A Prospective Study of Posterior Anorectal Myectomy As A Therapeutic Approach for Refractory Idiopathic Constipation in Children- Outcomes and Efficacy

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Abstract

Introduction: A subgroup of children with chronic idiopathic constipation continues to have persistent symptoms after treatment with high-dose laxatives, suppositories, and enemas. This study aims to determine the surgical outcome of anorectal myectomy as a treatment for these patients.

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Materials and Methods: The study included 46 children with refractory constipation who were not responsive to diet, laxatives, or enemas. Children with Hirschsprung disease, documented metabolic disease, diabetes, and hypothyroidism were excluded from the study. Posterior anorectal myectomy was performed in every included case. Children were followed up for 1 to 3 years after the surgery, and their frequency of fecal evacuations, fecal consistency, straining during defecation, and fecal diameter were monitored using the Bristol Stool Scoring system.

Results: Out of 46 cases that underwent surgery, 29 were boys, with an average age of 5.4 ± 2.5 years (range, 3 to 12 years). The mean duration of constipation was 13.7 ± 4.1 months (6 to 17 months). The duration of medical treatment for constipation was 13.9 ± 8.3 months (6 to 22 months). There was an overall improvement in 84% of the children, and the results were statistically significant (P<0.0005). Three (6.52%) of the patients continued to experience severe constipation 6 months postoperatively. Ganglion cells were found in 34 children, hypoganglionosis in 9, and absent in 2.

Conclusion: Improvement is observed in fecal consistency, fecal diameter, the number of bowel movements per day, and straining before and during defecation after anorectal myectomy.

Keywords

- Idiopathic constipation
- Anorectal myectomy
- Histology
- Children

Introduction

Constipation in children is a common issue, accounting for 3% to 5% of all pediatrician visits[1]. Chronic idiopathic or functional constipation is characterized by the passage of hard stools without an identifiable organic cause (such as anatomic, metabolic, or neurologic factors)[2]. In children, constipation typically begins

when solid foods are introduced, during toilet training, or when starting school[1]. Regardless of the cause, as constipation progresses, it can create a vicious cycle of fecal retention and rectal distention. This impairs normal colorectal motility, leading to increased stool retention and further rectal dilation. This can make defecation painful or uncomfortable for the child, worsening the condition. Although it may resemble Hirschsprung disease, rectal suction biopsy typically reveals the presence of ganglion cells, effectively ruling out aganglionosis[1-2]. For children with ongoing symptoms despite comprehensive medical treatments—including dietary fiber, stool softeners, behavioral modifications, and fecal disimpaction—surgical intervention may be needed. Posterior anorectal myectomy has been proposed as a treatment option for refractory constipation in children, especially in settings lacking advanced diagnostic tools and minimally invasive procedures. The surgery aims to reduce internal sphincter tone and help stool pass by disrupting the continuity of the muscle layer. Our study aimed to determine the effect of posterior anorectal myectomy as a treatment outcome of refractory idiopathic constipation in children who were treated at our institution from January 2019 to December 2022.

Materials and Methods

A prospective cohort study was conducted in the Department of Pediatrics and Pediatric Surgery at a tertiary care referral hospital in central India between January 2019 and December 2022. Functional constipation was diagnosed according to the Rome IV criteria, which were consistently applied during clinical evaluation. The children under 12 years suffering from intractable constipation, who did not respond to standard protocol-based management as per Indian Pediatric Gastroenterologists' treatments (parent and patient counseling, toilet training, modifications in diet, drug management like laxatives, or enemas) for at least 6 months, were analyzed[3]. The inclusion criteria required that these children could not pass stools daily despite receiving the maximum allowable dose of laxatives and needed daily rectal stimulation through enemas or suppositories to have bowel movements. Children with underlying anorectal anomalies, documented metabolic and endocrine disorders, or those

diagnosed with Hirschsprung's disease were excluded from the study. Additionally, children showing signs of intestinal obstruction were also excluded. All participants underwent investigations, including a barium enema and a rectal biopsy.

