and a perianal fissure. One patient was referred to the dermatologist because of perianal wound problems. None of the patients were diagnosed with Crohn's disease.

In 8/81 (9.8%) patients a TP-US was performed preoperatively because of recurrent perianal swelling with a clinical suspicion of the presence of a perianal abscess. The ultrasounds demonstrated, besides the perianal abscess, the FIA, but neither localization of the internal opening, nor was it possible to classify the FIA according to Park's classification. These three patients had a simple fistula according to the surgical report. Three MRI scans were performed prior to surgical exploration. The indications were a history of repetitive perianal abscesses or the suspicion of the presence of two FIA upon physical examination (and the anamnesis).

In the group with a recurrent FIA, an MRI scan was performed in 2/10 (20%) patients. One MRI scan showed a complex FIA, on the other MRI scan a simple FIA was visualized. None of these scans led to a change in treatment strategy.

DISCUSSION

This study demonstrated that a significant proportion (23.5%) of children under 3 years of age with a FIA experienced spontaneous resolution and could be managed conservatively. Among patients undergoing surgery, the majority had a simple FIA (>85%) with a recurrence rate of approximately 16%. These findings suggest that a wait-and-see approach may be appropriate in a subset of young children, while surgical intervention remains effective for the majority of cases. Preoperative imaging is often not required to guide treatment, except in cases of recurrent or persistent symptoms.

Our study population, one of the largest so far, aligns well with previously published data concerning patient characteristics. We also found a strong male predominance, a very young age at which most FIA occurred (median age 9.2 months with 95% being under the age of 2 years old) and a strong correlation between perianal abscesses and FIA (75% of the children had been diagnosed with one or more previous perianal abscess(es)).^{3,7,15,17,18} Approximately 30% of the PA were treated with I and D. Christison-Lagay et al described that PA treated with surgical drainage have a higher rate of fistula formation compared to conservative treatment. In the patient group with surgical drainage 60% developed a FIA versus 16% in the patient group without surgical drainage.¹⁹

None of the patients in our cohort developed Crohn's disease, a condition more commonly associated with complex perianal FIA in older children. This finding aligns with previous studies indicating that the incidence of IBD is low in this age group, even in the presence of perianal symptoms.^{11,17} Consequently, the a priori probability of a complex FIA in this younger cohort remains low. In recent years, however, there has been an increase in referrals to our center for children with perianal recurrences seeking preoperative imaging. Due to technological innovations, increased availability and increased demand by patients and physicians, use of diagnostic imaging has increased tremendously.²⁰ However, the necessity of preoperative imaging studies for children with a low suspicion of IBD remains questionable. The aim should be to perform only diagnostic modalities that result in changes of clinical management or to improve patients' quality of life in the long term (cost-utility balance). In this study, we showed that there are a relatively high spontaneous healing rate and the majority of FIA in this age group concerns simple FIA. Therefore, routine performance of preoperative imaging studies seems not to have additional value. Only in case of recurrent fistulae at the same location or in case of persistent symptoms, an MRI scan (with sedation) may provide information about the location/classification (Parks classification) of the fistula tract and could guide the clinician in determining the treatment strategy.⁹ Proper classification of the FIA is important especially in case of complex fistulas, as incorrect or suboptimal

treatment of these fistula has been associated with irreversible loss of function (incontinence) and increased rates of recurrences.⁸

The optimal treatment for FIA in young children has not been defined yet. In our cohort, all children underwent surgical exploration under general anesthesia, unless the symptoms resolved spontaneously while on the waiting list for surgery. Since the Amsterdam UMC is a tertiary referral center, the period of an attempt for conservative treatment has often already expired. For that reason, all children were scheduled for surgery. However, spontaneous recovery occurred in almost a quarter of the children. Afşalar et al who included a substantial amount of infants treated in a tertiary care children's hospital, reported a similar spontaneous resolution rate (9/52=17.4%).²¹ In the study of Rosen et al who included 18 children with FIA treated in the 90's in a hospital specialized in pediatric care, all children cured following a non-operative treatment strategy.²² In the study of Serour et al who also included older data from a non-academic center, 42.9% (21/49) of the FIA in infants healed spontaneously.¹⁶ It would be interesting to investigate in future studies which parameters or factors predict successful conservative management and what patients are prone to develop a recurrence (16.1% in our cohort).

The major strength of this research is that we investigated a relatively homogeneous cohort and data were collected in a standardized manner. Furthermore, the cohort is relatively large compared to existing literature.³

Limitations

However, a number of limitations need to be discussed. The first limitation is correlated to the retrospective nature of the study; the extent of involvement of the sphincter was not always described in detail in the surgical report. All reports with any uncertainty were therefore screened by a pediatric surgeon and surgical resident. The second limitation is also related to the retrospective design: in our cohort no cases were reported of fecal incontinence. Children of this young age are not continent for stool or urine yet and this is a parameter that should be evaluated at an older age (duration of follow-up in our study was not sufficient to evaluate this parameter). It is an important medical parameter because it concerns young children where continence is of life-long importance. Moreover, the recurrence rate and disadvantages of repetitive surgical interventions should be counterbalanced against radical (one-step) surgery with a risk of incontinence. The third limitation is that, since we are a tertiary referral center, possibly only a selected number of children with FIA are referred to and treated by us. This might have led to a relatively higher percentage of complex FIA in our series and may have introduced selection bias.

