A comparison of perineal stapled prolapse resection and the Altemeier procedure at 2 Canadian academic hospitals

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Background: The preferred perineal repair method for full-thickness rectal prolapse is the Altemeier procedure, a perineal proctosigmoidectomy with hand-sewn anastomosis. A recently described variant of this procedure combines the resection and anastomosis into 1 step by means of linear and transverse stapling. There are few published data comparing the characteristics and outcomes of these 2 approaches.

Methods: This retrospective review, performed at 2 Canadian academic hospitals, compares surgical and cost outcomes between the perineal stapled prolapse resection (PSPR) and the Altemeier procedure. All patients who underwent these procedures between 2015 and 2019 were included.

Results: There were 25 patients in the PSPR group and 19 in the Altemeier group. Patients in the PSPR group were significantly older than those in the Altemeier group (81 [95% confidence interval (CI) 70–92] yr v. 74 [95% CI 63–85] yr; $p = 0.047$), had a lower body mass index (21.4 [95% CI 17.7–25.1] v. 24.4 [95% CI 18.5–30.3]; $p = 0.042$) and had equivalent American Society of Anesthesiologists scores (2.84 [95% CI 2.09–3.59] v. 2.68 [95% CI 1.93–3.43]; $p = 0.49$). The operative time for PSPR was significantly less (30.3 [95% CI 16.3–44.3] min v. 67 [95% CI 43–91] min; $p < 0.001$), as were the operative costs. Recurrence (28.0% v. 36.8%; $p = 0.53$) and complication rates were equivalent.

Conclusion: PSPR is a safe, efficient and effective approach to perineal proctosigmoidectomy. It is associated with surgical outcomes comparable to those of the Altemeier procedure, but with a significant reduction in operative time and cost.

Contexte : La technique de réparation périnéale privilégiée pour le prolapsus rectal de pleine épaisseur est la technique d'Altemeier, une proctosigmoïdectomie périnéale avec anastomose manuelle. Une variante de cette intervention décrite récemment allie la résection et l'anastomose en 1 seule étape, par agrafage linéaire et transverse. Peu de données ont été publiées pour comparer les caractéristiques et les résultats de ces 2 approches.

Méthodes : La présente revue rétrospective, effectuée dans 2 centres hospitaliers universitaires canadiens, compare les résultats chirurgicaux et les coûts de la résection du prolapsus par agrafage péritonéal (RPAP) et par technique d'Altemeier. Tous les patients ayant subi ces 2 types d'interventions entre 2015 et 2019 ont été inclus.

Résultats : On comptait 25 patients dans le groupe soumis à la RPAP et 19 dans le groupe soumis à la technique d'Altemeier. Les patients du groupe RPAP étaient significativement plus âgés que ceux du groupe Altemeier (81 [intervalle de confiance (IC) de 95 % 70–92] ans c. 74 [IC de 95 % 63–85] ans; $p = 0{,}047$), avaient un indice de masse corporelle plus bas (21,4 [IC de 95 % 17,7–25,1] c. 24,4 [IC de 95 % 18,5–30,3]; $p = 0{,}042$) et un score de l'American Society of Anesthesiologists semblable (2,84 [IC de 95 % 2,09–3,59] c. 2,68 [IC de 95 % 1,93–3,43]; $p = 0{,}49$). Le temps opératoire pour la RPAP a été significativement moindre (30,3 [IC de 95 % 16,3–44,3] min c. 67 [IC de 95 % 43–91] min; $p < 0{,}001$), tout comme les coûts chirurgicaux. Les taux de récurrences et de complications ont été équivalents entre les 2 groupes (28,0 % c. 36,8 %; $p = 0{,}53$).

Conclusion : La RPAP est une approche sécuritaire, efficiente et efficace pour la proctosigmoïdectomie périnéale. Elle est associée à des résultats chirurgicaux comparables à ceux de la technique d'Altemeier, mais abrège significativement le temps opératoire et réduit les coûts.

