

Outcome of the Delorme procedure for the management of complete rectal prolapse in children

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Objectives

The aim of the study was to evaluate the surgical and functional outcome of the Delorme procedure for the management of full-thickness long-segment rectal prolapse (RP) in children.

Patients and methods

This study included 23 patients with a mean age of 5.5 ± 2 years. The severity of incontinence and impact on quality of life (QOL) were evaluated using the Fecal Incontinence Severity Index (FISI) and the Fecal Incontinence Quality of Life (FIQL) questionnaires. The primary outcome was defined as complete recovery of continence, and partial improvement was defined as improvement in either type or frequency of incontinence or both. Recurrence was defined as recurrent incontinence after complete recovery. The secondary outcome was defined as change in the impact of incontinence on patients' QOL as assessed by the FIQL questionnaire.

Results

The mean operative time was 60.7 ± 13 min, the mean time until the first oral intake was 8.7 ± 3.9 h, and the mean postoperative hospital stay was 33.4 ± 12 h. All patients showed significantly lower postoperative scores on individual items and the total FISI score. Surgical repair of RP showed a favorable outcome in the form of significantly higher postoperative scores of individual items of the FIQL questionnaire, with a significantly higher postoperative total FIQL score compared with preoperative scores. Throughout the follow-up duration of 25.6 ± 6.9 months, 18 patients (78.2%) showed complete recovery, four patients (17.4%) showed only partial improvement, and one patient (4.4%) developed recurrence of gas incontinence 6 months after the disappearance of his incontinence; however, in all five patients there was an infrequent occurrence of incontinence at a frequency of 1–3 times/month.

Conclusion

The Delorme procedure is safe and effective for the management of complete RP, with a high complete recovery rate and ability to alleviate the adverse impact of fecal incontinence on QOL even in those with partial improvement. The reported advantages and outcome of the Delorme procedure in children and adulthood could enable discarding old concepts for restricted indications for the procedure for old and/or unfit patients and could make it suitable for all cases with RP without limits of age or general condition.

Keywords:

complete rectal prolapse, Delorme procedure, outcome

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Introduction

Rectal prolapse (RP), the protrusion of the layers of the rectal wall through the anal canal, may be partial (mucosal) or complete (full thickness). Complete prolapse represents a protrusion of the entire layer of the rectum to the outside of the anus and, thus, shows concentric folds. Incomplete prolapse is defined as a condition in which the protruding rectal wall is limited to the inside of the anal canal. In clinical practice, mucosal prolapse is readily confused with RP. Mucosal prolapse is not a protrusion of the entire layer of the rectal wall, but a portion of the rectal wall or only the anal mucosa. It should be differentiated from RP as the surgical treatments are different [1,2].

The pathophysiology of RP remains a matter of debate. Etiologic factors may be congenital or acquired, and include poor bowel habits, diarrheal diseases, neurologic diseases,

female sex, nulliparity, and previous anorectal surgical procedures. Anatomic features associated with RP include a deep pouch of Douglas, rectosigmoid redundancy, levator ani diastasis, lack of fixation of the rectum to the sacrum, and weakness of the internal sphincter [3].

RP can present in a variety of forms and is associated with a range of symptoms including mass protrude during defecation, pain, incomplete evacuation, bloody and/or mucous rectal discharge, and fecal incontinence or constipation. Complete external RP may be intermittent or may be incarcerated and poses a risk of strangulation. Although complete prolapse is most common among older women, it affects individuals of all ages, including children [4].

Management of complete RP is still a matter of debate in terms of the choice of approach, abdominal

or perineal, the appropriateness of the procedure to the age of the patient, and the outcome in terms of surgical data and short-term and long-term results. The perineal approach provided multiple advantages over the abdominal approach including the feasibility of using spinal anesthesia or even local anesthesia, early oral feeding, and patient comfort, with little or no postoperative pain, and thus short hospital stay [5,6]. Moreover, the perineal approach did not lead to the documented risks of injury of pelvic or hypogastric nerves causing erection or ejaculatory problems in males [7,8] and the possibility of development of pelvic adhesions that may affect the ovaries and tubes and cause secondary infertility [9].

The Delorme–Thiersch procedure has appeal as a lesser procedure for patients of any age or risk category, especially for elderly low-risk patients, patients with constipation or evacuation difficulties, young males, and patients with symptomatic hemorrhoids or mucosal prolapse [1]. The current prospective study aimed to evaluate the surgical and functional outcome of the Delorme procedure for the management of full-thickness long-segment RP in children and adolescents.