Previous study data showed that FIA in this young age group are not associated with Crohn's disease. Although we had a relatively limited follow-up time, none of the patients in our study developed Crohn's disease. Therefore, routine follow-up specifically for IBD in this population does not appear to be necessary.

CONCLUSION

In conclusion, in children under 3 years with FIA spontaneous resolution occurs in a substantial proportion (23.5%), supporting conservative management as a viable initial approach. Among those requiring surgery, the majority had simple FIA (>85%) with a low recurrence rate (~16%). Routine preoperative imaging and follow-up for IBD appear unnecessary in this age group, except in cases of recurrent or persistent symptoms.

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Ethical approval: The study was approved by the Institutional Ethics Committee (reference W21_016 # 21.018).

REFERENCES

1. Macdonald A, Wilson-Storey D, Munro F. Treatment of perianal abscess and fistula-in-ano in children. *Br J Surg.* 2003;90(2):220-1.
2. Deodhar J. Pediatric Fistula-in-Ano. Medscape. Available at: <https://emedicine.medscape.com/article/935312-overview>. Accessed on 15 June 2026.
3. Emile SH, Elfeki H, Abdelnaby M. A systematic review of the management of anal fistula in infants. *Tech Coloproctol.* 2016;20(11):735-44.
4. Ezer SS, Oguzkurt P, Ince E, Hicsonmez A. Perianal abscess and fistula-in-ano in children: aetiology, management and outcome. *J Paediatr Child Health.* 2010;46(3):92-5.
5. Poenaru D, Yazbeck S. Anal fistula in infants: etiology, features, management. *J Pediatr Surg.* 1993;28(9):1194-5.
6. Al-Salem AH, Laing W, Talwalker V. Fistula-in-ano in infancy and childhood. *J Pediatr Surg.* 1994;29(3):436-8.
7. Festen C, van Harten H. Perianal abscess and fistula-in-ano in infants. *J Pediatr Surg.* 1998;33(5):711-3.
8. Lavazza A, Maconi G. Transperineal ultrasound for assessment of fistulas and abscesses: a pictorial essay. *J Ultrasound.* 2019;22(2):241-9.
9. Parks AG, Gordon PH, Hardcastle JD. A classification of fistula-in-ano. *Br J Surg.* 1976;63(1):1-12.
10. Carmona J, Osterman A, Lugo Vicente H. Fistula-in-ano in children: a case series. *Bol Asoc Med P R.* 2011;103(1):14-7.
11. Roskam M, de Meij T, Gemke R, Bakx R. Perianal Abscesses in Infants Are Not Associated With

- Crohn's Disease in a Surgical Cohort. *J Crohns Colitis*. 2020;14(6):773-7.
12. Siddiqui MR, Ashrafian H, Tozer P, Daulatzai N, Burling D, Hart A, et al. A diagnostic accuracy meta-analysis of endoanal ultrasound and MRI for perianal fistula assessment. *Dis Colon Rectum*. 2012;55(5):576-85.
 13. Nevler A, Beer-Gabel M, Lebedyev A, Soffer A, Gutman M, Carter D, et al. Transperineal ultrasonography in perianal Crohn's disease and recurrent cryptogenic fistula-in-ano. *Colorectal Dis*. 2013;15(8):1011-8.
 14. Kobayashi Y, Tokuda N, Adachi S, Takeshima Y, Hirose M, Shima M. Association between surgical procedures under general anesthesia in infancy and developmental outcomes at 1 year: the Japan Environment and Children's Study. *Environ Health Prev Med*. 2020;25(1):32.
 15. Stites T, Lund DP. Common anorectal problems. *Semin Pediatr Surg*. 2007;16(1):71-8.
 16. Serour F, Somekh E, Gorenstein A. Perianal abscess and fistula-in-ano in infants: A different entity? *Dis Colon Rectum*. 2005;48(2):359-64.
 17. Nix P, Stringer MD. Perianal sepsis in children. *Br J Surg*. 1997;84(6):819-21.
 18. Shafer AD, McGlone TP, Flanagan RA. Abnormal crypts of Morgagni: the cause of perianal abscess and fistula-in-ano. *J Pediatr Surg*. 1987;22(3):203-4.
 19. Christison-Lagay ER, Hall JF, Wales PW, Bailey K, Terluk A, Goldstein AM, et al. Nonoperative management of perianal abscess in infants is associated with decreased risk for fistula formation. *Pediatrics*. 2007;120(3):e548-52.
 20. Smith-Bindman R, Miglioretti DL, Larson EB. Rising use of diagnostic medical imaging in a large integrated health system. *Health Aff (Millwood)*. 2008;27(6):1491-502.
 21. Afsarlar CE, Karaman A, Tanir G, Karaman I, Yilmaz E, Erdogan D, et al. Perianal abscess and fistula-in-ano in children: clinical characteristic, management and outcome. *Pediatr Surg Int*. 2011;27(10):1063-8.
 22. Rosen NG, Gibbs DL, Soffer SZ, Hong A, Sher M, Pena A. The nonoperative management of fistula-in-ano. *J Pediatr Surg*. 2000;35(6):938-9.

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