Full-thickness rectal prolapse is a common benign anorectal condition that can have a devastating lifestyle impact. The first surgical approach to treating this condition, described in the 19th century, was perineal proctosigmoidectomy with hand-sewn anastomosis.[1] Transabdominal approaches were later developed, offering improved durability of repair, but they were associated with greater physiologic demand on the patient. Because the condition commonly presents in elderly patients with comorbidities, the perineal proctosigmoidectomy (Altemeier procedure) was preserved and refined as an effective treatment that avoids the potentially unnecessary physiologic strain of a transabdominal approach. With a focus on further limiting operative time in this high-risk population, in 2008 Scherer and colleagues described a novel alternative to the traditional Altemeier procedure, the perineal stapled prolapse resection (PSPR).[2]

There is little literature published to date on this topic. Before 2017, 7 observational studies were published with a total of 197 patients included.[3–9] Each of these investigations found that the operative time of PSPR was significantly less than that of the hand-sewn Altemeier procedure, while the rates of recurrence, complication and patient satisfaction were comparable.

In 2017, a systematic review by Emile and colleagues compared the 3 most common perineal prolapse repairs (Altemeier, Delorme, PSPR).[10] While only 187 of the 2647 patients being treated for rectal prolapse received a PSPR, the review supported the previous studies' findings that operative time was significantly shorter for PSPR than for the Altemeier procedure (41 v. 96 min) and that recurrence rates (13.9% v. 11.4%), complication rates (11.1% v. 11.7%) and functional outcomes were each comparable. Most recently, Ram and colleagues published a long-term follow-up study in 2018, reviewing 30 patients who received PSPR at a median of 61 months, with a recurrence rate of 20%.[11]

To our knowledge, we offer the first head-to-head outcomes comparison of the Altemeier and PSPR procedures at 2 Canadian tertiary care teaching hospitals. We also recognize that cost outcomes are important in management planning, and so we have performed an up-to-date cost analysis to further inform the discussion.

Methods

This was a retrospective review of every patient with an external rectal prolapse who underwent an Altemeier or PSPR procedure performed by a colorectal fellowship-trained surgeon at St. Paul's Hospital in Vancouver, British Columbia, or Royal University Hospital in Saskatoon, Saskatchewan, during a 5-year period (January 2015 to December 2019). The operating surgeon decided which procedure to perform. In general, PSPR was selected for frail patients with comorbidities who had prolapse of 8–10 cm and for whom the surgeon was confident that the physical examination excluded enterocele. In our experience, external prolapse of greater than 10 cm requires multiple linear stapler firings and is less suitable for PSPR. Follow-up was scheduled with the operating surgeon in clinic for all patients, and the results were retrospectively reviewed. There were no specific exclusion criteria. The primary outcome investigated was operative time. Secondary outcomes included postoperative length of stay, complications and recurrence, defined as renewed circumferential, full-thickness rectal prolapse.

