Management of Perianal Abscess and Fistula-in-ano in Children

A. Niyogi, T. Agarwal, J. Broadhurst, R. M. Abel

Chelsea and Westminster Hospital, Department of Paediatric Surgery, London, United Kingdom

Key words
- abscess
- rectal fistula
- retrospective studies
- child
- tacrolimus

Abstract

Introduction: Perianal abscess (PA) and fistula-in-ano (FIA) are common acquired anorectal disorders in children, but their management is still controversial. This study was performed to evaluate our experience with the treatment of PA and FIA in children of different age groups.

Material and Methods: A retrospective study was conducted of children below 16 years of age treated for PA/FIA in a pediatric surgery center between January 2002 and April 2006. The standard treatment for PA was incision and drainage (I & D). Judicious probing for fistulae was only performed in recurrent abscess or if a discharge of pus was identified from the anal verge at surgery. Fistulotomy was routinely performed in low fistulae not associated with inflammatory bowel disease (IBD). IBD associated fistulae were treated with topical tacrolimus in the absence of deep seated infection. Patients were divided into 3 age groups: < 2 years, 2 – 8 years and > 8 years. Mode of treatment, microbial organisms, recurrence, associated FIA and association with IBD were recorded. The median follow-up period was 6 months (8 weeks–3 years). Fisher’s exact test was used for the analysis of categorical variables.

Results:

- A total of 78 (39 [< 2 years]; 17 [2–8 years]; 22 [> 8 years]) patients were treated for PA/FIA during the four year period. In children aged < 2 years, 33 (85%) had I&D of PA and the other 6 (15%) had fistulotomy. Recurrence was seen in 9 (23%) children, of which 3 (8%) had FIA. In children aged 2–8 years, 13 (76%) had PA and 4 (24%) had a FIA and there were no recurrences. In children > 8 years, 12 (55%) had I&D, 1 (4%) had a fistulotomy and 9 (41%) were treated non-surgically. Six of 7 patients with IBD associated FIA were treated successfully with topical tacrolimus. The recurrence rate after primary surgery was significantly higher for < 2 years and > 8 years age groups compared to the 2–8 years age group. The incidence of FIA identified either at primary operation or during exploration for recurrence was highest (50%) in > 8 years age group and lowest (21%) in the < 2 years age group. Lactose fermenting coliforms were the most common organisms isolated from pus. The presence of intestinal organisms in pus was associated with significantly higher recurrence rates in children aged < 2 years.

Conclusions: Surgery for PA/FIA in children aged < 2 years resulted in low recurrence rates and should be considered as the primary treatment. Topical tacrolimus was found to be an effective treatment for IBD associated FIA.

Introduction

Perianal abscess (PA) and fistula-in-ano (FIA) are common acquired anorectal disorders in children, but there are several controversies concerning their management. There are disagreements between various studies about the rates of recurrence of PA and the rates of associated fistulae. Some researchers [1–3] recommended active probing for underlying fistulae in all children with PA undergoing surgery, while others recommend nonsurgical treatment [4–6]. This study was performed to compare the outcome of PA and FIA managed in our center in children of different age groups. In our hospital, pediatric surgical services range from a primary care walk-in center to a quaternary inflammatory bowel disease (IBD) center. This provides us with an opportunity to manage perianal disease of various severities in children.

Bibliography

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Correspondence

Anindya Niyogi
Chelsea and Westminster Hospital
Paediatric Surgery
369 Fulham Road
SW10 9TQ London
United Kingdom
Tel.: +44 77 85962158
Fax: +44 20 87468644
a_niyogi@yahoo.com
### Material and Methods

A retrospective case note review was carried out for all children below 16 years treated for PA/FIA over a four year period (January 2002–April 2006). Patients were identified from a comprehensive hospital database, supplemented by theater records. Data obtained included demographic information, presenting symptoms, surgical management, microbial organisms in pus, complications, recurrences, rates of FIA and association with IBD. Hypothesis testing was conducted with a 2-tailed Fisher’s exact test for categorical data and a p-value of <0.05 was deemed significant. SPSS Statistics v17 (SPSS Inc., Chicago, IL, USA) was used for data analysis. This study was approved by the local research and development team.

In this study, PA was defined as an infective process in the perianal area with a definite presence of pus characterized by fluctuation on examination. Children with erythema and induration alone with no definite abscess were treated with oral antibiotics and were not included in the study. FIA was defined as a definite communication between the anal mucosa and perianal skin demonstrated during clinical examination, operation or during a Magnetic Resonance Imaging (MRI) scan. All children with confirmed FIA were included in the study. In our center, the standard method of treatment for PA in all age groups was incision and drainage (I&D). Judicious probing for fistula was only performed if the abscess was recurrent or a discharge of pus was identified from the anal verge during surgery. All children with PA received intravenous Co-amoxiclav preoperatively. Fistulotomy (surgical opening of the fistulous tract) was routinely performed for low fistulae not associated with IBD. Fistulae associated with IBD were treated with topical tacrolimus in the absence of deep seated infection. Tacrolimus ointment (0.03%) was topically applied twice a day for 12 weeks; the application was repeated, if necessary. MRI scans were performed prior to tacrolimus therapy and the response to treatment was assessed with further scans. Treatment was considered successful if the MRI scans demonstrated no active inflammation and patients were asymptomatic.