Patients and methods

The current study was carried out at the Department of General Surgery, Al Jafel International Hospital, Riyadh, Kingdom of Saudi Arabia, from January 2009 till June 2013 to allow a minimum follow-up period of 6 months for the last case operated upon. After approval of the study protocol by the Local Ethical Committee and obtaining written fully informed parental consent, patients with long-segment complete RP resisting or recurring after conservative treatment were recruited into the study.

The preoperative data of the patients collected included the following: history of straining at defecation, constipation, fecal incontinence, and previous surgery, full laboratory investigations, proctoscopy and colonoscopy, and radiological investigations including barium enema and defecation proctography.

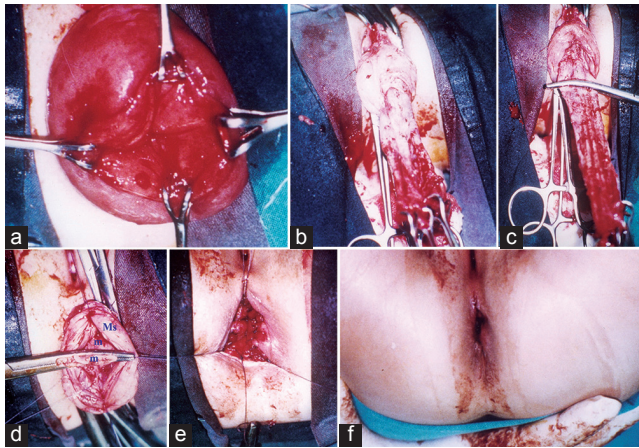
Parents of enrolled young children and patients who could answer the questions were asked to complete the Fecal Incontinence Severity Index (FISI) and the Fecal Incontinence Quality of Life (FIQL) questionnaires. The FISI questionnaire evaluates the frequency of incontinence for four types of bowel leakage: gas, mucus, liquid stool, or solid stool and the severity of leakage were graded on a six-point scale: 5: ≥ 2 times/day, 4: once/day, 3: ≥ 2 times/week,

2: once/week, 1: 1–3 times/month, and 0: never. For calculation of the total FISI score, a higher score indicated greater severity, with 1 = least severe condition and 20 = most severe condition [10]. The FIQL questionnaire included four domains: Lifestyle (10 items), Coping/Behavior (nine items), Depression/Self-Perception (seven items), and Embarrassment (three items). Each item was graded on a four-point scale: 1: most of the time, 2: some of the time, 3: a little of the time, and 4: never. For calculation of the total FIQL score, a higher score indicated lower severity of the impact of incontinence on patients' quality of life (QOL) [11].

Surgical technique

All patients underwent preoperative mechanical bowel preparation. Under general inhalational anesthesia with tracheal intubation, patients received a prophylactic intravenous dose of broad-spectrum antibiotic that was continued postoperatively and urinary catheterization was performed. With the patient in the lithotomy position, the prolapsed rectum was identified and pulled tightly downward with Babcock forceps so that the redundant rectal wall was taken into the prolapsed segment. Adrenaline (1/200 000) in normal saline was injected into the submucous layer above the dentate line to reduce bleeding and define the plane of dissection. A circumferential incision was performed in the rectal mucosa at 1–1.5 cm proximal to the dentate line to preserve a sensitive area of rectal mucosa and to simplify anastomosis. A plane of dissection between the mucosa and the internal sphincter and circular muscle of the rectum was developed, and a sleeve of mucosa of 10–15 cm was mobilized and upwards dissection was performed until rectal mucosa could not be pulled down any further. Careful homeostasis was ensured, and then the rectal muscle was plicated longitudinally in the four quadrants with 2/0 absorbable sutures starting at the apex of the dissection and continuing down to the distal cut edge of the mucosa in the anal canal. Additional sutures were placed in between for a total of eight sutures to plicate rectal muscle on tightening the sutures. Excess mucosa was excised and an interrupted mucosa-to-mucosa anastomosis with 3/0 absorbable sutures was performed (Fig. 1). Immediate postoperative care included an intramuscular injection of nonsteroidal anti-inflammatory analgesia, intravenous antibiotic therapy, and intravenous fluid therapy until oral intake. The urinary catheter was removed on the first postoperative day. Once oral intake was allowed, patients were administered oral antibiotics and analgesia and discharged. Mild laxatives were administered for 2 weeks and the patients were advised not to strain during defecation.

