Outcome of Fecal Incontinence in Patients with Rectal Prolapse Undergoing the Altemeier Procedure with or without Posterior Levatorplasty

Desfecho de incontinência fecal em pacientes com prolapso retal submetidos ao procedimento de Altermeier com ou sem levatorplastia posterior

Alimohammad Bananzadeh[1] Hamed Shariat Razavi[1] Shahin Khodaei[1] Maytham Hameed Al-Qanbar[2] Seyed Mohammad Kazem Tadayon[1] Seyed Vahid Hosseini[1] Leila Ghahramani[1]

[1] Colorectal Research Center, Shiraz University of Medical Sciences, Shiraz, Iran
[2] University of Kufa, College of Medicine, Kufa, Iraq

Address for correspondence Leila Ghahramani, Associate Professor of colorectal surgery, Coloretcal Research Center, Shiraz University of Medical Sciences, Shiraz, Iran (e-mail: leila_ghahramani@yahoo.com).

J Coloproctol 2021;41(1):52–57.

Abstract

Objective To compare the fecal incontinence status of patients submitted to theAltemeier procedure with or without posterior levatorplasty.

Materials and Methods Medical records of the patients who underwent the Altemeier procedure at Shahid Faghihi Hospital (in Shiraz, Iran) from 2014 to 2018 were retrospectively studied. Patients older than 17 years of age who underwent the Altemeier procedure due to complete rectal prolapse were considered. In some cases, the operation was performed with posterior levatorplasty. Rectal prolapse due to collagen or connective tissue disorders, anal/sacral anomalies, immunodeficiency, history of rectal surgery, and pelvic radiotherapy were the exclusion criteria of the present study. In addition to the demographics (including age, gender, and body mass index), the fecal incontinence status of each case was determined through the Wexner scale preoperatively and 12 months after the surgery. The incontinence scores were then compared against the baseline values of the two groups of patients: those with and those without posterior levatorplasty. The statistical analysis was performed using the Statistical Package for the Social Sciences (SPSS, IBM Corp., Armonk, NY, US), software, version 21.

Results In total, 53 patients (17 men and 36 women) with a mean age of 55.23 ± 18.24 years were analyzed. The comparison of the pre- and postoperative scores on the Wexner scale between the two groups revealed no statistically significant difference ($p > 0.05$).

Keywords
- rectal prolapse
- posterior levatorplasty
- fecal incontinence

received
July 22, 2020
accepted
August 23, 2020

DOI https://doi.org/10.1055/s-0041-1724063.
ISSN 2237-9363.

© 2021. Sociedade Brasileira de Coloproctologia. All rights reserved.
This is an open access article published by Thieme under the terms of the Creative Commons Attribution-NonDerivative-NonCommercial-License, permitting copying and reproduction so long as the original work is given appropriate credit. Contents may not be used for commercial purposes, or adapted, remixed, transformed or built upon. (https://creativecommons.org/licenses/by-nc-nd/4.0/)

Thieme Revinter Publicações Ltda., Rua do Matoso 170, Rio de Janeiro, RJ, CEP 20270-135, Brazil

Conclusion Posterior levatorplasty during the Altemeier procedure did not result in significant improvement of the fecal incontinence outcome of the patients.

Resumo

Objetivo Comparar o *status* de incontinência fecal de pacientes após o procedimento de Altemeier com e sem levatorplastia posterior.

Materiais e métodos Os prontuários médicos dos pacientes submetidos ao procedimento de Altemeier no Shahid Faghihi Hospital (em Shiraz, Irã) entre 2014 e 2018 foram avaliados retrospectivamente. Pacientes com idade superior a 17 anos submetidos ao procedimento de Altemeier devido a prolapso retal completo foram considerados. Em alguns casos, a operação foi realizada com levatorplastia posterior. Prolapso retal devido a distúrbios de colágeno ou do tecido conjuntivo, anomalias anais/sacrais, imunodeficiência, histórico de cirurgia retal, e radioterapia pélvica foram os critérios de exclusão deste estudo. Além dos dados demográficos (incluindo idade, sexo, e índice de massa corporal), o *status* da incontinência fecal de cada caso foi determinado por meio da escala de Wexner antes e doze meses após a cirurgia. Então, as pontuações de incontinência foram comparadas aos valores de referência dos dois grupos de pacientes: com e sem levatorplastia posterior. A análise estatística foi feita usando-se o programa Statistical Package for the Social Sciences (SPSS, IBM Corp., Armonk, NY, EUA), versão 21.