All children who underwent surgery were seen by the surgical team 48h after surgery for wound monitoring and then 8 weeks after surgery. While waiting for the eight week follow-up appointment, all patients were regularly checked by community nurses and they had direct access to the pediatric ambulatory care unit in the hospital. Further follow-up was arranged depending on the healing of the wound. Children with IBD associated perianal disease were followed up in a combined clinic with pediatric gastroenterologists and surgeons. Children with IBD associated FIA treated with topical tacrolimus were seen in the clinic at 4 weeks and 12 weeks after the commencement of therapy. MRI scans of the FIA were performed before starting tacrolimus. The presence of an abscess cavity in association with FIA was considered as a contraindication for tacrolimus. The median follow-up period for all children in this study was 6 months (8 weeks–3 years). The family physician and parents of patients who had no contact with the hospital after follow-up were contacted to exclude any recurrence treated in another center.

### Results

A total of 78 children treated for PA and FIA were eligible for the study. The patients were divided into three groups according to age: <2 years (n=39), 2–8 years (n=17) and >8 years (n=22). We used this division based on our previous experience (as these groups show distinct differences in pathophysiology and outcome) and other studies [1, 2, 7, 8]. Age and sex distribution of these children is shown in Fig. 1.

In the group of children aged <2 years (Fig. 2), the male to female ratio was 12:1. I&D was done in 33 (85%) cases for PA and 6 (15%) had fistulotomy for FIA. Of those 33 patients who underwent I&D, 6 (18%) had recurrence. An underlying fistula was identified in 2 of them. Three (50%) children out of a total of six who underwent fistulotomy had recurrence; 2 had an abscess and 1 had a new fistula. All patients with recurrent abscess had

![Fig. 1 Age and sex distribution of children with perianal abscess and fistula-in-ano.](image-url)
I&D and those with recurrent fistula had a fistulotomy; there were no subsequent recurrences.

In the 2–8 years age group (n = 17), the male to female ratio was 3:1. I&D of abscesses was performed in 13 (76%), and 4 (24%) children had a fistulotomy. There were no recurrences.

In the group of children aged >8 years (Fig. 3), two-thirds were boys. I&D was performed for abscess in 12 (54%) with recurrence in 6 (50%). Two children had I&D for recurrent abscess and 3 patients had a fistulotomy for recurrent fistula. One had a further recurrence after the second surgery and tacrolimus was started with good results. Only 1 patient in the >8 years group had a fistulotomy but unfortunately had a recurrence. After two recurrences, tacrolimus was started and there were no further recurrences.

Nine (41%) children were managed primarily without surgery. All of them had confirmed fistulae on MRI scan, except one with inflamed granulation tissue. Four had associated Crohn’s disease; 3 of them were started on tacrolimus with good results. The fourth patient’s perianal disease improved with successful immunomodulation therapy for Crohn’s disease. Five patients developed fistulae without any evidence of IBD. One of them had perianal fistula due to neutropenic sepsis secondary to acute lymphoid leukemia and was medically treated. The other 4 patients had minimal local symptoms and received symptomatic treatment.

Tacrolimus was used to treat 3 primary and 3 recurrent FIA associated with Crohn’s disease. Doses were repeated in 2 (33%) and none of them required surgery.

On comparing the age groups, it was found that the recurrence rate after primary surgery was significantly higher for <2 years and >8 years age groups compared to the 2–8 years age group (Table 1). The incidence of FIA identified either at the primary operation or during exploration for recurrence was highest (50%) in the >8 years age group and lowest (21%) in the <2 years age group (Table 2).

Microbial cultures were available for 62 children. In 7 (11%) children, no organism was identified. Intestinal organisms were identified in 38 (61%) children and lactose fermenting coliforms were the most common organism. Skin organisms were isolated in 17 (27%) with *Staphylococcus aureus* being the most common organism. In females (n = 6), 67% (n = 4) had *Staphylococcus aureus* in culture. Intestinal organisms were more predominant in the <2 years and >8 years age groups compared to the 2–8 years age group (Table 3). The presence of intestinal organ-

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**Table 1** Recurrence rates after primary surgery for perianal abscess and fistula-in-ano in different age groups.