Figure 1



(a) The patient in the lithotomy position, the prolapsed rectum was identified. (b) The prolapsed rectum was pulled tightly downward with Babcock forceps. (c) Mucosal dissection was performed until the end of the redundant segment. (d) The dissected redundant mucosa (m) was excised while the muscle (Ms) layer was plicated and hung in four quadrants with vicryl 2/0. (e) Closure of the mucosal defect. (f) Postoperative appearance of the anal verge.

Outcome

The primary outcome was defined as complete recovery of continence; partial improvement was defined as improvement in either the type or the frequency of incontinence, or both. Recurrence was defined as complaint of recurrent incontinence after complete recovery, irrespective of the type and the frequency of incontinence. The secondary outcome was defined as a change in the impact of incontinence on patients' QOL as assessed by the FIQL questionnaire.

Statistical analysis

The data obtained were presented as mean \pm SD, ranges, numbers, and ratios. Results were analyzed using the χ^2 -test and the paired *t*-test. Statistical analysis was carried out using the SPSS (version 15, 2006, SPSS Inc., Chicago, IL, USA) for Windows statistical package. *P* value less than 0.05 was considered statistically significant.

Results

The study included 23 patients, 15 males and eight females, mean age 5.5 ± 2 , range: 2–9 years. Thirteen patients were younger than 6 years old and 10 patients were in the age range of 6–9 years. The mean weight of the studied patients was 20.6 ± 6.7 , range: 11–43 kg. Four patients had a history of constipation and seven patients had a history of previous surgery. All patients had received conservative treatment that failed to control incontinence (Table 1).

Table 1 Patients' enrollment

Data	Findings
Age (years)	
Strata	
<6	
Frequency	13 (56.5)
Mean	4.2 ± 1.1 (2–5)
≥ 6	
Frequency	10 (43.5)
Mean	7.3 ± 1.3 (6–9)
Total	5.5 ± 2 (2–9)
Sex	
Males	15 (65.2)
Females	8 (34.8)
Weight (kg)	20.6 ± 6.7 (11–43)
History of	
Conservative treatment	23 (100)
Surgical interference	7 (30.4)

Data are presented as mean \pm SD and numbers; ranges and percentages are in parentheses.

All patients had an uneventful intraoperative course without excessive bleeding or injury to the rectal muscle layer. The mean operative time was 60.7 ± 13 , range: 35–90 min; six patients had an operative time of less than 60 min and 17 patients had an operative time of at least 60 min. The mean length of the excised mucosal sleeve was 14 ± 2 , range: 10–18 cm; the length of the excised mucosal sleeve was less than 15 cm in 11 patients and of at least 15 cm in 12 patients. The mean time until the first oral intake was 8.7 ± 3.9 , range: 3–15 h; nine patients received their first oral intake within 6 h, six patients received their first oral intake within 12 h, and eight patients received their first oral intake after 12 h. The mean postoperative hospital stay was 33.4 ± 12 , range: 24–48 h; 14 patients were discharged 24 h after surgery and nine patients had a postoperative hospital stay for 48 h (Table 2).

Functional evaluation was performed using the FISIQ questionnaire, and all patients showed improvement in their complaints; however, one patient still had gas incontinence, two had mucus incontinence, and a fourth patient had mucus and liquid stool incontinence, with persistence of incontinence in 17.4%. One patient developed recurrence of gas incontinence 6 months after the disappearance of his incontinence, a recurrence rate of 4.3%. All these five patients had graded their incontinence as one, indicating its infrequent occurrence of 1–3 times/month. The mean postoperative scores of individual items of the FISIQ questionnaire were compared with the preoperative scores and showed a significant difference in favor of postoperative scoring. The total postoperative FISIQ score was significantly decreased compared with the preoperative score (Table 3, Fig. 2).

Rectal incontinence had an adverse impact on patients' QOL as shown by low scores of individual items of the FIQL questionnaire; however, surgical repair showed a favorable outcome in the form of significantly higher postoperative scores compared with the preoperative scores of individual items of the FIQL questionnaire (Fig. 3), with a significantly higher postoperative total FIQL score compared with the preoperative total score (Table 4, Fig. 4).