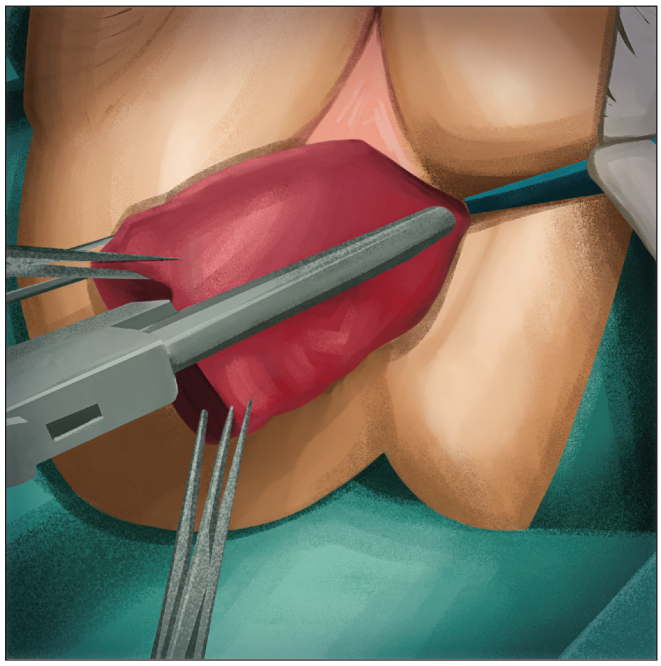

Fig. 1. The prolapsed rectum is divided with a linear cutting stapler at the left lateral and right lateral positions. Image by Nexus Illustration.

The technique employed for PSPR included GIA linear cutting staplers (Medtronic) and 2 firings of the Contour curved cutter stapler (Ethicon). First, the rectum is prolapsed to its maximal extent. GIA staplers are then used to divide the prolapsed segment at the left and right lateral positions, from the apex of the prolapse to a point 1–2 cm proximal to the dentate line (Figure 1). This divides the prolapse into anterior and posterior leaflets (Figure 2). The Contour stapler is then used to simultaneously anastomose and resect the specimen by firing it across the leaflets, again 1–2 cm above the dentate line (Figure 3). Oversewing of the staple lines can be performed at the surgeon's discretion. This is similar to previously described techniques.[2,11] Some authors have described using magnetic resonance defecography to exclude enterocele before surgery, but we have found that careful bimanual examination is sufficient to exclude trapped viscera in the cul-de-sac. We were not able to identify any reported cases of enteric fistula resulting from PSPR.

All statistical analyses were performed with the χ^2 test or 2-tailed Student *t* test, with a 95% confidence interval (CI). We considered *p* values of less than 0.05 to be significant. Owing to the retrospective nature of this study, a power calculation was not performed.

Results

A total of 44 participants were included in the study. Nineteen participants received an Altemeier procedure, while 25 underwent PSPR (Table 1). Patients receiving PSPR were older (81 [95% CI 70–92] yr v. 74 [95% CI 63–85] yr; p = 0.047), with a lower body mass index (21.4 [95% CI 17.7–25.1] v. 24.4 [95% CI 18.5–30.3]; p = 0.042). There was no difference in sex, American Society of Anesthesiologists score (2.84 [95% CI 2.09–3.59] v. 2.68 [95% CI 1.93–3.43]; p = 0.49), previous perineal proctosigmoidectomy or case urgency (emergent v. elective).

As seen in Table 2, operative time was significantly shorter in the PSPR group (30.3 [95% CI 16.3–44.3] min v. 67 [95% CI 43–91] min; p < 0.001). The length of the prolapse was not significantly different between the PSPR and Altemeier groups (8.9 [95% CI 2.8–15] cm v. 9.5 [95% CI 5–14] cm; p = 0.68).

The average number of stapler firings in the PSPR group was 5, comparable to the results of previously published studies.[7] This included 1 GIA linear cutting stapler (US$150) with 2 reloads (US$60/reload), and 1 Contour curved cutter green stapler (US$385) with 1 reload (US$60/reload). These cost quotations are based on contract pricing at the Royal University Hospital's operating room stores at the time of submission for publication. Prices are reported in US dollars to enable direct comparison with published operating room per minute costs. The resulting average stapler cost for a PSPR was US$715.