Constipation was defined as the presence of two or more of the following features lasting more than four weeks: defecation frequency of ≤2 times per week, fecal incontinence occurring ≥1 time per week after the acquisition of toileting skills, history of excessive stool retention, history of painful or hard bowel movements, history of large-diameter stools that may obstruct the toilet, or presence of a large mass in the rectum or upon abdomen examination[3]. Upon obtaining approval from the institutional ethics committee, children fulfilling the inclusion criteria were enrolled in the study after obtaining informed consent from parents or guardians. Data were collected in a standardized proforma, which included demographic, clinical, laboratory, and radiological data. The information included the frequency of bowel movements, stool consistency, fecal diameter, straining behavior, discomfort during bowel movements, rectal bleeding, need for laxatives, and instances of soiling. The surgical procedure details were recorded. The anorectal myectomized muscle strips were 1 cm in width, and the length of the strips ranged from 4 to 6 cm. Histopathology results from myectomized muscle strips were documented. The follow-up protocol involved a monthly questionnaire about bowel habits, complications, symptom relief, and the use of laxatives and stool softeners for the first 6 months, followed by assessments every 3 months for a year. A contrast enema study was done at 6 months follow-up for all children in this study as objective evidence of return of distal colonic & rectal dilatation or may show a spastic segment.

Statistical analysis was conducted using IBM SPSS Statistics for Windows, Version 22.0 (IBM Corp., Armonk, NY). Continuous parameters were presented as mean ± standard deviation or median (range), while categorical parameters were expressed as numbers and percentages. Discrete variables were compared using the chi-square test or Fisher’s exact test, while continuous variables were compared using independent samples t-test or the Mann-Whitney U test, depending on normality. A one-way ANOVA test was used to analyze the difference between the means of more

than two groups. A p-value of <0.05 was considered statistically significant.

Result

During this study period, 46 children were included for analysis. There were 29 boys in this study, with a mean age of 5.4 ± 2.5 years (ranging from 3 to 12 years). The mean duration of constipation was 13.7 ± 4.1, ranging from 6 to 17 months. The duration of medical treatment for constipation was 13.9 ± 8.3 months (range, 6-22 months). Patients were followed up for a period ranging from 1 to 3 years after surgery. The most frequently observed symptoms were hard stool consistency (n = 38, 82.6%), distress during defecation (n = 32, 69.6%), soiling (n = 7, 15.2%), and rectal bleeding (n = 3, 6.5%). The histology examinations of myectomy specimens in 34 (73.9%) children showed normal ganglion cells. Furthermore, we had hypoganglionosis in 9 (19.6%) and aganglionosis in 3 (6.5 %) patients.

Table 1: Histology and outcome

Histology	Improved Post myectomy		Improved with low-dose medication		Not Improved	
	n	%	n	%	n	%
Normal n= 34	31	91.2	2	5.9	1	2.9
Hypoganglionosis n=9	6	66.7	2	22.2	1	11.1
Aganglionosis n=3	2	66.7	1	33.3	1	33.3

At 6 months postoperatively, 38 patients (82.6%) achieved regular bowel movements (≥3 times per week) without the need for laxatives. Five children (10.8%) continued to require a low dose of stool softeners to maintain regular bowel habits. Three patients (6.5%) had persistent constipation with <3 bowel movements per week despite medical therapy Table 2 summarize the results in 46 patients.

Table 2: Clinical Outcome

Result (n 46)	n	%
Excellent*	38	82.6
Improved #	5	10.8
No Improvement	3	6.5

* Regular bowel habits with no diet management
# Regular bowel habits with diet management and a small dose of laxatives.

There was no correlation between histopathological findings, duration of symptoms, age, sex of operation, and response to myectomy. Only in one case did rectal bleeding occur, but it spontaneously stopped after 12 h. The mucosal breach occurred in 7 patients during the operation, which was repaired. No retrorectal collection was seen in this study

Stool consistency was types 3 and 4 of the Bristol stool classifications in 42 cases after surgery (hard stool was reported in 4 cases) (<0.001) **(Table 3)**. Fecal diameter was large in 41 cases before surgery versus 6 cases after surgery (P<0.0005) **(Table 3)**. Straining behavior was significantly improved following surgery (P<0.0005) **(Table 3)**.

Table 3: Comparison of Preoperative and Postoperative Stool Parameters in 46 Children Undergoing Posterior Myectomy

Parameter	Preoperative	Postoperative	P-value
Bristol Stool Type			
• Type 1–2 (hard, lumpy stools)	38 (82.6%)	4 (8.7%)	<0.001
• Type 3–4 (normal, sausage-like stools)	6 (13.0%)	42 (91.3%)	–
• Type 5–7 (loose stools)	2 (4.4%)	0 (0%)	–
Fecal Diameter (large stools)	41 (89.1%)	6 (13.0%)	<0.00005
Frequency of Defecation (abnormal)	44 (95.6%)	3 (6.5%)	<0.001
Straining during Defecation	32 (69.6%)	6 (13.0%)	<0.00005
Soiling	7 (15.2%)	0 (0%)	–
Regular Bowel Habits without Laxative	0	38 (82.6%)	<0.0005
Improved with Low-dose Laxative	0	5 (10.8%)	–
No Improvement	46 (100%)	3 (6.5%)	<0.0005