All patients attended the follow-up visits for a mean follow-up duration of 25.6 ± 6.9 , range: 8–38 months. Throughout follow-up, 18 patients showed complete recovery without any manifestations of incontinence, a rate of 78.2%. Four patients showed only partial improvement as one patient still had gas incontinence, two patients had mucus incontinence, and the fourth patient had mucus and liquid stool incontinence, a rate of partial improvement incontinence of 17.4%. One patient developed recurrence of gas incontinence 6 months after the disappearance of his incontinence, a recurrence rate of 4.3%; however, all five patients had graded their incontinence as one, indicating its infrequent occurrence of a frequency of 1–3 times/month (Table 5, Fig. 5).

Discussion

The outcome of the current study was bimodal including both surgical and functional outcomes. All patients had an uneventful intraoperative course without excessive bleeding during mucosal dissection or injury to the rectal muscle; thus, no additional morbidities were encountered. Delorme's procedure provided multiple advantages including a short operative time (60.7 ± 13 min), early resumption of oral feeding (13.3 ± 1.4 h), and little need for postoperative analgesia, which provided more patients and parents' comfort and a short duration of postoperative hospital stay (33.4 ± 12 h). These operative

and immediate postoperative data show the advantages of Delorme's procedure as a perineal approach for the correction of RP.

In support of the choice of perineal repair for complete RP, Riansuwan *et al.* [12] retrospectively studied 177 patients who underwent abdominal or perineal repair for complete RP and found that those undergoing perineal repair had less procedural blood loss, operative

Table 2 Operative and immediate postoperative data

Data	Findings
Operative time (min)	
Strata	
<60	
Frequency	6 (26.1)
Mean	42.5 ± 5.2 (35–50)
≥60	
Frequency	17 (73.9)
Mean	67.1 ± 7.5 (60–90)
Total	60.7 ± 13 (35–90)
Length of excised mucosal sleeve (cm)	
Strata	
<15	
Frequency	11 (47.8)
Mean	12.3 ± 1.3 (10–14)
≥15	
Frequency	12 (52.2)
Mean	15.6 ± 0.9 (15–18)
Total	14 ± 2 (10–18)
Time until the first oral intake (h)	
Strata	
≤6	
Frequency	9 (39.1)
Mean	4.9 ± 1.1 (3–6)
>6–11	
Frequency	6 (26.1)
Mean	8.5 ± 1.4 (7–10)
≥12	
Frequency	8 (34.8)
Mean	13.3 ± 1.4 (12–15)
Total	8.7 ± 3.9 (3–15)
Total PO hospital stay (h)	
Strata	
24	14 (60.9)
48	9 (39.1)
Total	33.4 ± 12 (24–48)

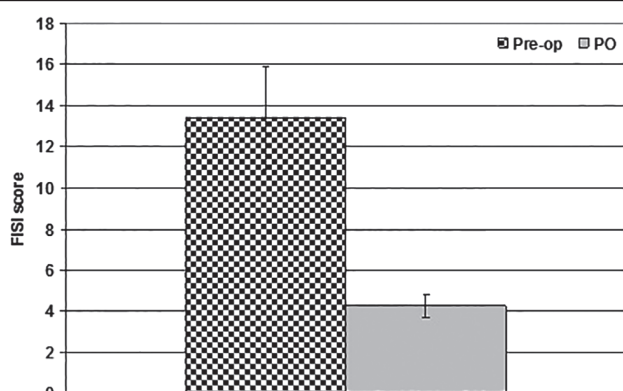
Data are presented as mean \pm SD and numbers; ranges and percentages are in parentheses; PO, postoperative.

Table 3 Mean postoperative score of individual items of fecal incontinence severity index and total score compared with preoperative scores

	Preoperative	Postoperative	P value
Gases	4 ± 1	0.09 ± 0.3	0.0008
Mucus	3.9 ± 0.9	0.13 ± 0.3	0.0008
Liquid stool	3.1 ± 1	0.04 ± 0.2	0.0008
Solid stool	2.4 ± 1.3	0	0.0006
Total score	13.4 ± 2.5	0.26 ± 0.5	0.0004

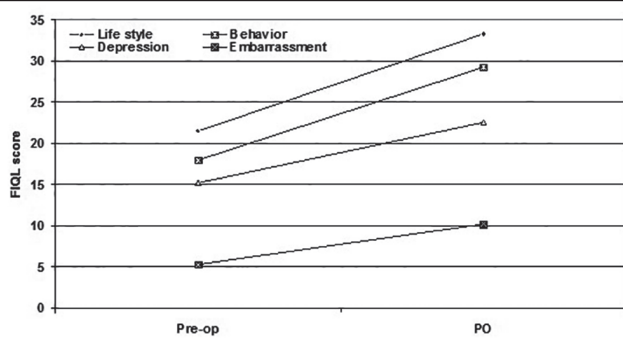
Data are presented as mean \pm SD.