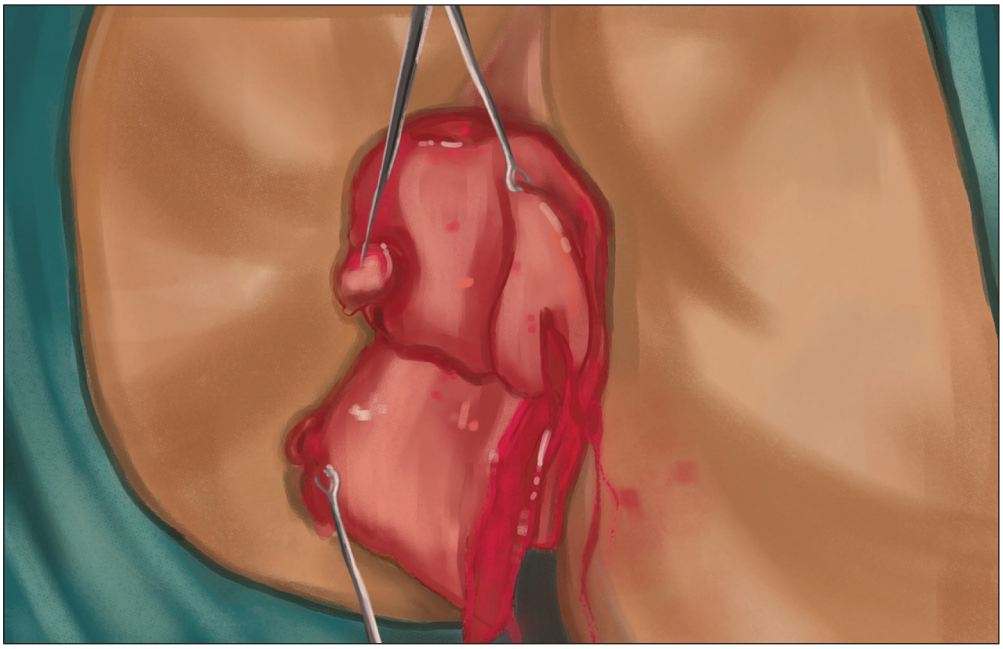

Fig. 2. The stapled rectum is split into anterior and posterior leaflets. This figure shows the appearance after the linear cutting stapler has been fired down one side. A second stapler firing is then performed on the other side to create the anterior and posterior leaflets. Image by Nexus Illustration.

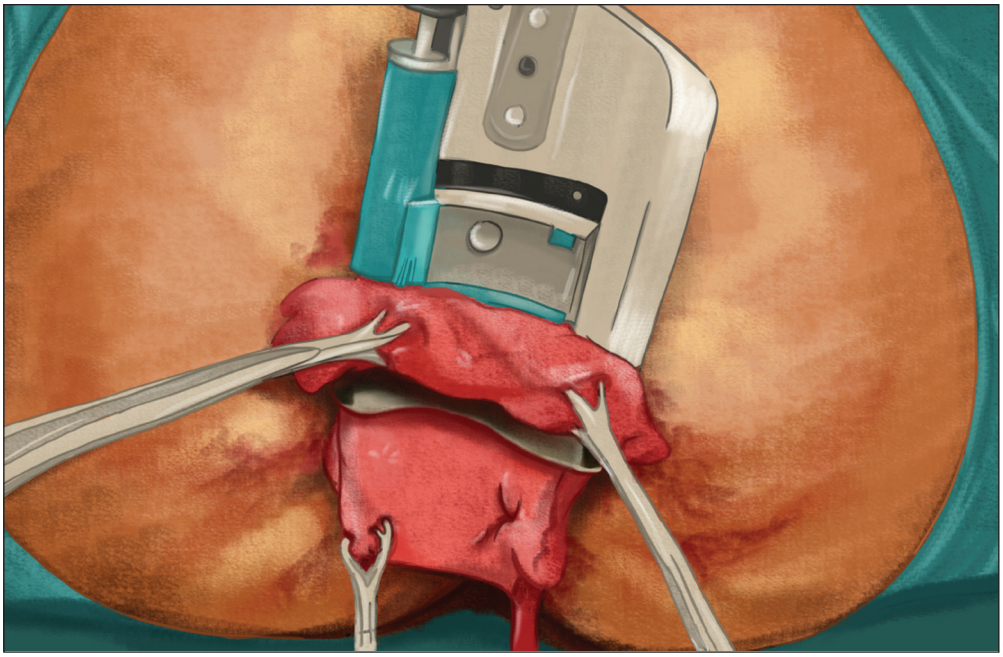

Fig. 3. A Contour stapler then divides the individual leaflets, simultaneously anastomosing and resecting the prolapsed segment. In this figure, the posterior leaflet is being deflected downward and the anterior leaflet is being positioned in the Contour stapler. The placement of stay sutures distal to the linear staple lines on the left and right may be considered before leaflet division to help prevent retraction and improve visualization of the staple line for oversewing. Image by Nexus Illustration.