The frequency of defecation was abnormal in 44 cases before surgery, compared to 3 cases after surgery ($P < 0.001$). Improvement in force was noticed in 39 (84.7%) of subjects. Of the 34 cases with the presence of ganglion cells, 31 (91.2%) subjects showed improvement in fecal diameter and consistency. Defecation improved in 2 (5.9 %) cases with low doses of laxatives. Of 9 cases with hypoganglionosis, 6 (66.7%) showed improvement, and 2 out of 3 (66.7%) showed improved defecation with absent ganglion cells. There was no significant difference in treatment responses between patients with and without ganglion **(Table 2)**. Postoperative bowel movements showed an evident improvement, with a mean of 2.6 ± 1.3 bowel movements per week. The mean laxative dose was reduced to 0.8±1.1 of the usual dose, and soiling disappeared in all children (n=7, 100%). one child had transient soiling that stopped spontaneously after 8 months.

Overall, the improvement was excellent in 82.6% of the children after 6 months of follow-up, with 5 (10.8%) improvements with low doses of laxatives. Three (6.5%)

of the patients continued to have severe constipation 6 months after posterior myectomy **(Table 2)**.

Discussion

Constipation is a common issue among children, but less than 5% have a known physiological or anatomical cause[4]. Idiopathic constipation is diagnosed when all other possible causes have been ruled out. It is characterized by ongoing difficulty with bowel movements, often due to painful bowel movements, which leads to the child holding back their stool, even though there is no evidence of an organic disorder. This stool-withholding behavior can lead to a buildup of stool in the colon, causing the stool to become harder and larger, which in turn leads to increased rectal compliance and reduced sensitivity[5]. This creates a cycle of hard stools, painful bowel movements, and stool retention, exacerbating the problem. These children may also experience abdominal distension, pain, or discomfort, which can impact the psychological well-being of both the children and their families. Management of chronic constipation depends on two key factors: the child's adherence to conventional treatment (such as consuming enough dietary fiber, making dietary changes, behavioral modifications, drug therapy, and fecal disimpaction) and the parent's understanding of the importance of these modifications. However, long-term studies have shown that around 50% of children need ongoing conventional treatment[5-7]. Defecation involves many structures and physiologic processes. The anterior abdominal wall, the pelvic floor, the external sphincter besides the anorectum with internal anal sphincter, proximal colon, and the gastrocolic reflex. Diagnosis of Hirschsprung disease is ruled out by finding ganglion cells and normal acetylcholinesterase activity through suction rectal biopsy, and observing the absence of the recto-sphincteric reflex during rectal balloon inflation in anorectal manometry[8]. Anorectal manometry could not be performed in this study due to the unavailability of the manometric system, as well as the lack of defecography and pelvic floor studies.

According to our findings, 38 out of 46 patients (82.6%) showed improvement after undergoing the operation and remained well four years later, suggesting that these early results have been consistently maintained. Additionally, the maximum resting anal pressures, as

detected during a per rectal examination, were notably reduced after the operation, especially in patients who experienced positive outcomes. We agree that objective measurement of anal resting pressure requires anorectal manometry, which was not performed in our study. The statement referring to reduced resting pressure reflects a clinical impression based on postoperative digital rectal examination, rather than a quantifiable physiological measurement.

This study demonstrated a significant improvement in bowel function and quality of life after surgery. We objectively assessed clinical improvement by measuring the number of bowel movements per week, the discontinuation of laxatives, the absence of soiling, and feedback from both the children and their parents. Postoperative bowel movements increased from an average of 2.1 per week before surgery to 6.1 per week at the one-year follow-up, showing a marked improvement in bowel habits. The need for laxatives decreased significantly, with only 6 patients requiring laxatives at the one-year follow-up compared to all 46 patients before the surgery. The average laxative dose was reduced to 0.8±1.1 of the usual dose, and soiling completely disappeared in all (100%) children.