Figure 2



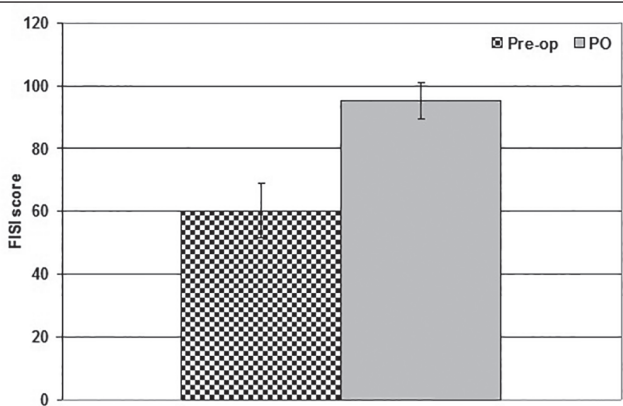
Mean total PO score of FISI compared with preoperative scores. FISI, Fecal Incontinence Severity Index; PO, postoperative.

Figure 3



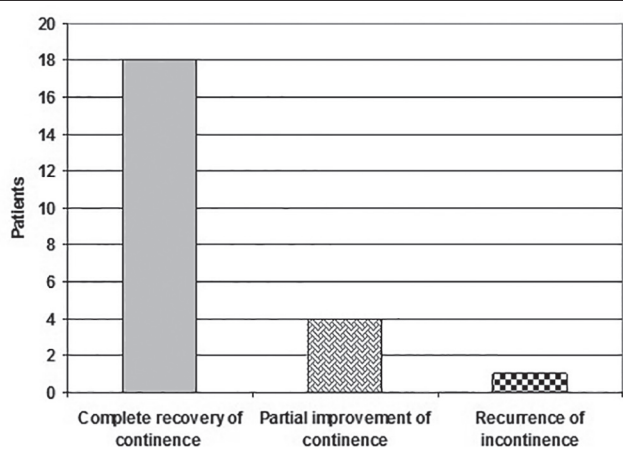
PO scores of FIQL compared with preoperative scores of studied patients. FIQL, Fecal Incontinence Quality of Life; PO, postoperative.

Figure 4



Mean total PO scores of FIQL compared with operative scores. FIQL, Fecal Incontinence Quality of Life; PO, postoperative.

Figure 5



Patients' distribution according to surgical outcome.

time, hospital stay, and dietary restriction. Also, Lee *et al.* [13] retrospectively studied 104 patients who had undergone abdominal or perineal repair for complete RP and found that the abdominal group had significantly longer operative times and postoperative hospital stay than the perineal group.

The results obtained in of the surgical outcome of the Delorme procedure are in agreement with those

Table 4 Mean postoperative score of individual items of Fecal Incontinence Quality of Life and total score compared with preoperative scores

	Preoperative	Postoperative	P value
Lifestyle	21.5 ± 5.9	33.3 ± 3.6	0.0006
Coping/Behavior	18 ± 5.8	29.3 ± 2.9	0.0006
Depression/Self-perception	15.2 ± 4.4	22.5 ± 1.2	0.0008
Embarrassment	5.3 ± 1.8	10.2 ± 0.8	0.0009
Total score	60 ± 8.7	95.2 ± 5.8	0.0003

Data are presented as mean ± SD.

Table 5 Follow-up data

Data	Findings
Duration of follow-up (months)	
Strata	
<12	
Frequency	1 (4.4)
Mean	8
12–24	
Frequency	10 (43.5)
Mean	21.7 ± 2.7 (16–24)
>24–36	
Frequency	9 (39.1)
Mean	28 ± 2.4 (25–31)
>36	
Frequency	3 (13)
Mean	37.3 ± 0.6 (37–38)
Total	25.6 ± 6.9 (8–38)
Outcome	
Complete recovery	18 (78.2)
Partial improvement	4 (17.4)
Recurrence	1 (4.4)

Data are presented as mean ± SD and numbers; ranges and percentages are in parentheses.