Table 1. Characteristics of patients who undewent perineal stapled prolapse resection and the Altemeier procedure

Variable	Group; no. (%) of patients* PSPR *n* = 25	Altemeier *n* = 19	*p* value
Age, yr, mean ± SD	81 ± 11	74 ± 11	0.047
Sex			0.72
Male	3 (21.0)	3 (15.8)	
Female	22 (88.0)	16 (84.2)	
Body mass index, mean ± SD	21.4 ± 3.7	24.4 ± 5.9	0.042
ASA score, mean ± SD	2.84 ± 0.75	2.68 ± 0.75	0.49
Previous Altemeier procedure	3 (12.0)	7 (36.8)	0.05
Emergency case	1 (4.0)	2 (10.5)	0.39

ASA = American Society of Anesthesiologists; PSPR = perineal stapled prolapse resection; SD = standard deviation.
*Unless indicated othewise.

Table 2. Operative characteristics of patients who underwent perineal stapled prolapse resection or the Altemeier procedure

Variable	Group; mean ± SD PSPR *n* = 25	Altemeier *n* = 19	*p* value
Total operating room time, min	75 ± 24	114 ± 29	< 0.001
Total operative time, min	30 ± 14	67 ± 24	< 0.001
Length of prolapse, cm	8.9 ± 6.1	9.5 ± 4.5	0.68

PSPR = perineal stapled prolapse resection; SD = standard deviation.

Table 3. Postoperative characteristics of patients who underwent perineal stapled prolapse resection and the Altemeier procedure

Variable	Group; no. (%) of patients* PSPR *n* = 25	Altemeier *n* = 19	*p* value
Length of stay, d, median	2	2	0.32
Complications	5 (20.0)	3 (15.8)	0.72
Bleeding	2 (8.0)	1 (5.3)	
Urinary retention	3 (12.0)	–	
Urinary tract infection	–	1 (5.3)	
Anastomotic leak	–	1 (5.3)	
Recurrence	7 (28.0)	7 (36.8)	0.53
Constipation	–	–	–
Follow-up, mo, mean ± SD	5.3 ± 4	6 ± 5.8	0.65

PSPR = perineal stapled prolapse resection; SD = standard deviation.
*Unless indicated otherwise.

All postoperative characteristics were equivalent between the PSPR and Altemeier groups, including length of stay, complications (bleeding, urinary retention, urinary tract infection, anastomotic leak) and postoperative constipation or stricture, assessed by subjective history and physical examination (Table 3). Likewise, there was no difference between the PSPR and Altemeier groups with respect to prolapse recurrence (28.0% v. 36.8%; $p = 0.53$). In the Altemeier group, 3 patients experienced recurrence within 3 months, 1 patient between 4 and 9 months and 3 patients after more than 1 year. Within the PSPR group, 1 patient experienced recurrence within 3 months, 5 patients between 3 and 9 months and 1 patient after more than 1 year. Mean follow-up time was 5.3 (95% CI 1.3–9.3) months for the PSPR group and 6 (95% CI 0.2–11.8) months for the Altemeier group ($p = 0.65$).