In this study, 82.6% of the children had good bowel movements without the need for laxatives, while 10.8% of patients required a small dosage of laxatives after a 6-month follow-up. Only 6.5% of the patients continued to experience severe constipation 6 months after posterior myectomy. These findings align with a study by Redkar et al.[9], which reported an improvement in bowel habits in 92.86% of patients after myectomy. Similarly, research by Freeman[10] indicated improvement in 85.7% of 61 children who had anorectal myectomies. Our results were slightly better than those reported by Mousavi et al.[11], who found improvement in only 68.2% of their patients, and the study by Doodnath and Puri[12], in which 62.5% of cases showed regular bowel movements after myectomy.

Anal stricture[13] and incontinence[14] have both been reported as complications of myomectomy. However, no case of soiling, stricture, or incontinence was observed in our patients.

The histological examination of the myectomy specimens in 34 (73.9%) children showed normal ganglion cells. In nine children (19.5%), we observed

hypoganglionosis; in three children (6.5%), there was aganglionosis. These findings align with Mousavi et al.[11], who studied 44 patients treated with myectomy. Their study confirmed that 32 (72.7%) children had normal ganglion cells, while four (9.1%) had aganglionosis. However, our results differed significantly from those of Redkar et al.[9], who reported aganglionosis in 10 out of 28 patients and normal ganglion cells in only seven children. Our findings also contrasted significantly with those of Peyvasht et al.[15], who observed aganglionosis in 30 out of 48 patients, with only seven showing normal ganglion cells. The study by Ahmadi et al[16]. classified patients into three groups based on the presence of ganglionic cells. Group A consisted of patients with normal ganglion cells in both the proximal and distal ends of the muscle stripe, Group B had no ganglion cells in either the proximal or distal ends, and Group C had normal ganglion cells only in the proximal end. The study found no significant differences in surgical outcomes between Groups A, B, and C. Patients in all three groups benefited from dilatation and anorectal myomectomy, which involves excising a strip of muscle along one wall to disrupt the circumferential action of the muscle group. Interestingly, some patients showed improvement despite the muscle biopsy specimen exhibiting no ganglia along its entire length. This may suggest that the remaining aganglionic segment is too short to cause further symptoms, or it could represent a subgroup of sphincteric dysfunction[17]. In cases where posterior internal anal sphincter myectomy fails to relieve symptoms completely, adjunctive therapies such as botulinum toxin injection may offer additional benefit. Mohajerzadeh et al[18]. reported favorable outcomes using high-dose botulinum toxin injections in children with internal anal sphincter achalasia who remained symptomatic despite prior myectomy. Their study highlights the potential of combining surgical and pharmacologic interventions to manage refractory cases more effectively. The present study indicates that most patients experienced improvement in bowel habits, and the presence or absence of ganglion cells had no significant effect on the outcomes. The study found no correlation between histopathological findings and the success rate.

Limitation

This study has several limitations. First, the sample size was relatively small, and although follow-up extended up to four

years for some patients, it may still be too short to assess long-term outcomes or late complications fully. Second, objective measurements of anorectal physiology were limited. We did not conduct anorectal manometry or colonic transit time studies because these tests were not available at our institution. Additionally, fecal diameter was estimated based on clinical observation and parental reports, as there are no widely accepted criteria or tools to measure stool diameter in pediatric populations. Another key limitation is the absence of a control group, which restricts the ability to make direct comparisons about the effectiveness of anorectal myectomy versus other treatment options. In twelve patients who showed postoperative signs of aganglionosis or hypoganglionosis, ganglion cells were found in the initial biopsy. The difference between the preoperative and postoperative histopathological results may be due to sampling error, variability in biopsy depth, or technical challenges in analyzing small tissue fragments. This highlights the risk of false-negative results in suction biopsies, especially in cases of ultra-short segment disease or when biopsies are taken too proximally or superficially. Future research should include a larger cohort, a prospective comparative design, and functional assessments such as anorectal manometry, defecography, or scoring systems to provide a more thorough evaluation.

Conclusion

Posterior anorectal myectomy appears to be a safe, simple, and effective surgical option for children with chronic, refractory idiopathic constipation who have failed to respond to prolonged medical management. The procedure was associated with a high rate of symptom improvement, reduced need for laxatives, and resolution of soiling in most patients. While histopathological findings varied, the presence or absence of ganglion cells did not significantly impact clinical outcomes. However, further studies with larger sample sizes, longer follow-up, and standardized diagnostic protocols are essential to validate these results and better define the subset of patients who are most likely to benefit from this procedure.

Ethical Consideration

Approval was obtained from the Ethics Committee of Ashish Hospital, home science college road, Napier town Jabalpur, India. (Ref. No: 03/ASH/Study05/2018)

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Conflict of interests

There is no conflict of interest

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