of Pascual Montero *et al.* [14], who documented that Delorme's procedure for the management of complete RP is associated with low morbidity, improves anal continence, gives rise to no postoperative constipation, and has an acceptable relapse rate with high patient satisfaction because of its (intradural anesthesia, short hospital stay, and little postoperative pain) and optimal results. Lieberth *et al.* [15] reported that most preoperative evacuatory symptoms resolve with the repair of RP and serious complications are uncommon after Delorme's procedure, and the observation that recurrence and complication rates were lower in younger medically fit patients suggests that the Delorme repair need not be restricted specifically to older, medically unfit patients. Mahmoud *et al.* [16] studied 37 patients with full-thickness RP who were operated on by Delorme's procedure and reported a mean operative time of 65±4.5 min, no mortality, and minimal blood loss, with a mean hospital stay of 3.5 days. Recently, Makineni *et al.* [17] documented that the treatment of RP should be individualized to

achieve the best results; abdominal posterior mesh rectopexy can be applied safely in most patients with minimal postoperative increase in constipation and recurrence and Delorme's procedure can be performed with minimal morbidity, shorter hospital stay, and good functional results with an acceptable recurrence rate and can be considered an alternative to rectopexy not only in patients unfit for laparotomy but also in individuals with a short prolapse, avoiding a laparotomy.

Functionally, all patients showed improvement in their QOL as they had significantly higher FIQL scores determined 6 months postoperative compared with their preoperative scores, with significantly higher postoperative scores of individual items of the questionnaire compared with the preoperative scores. These data show the adverse impact of rectal incontinence on patients' QOL and psychological status and to what extent surgical correction can alleviate this adverse effect.

In line with the negative effect of complete RP on patients' QOL and the positive effect of its correction, irrespective of the operative procedure used, Sagar *et al.* [18] reported significantly lower median subscales scores and median global Pelvic Floor Distress Inventory Score 6 months after laparoscopic sacrocolporectopexy compared with preoperative scores. Robert-Yap *et al.* [19] found that on the basis of their continence diaries, nine of 11 patients treated for fecal incontinence by sacral nerve modulation, following transabdominal or transanal repair of RP, reported an improvement in their fecal incontinence and after a median follow-up time of 36 months, fecal incontinence scores decreased from a median of 15 preoperatively to a median of 5, with a significant improvement in all four domains of the QOL questionnaire. Wnęk *et al.* [20] reported that the following RP, if untreated, is a pathology that markedly alters patients' QOL for the worse; an individual, standardized surgical approach to each patient is necessary and transabdominal methods have a low risk of complications and improve QOL of young patients, enabling a relatively quick return to normal life.

Throughout a mean duration of follow-up of 25.6 months, one patient still had gas incontinence, two patients had mucus incontinence, and a fourth patient had mucus and liquid stool incontinence, a partial continence improvement rate of 17.4%. One patient developed recurrence of gas incontinence 6 months after the disappearance of his incontinence, a recurrence rate of 4.3%; however, all five patients had graded their incontinence as one, indicating its

infrequent occurrence of 1–3 times/month. Eighteen patients recovered completely from incontinence, yielding a success rate of 78.3%.

The reported improvement rates are in agreement with previous studies that evaluated the outcome of Delorme's procedure, wherein Mahmoud *et al.* [16] reported that of 11 patients who were incontinent preoperatively and underwent Delorme's procedure, seven patients became fully continent (63.6%), two patients (18.2%) showed partial improvement, and two patients (18.2%) showed no response. Lee *et al.* [21] studied 19 patients who had undergone Delorme's procedure for complete RP correction and found that three patients (15.8%) reported RP recurrence and functional outcome evaluated in 16 indicated that five (31.3%) of these 16 patients reported improved continence, seven patients (43.7%) recovered completely from incontinence, and in four patients, incontinence remained unchanged. Fazeli *et al.* [22] reported that fecal incontinence improved in 92.3% and recurrence was observed in 9.75% of patients who had undergone Delorme's procedure.

The results obtained and review of the literature led to the conclusion that the Delorme procedure for the management of complete RP is a safe and effective therapeutic modality with a high complete recovery rate and ability to alleviate the adverse impact of fecal incontinence even in those with partial improvement. The reported advantages and outcome of the Delorme procedure in children and adulthood could enable discarding old concepts for restricted indications for the procedure in old and/or unfit patients and could make it suitable for all cases with RP without limits on age or general condition.

Acknowledgements

Conflicts of interest

None declared.

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