<table>
<thead>
<tr>
<th>Age group</th>
<th>Number</th>
<th>Recurrence (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt;2 years</td>
<td>39</td>
<td>9 (23%)</td>
</tr>
<tr>
<td>&gt;8 years</td>
<td>16</td>
<td>8 (50%)</td>
</tr>
<tr>
<td>2–8 years</td>
<td>17</td>
<td>0 (0%)</td>
</tr>
</tbody>
</table>

Fisher’s exact test (<2 years vs. 2–8 years): Two-tailed *p*-value = 0.0449
Fisher’s exact test (2–8 years vs. >8 years): Two-tailed *p*-value = 0.0008
Fisher’s exact test (<2 years vs. >8 years): Two-tailed *p*-value = 0.1697

**Table 2** Incidence of underlying fistula-in-ano identified during primary surgery or subsequent procedures in children of different age groups.

<table>
<thead>
<tr>
<th>Age group</th>
<th>Surgically treated</th>
<th>Underlying fistula (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt;2 years</td>
<td>39</td>
<td>8 (21%)</td>
</tr>
<tr>
<td>&gt;8 years</td>
<td>15</td>
<td>5 (33%)</td>
</tr>
<tr>
<td>2–8 years</td>
<td>17</td>
<td>4 (24%)</td>
</tr>
</tbody>
</table>

Fisher’s exact test (<2 years vs. 2–8 years): Two-tailed *p*-value = 0.0483
Fisher’s exact test (2–8 years vs. >8 years): Two-tailed *p*-value = 0.1571
Fisher’s exact test (<2 years vs. >8 years): Two-tailed *p*-value = 0.0296

**Table 3** Predominance of intestinal organisms in microbial cultures of pus obtained during surgery.

<table>
<thead>
<tr>
<th>Age group</th>
<th>Microbial culture available</th>
<th>Intestinal organisms (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt;2 years</td>
<td>34</td>
<td>23 (68%)</td>
</tr>
<tr>
<td>&gt;8 years</td>
<td>15</td>
<td>5 (33%)</td>
</tr>
<tr>
<td>2–8 years</td>
<td>17</td>
<td>4 (24%)</td>
</tr>
</tbody>
</table>

Fisher’s exact test (<2 years vs. 2–8 years): Two-tailed *p*-value = 0.0328
Fisher’s exact test (2–8 years vs. >8 years): Two-tailed *p*-value = 0.0296
Fisher’s exact test (<2 years vs. >8 years): Two-tailed *p*-value = 0.0449

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isms in pus was associated with significantly higher recurrence rates in children below 2 years of age (*Table 4*).

Of the children >8 years, 9 (41%) had Crohn’s disease. Although half of the patients with recurrent FIA had Crohn’s disease, no statistically significant correlation between recurrent PA/FIA and Crohn’s disease could be established (2-tailed Fisher’s exact test: p = 0.4149).

**Discussion**

PA/FIA is more common in infants below 2 years and a strong male predominance was observed in the younger age group, which was similar to previous studies [2,7,9–13]. Due to the high incidence of PA/FIA in infants, the overwhelmingly male predominance was observed in the younger age group, which was similar to previous studies [2,7,9–13]. Due to the male predominance, we cannot exclude the possibility that the regional IBD center could have contributed to the high incidence of PA/FIA in infants, the overwhelmingly male predominance being the regional IBD center could have contributed to the high incidence of Crohn’s disease and FIA in our study group.

Lactose fermenting coliforms were the most common organisms found in PA similar to previous studies [3,13,20,22]. Staphylococcus was more common in females as observed by Watanabe, et al. [6]. Intestinal organisms were more predominant in children below 2 years and above 8 years (*Table 3*). Presence of intestinal organisms in pus was associated with higher recurrence rates particularly in children below 2 years (*Table 4*). Though the presence of intestinal organisms in the pus supports the presence of an underlying FIA, we failed to establish any correlation between the presence of FIA and the organisms in culture.

**Conclusion**

Surgery for PA/FIA in children <2 years was not found to be associated with higher recurrence rates and should be considered as the primary treatment. Topical tacrolimus was found to be an effective treatment for IBD associated FIA. A long-term prospective study (preferably a randomized controlled trial) is clearly in order, although given that this has never occurred in previous pediatric surgical practice this appears unlikely.

**Conflict of Interest:** None

**References**


<table>
<thead>
<tr>
<th>Age group</th>
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<th>Intestinal organisms</th>
<th>Recurrence</th>
<th>Fisher’s exact test</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt;2 years</td>
<td>34</td>
<td>23</td>
<td>8 (35%)</td>
<td>p = 0.0339</td>
</tr>
<tr>
<td>&gt;8 years</td>
<td>13</td>
<td>10</td>
<td>7 (70%)</td>
<td>p = 0.5105</td>
</tr>
</tbody>
</table>

*Others include skin organisms, normal skin flora, mixed growth and no growth

*Table 2* Association of recurrence of perianal abscess and fistula-in-ano in children with the type of organism isolated from microbial culture of pus obtained during surgery.