Discussion

This study demonstrates that PSPR is a significantly faster approach to perineal proctosigmoidectomy. It is associated with recurrence and complication rates comparable to those of the Altemeier procedure, and it offers the potential for significant cost savings. Participants receiving PSPR were significantly older than those who received the Altemeier procedure, in keeping with the current understanding that PSPR is a good option for older patients and unwell patients who will not tolerate a longer anesthetic. However, the fact that an elderly group that underwent PSPR had outcomes similar to those of a significantly younger group undergoing the Altemeier procedure suggests that PSPR could be considered a valid option for any patient requiring a perineal approach to proctosigmoidectomy.

In our opinion, this procedure is straightforward and easy to learn. Each of the participating surgeons taught themselves how to perform it by reviewing the literature, operative descriptions and procedural videos. To our knowledge there are no published data evaluating the learning curve, but anecdotal evidence suggests that comfort with this procedure is rapidly achieved. From a theoretical perspective, it may be more difficult to perform reoperation after PSPR because of the staple lines that may interfere with dissection. However, as we have yet to re-operate on any patient after PSPR, we cannot offer any real qualitative assessment. In our data, fewer patients undergoing PSPR had a prior prolapse procedure (12.0%) than those undergoing a conventional Altemeier procedure (36.8%). This probably reflects greater surgeon comfort with repeat Altemeier procedures in the context of prior prolapse surgery, because they provide the ability to directly visualize and exclude viscera and the vagina from the anastomosis.

On the basis of the results of a study by Childers and Maggard-Gibbons detailing average operating rooms costs in 2018, it is difficult to precisely delineate an average per minute operating room (OR) cost because of multiple variables, including type, duration and timing of procedure.[12] Although the average cost can easily surpass US$100 per minute, a very conservative estimate of US$37 per minute applies to most situations and is comparable to the values in similar publications (range US$22–US$133/min).[13,14] With the Altemeier procedure requiring an average of

37 minutes more OR time than PSPR, the average OR cost for an Altemeier procedure, not including stapler costs, is $US1369 more than that of a PSPR. When we factor in stapler costs and consider the conservative nature of the OR cost estimate, the PSPR offers a minimum cost savings of US$654.

Limitations

This study has several limitations. The retrospective nature of this analysis, combined with the non-randomized, small sample size (although relative to previously published studies, this is a large case series), allows for potential selection bias and type II error. We attempted to limit this effect by including every patient operated on during the study period. Furthermore, it is not possible to provide a detailed functional outcome analysis, which is important to consider when making treatment decisions. Also, the fact that the follow-up period was relatively short, and the results were recorded by the operating surgeon, allows for reporting bias, but this may be mitigated by the finding that recurrence rates in both groups were slightly higher than in previously published studies.[15] These rates may be explained by technical operative considerations, or by the lack of a unified definition of recurrence. Finally, any cost analysis is region and context specific, with a high degree of variability. Operating room economics are complex, and depending on the time and day of the procedure, contract pricing, support staff salary, and other factors, a theoretical cost benefit may not necessarily translate into tangible savings. We intentionally used conservative estimates to limit this effect.

Conclusion

The limited data to date argue that PSPR is a safe, efficient and effective approach to perineal resection for any patient who requires this approach. Considering the limitations noted above, the results of this case series support this conclusion and bolster its external validity by adding additional congruent results from a multicentre context and contributing the results of a cost analysis that also support PSPR. Further randomized studies are needed to confirm these conclusions.

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Competing interests: C. Brown has received speaker fees from Ethicon and Amgen, unrelated to the current study. N. Ginther is a member of the Video-based Education Committee of the American Society of Colon and Rectal Surgeons and Saskatchewan governor of the American College of Surgeons.

Contributors: H. Roy, A. Karimuddin, D. Gill conceived the study. Z. Baig acquired the data, which M. Raval, C. Brown, T. Phang and N. Ginther analyzed. H. Roy and Z. Baig wrote the article, which Z. Baig, A. Karimuddin, M. Raval, C. Brown, T. Phang, D. Gill and N. Ginther critically revised. All authors agreed to be accountable for all aspects of the work.

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