Resultados No total, 53 pacientes (17 homens e 36 mulheres) com idade média de 55.23 ± 18.24 anos foram avaliados. A comparação entre os grupos das pontuações na escala de Werner no pré e pós-operatório não revelou diferença estatisticamente significativa ($p > 0.05$).

Conclusão Levatorplastia superior durante o procedimento de Altemeier não resultou em melhora significativa do desfecho da incontinência fecal dos pacientes.

Palavras-chave
- prolapso retal
- levatorplastia posterior
- incontinência fecal

Introduction

Rectal prolapse refers to the protrusion of the entire rectal wall through the anus. The different types of this condition include internal, external, full thickness, and mucosal prolapse, which affects women significantly more than men.[1] The exact etiology is not completely understood; nevertheless, conditions that increase the intra-abdominal pressure, such as obesity, pregnancy and constipation, are proposed as risk factors.[1] The main symptoms include pain, hemorrhage, mucus discharge, and defecatory problems such as incontinence, tenesmus, and sensation of incomplete evacuation.[1] However, a small number of patients may be asymptomatic, and others may use home treatments to reduce their symptoms, resulting in chronic protrusion of the rectum.[2] Therefore, it is necessary to properly diagnose and manage cases of rectal prolapse, with the surgical treatment being required in most adult cases.[3]

Several surgical approaches are suggested for the management of rectal prolapse, such as stapled transanal rectal resection (STARR), the Wells, Thiersch, or Altemeier approaches, or a combination of these approaches.[4] Different rates of recurrence and postoperative complications have been reported for each approach.[5] Functional problems following the correction of rectal prolapse are among the most important complications, as they can significantly disturb the patients.[6] Fecal incontinence is an important functional problem specific adult resolution the prolapse part with calve effect. Accordingly, it is suggested that surgeons choose the most appropriate surgical approach based on the postoperative complication rates, including fecal incontinence.[6,7]

The Altemeier procedure is considered an appropriate surgical approach for patients with rectal prolapse at all ages, for it presents minimal mortality and postoperative complications;[7] it is suggesred that posterior levatorplasty be performed simultaneously with this procedure to reduce the recurrence rate and to improve the postoperative continence status.[8,9] Some surgeons believe that correction of the rectal prolapse (through the transanal or abdominal approaches) the stretch effect of rectum on sphincters elemenate of anal. Therefore, the sphincter muscle can be contracted appropriately and the its function can improve over time.[10] However, there are few reports[11–15] available about the effect of the Altemeier procedure on the continence status of the patients. There is controversy involving adult fecal incontinence after the Altemeier procedure. In the present study, we aimed to compare the fecal incontinence status of patients after the Altemeier procedure with or without posterior levatorplasty.

Materials and Methods

Study Design

The medical records of the patients who underwent the Altemeier procedure at Shahid Faghihi Hospital (in Shiraz, Iran) between 2014 and 2018 were reviewed. All of the

 © 2021. Sociedade Brasileira de Coloproctologia. All rights reserved.

patients had been operated by colorectal surgeons. We analyzed the patients' history, the records of physical exams, operation notes, preoperative investigations, and postoperative complications, such as incontinence. Were evaluated and in tired in data collecting forms. The inclusion criteria consisted of patients aged more than 17 years who were diagnosed with rectal prolapse and underwent the Altemeier procedure. The exclusion criteria were: rectal prolapse with collagen or connective-tissue disorders; anal/sacral anomalies; immunodeficiency; history of previous rectal surgery; and pelvic radiotherapy. All of the patients who met the criteria were enrolled by census. After determining the study sample, the researchers contacted the patients by telephone calls, explained the study objectives, and asked for their consent to use their information while maintaining confidentiality. Then they applied the Wexner questionnaire to assess the continence status of the patients 12 months postoperatively, and recorded their Wexner scores. Prior to undertaking the questionnaire, the participants received a complete explanation about its items and how to answer it. The Wexner questionnaire was designed by Jorge and Wexner,[16] and it is a simple tool that evaluates the frequency of different types of fecal incontinence (solid, liquid, and gas) along with the need to wear pads and lifestyle alterations.[10]

The method of resection was similar in every case: first, the prolapse was pulled out and a clamp was used to grasp its apex. A circumferential incision was made 1 cm proximally to the mucocutaneous junction through all layers of the bowel wall, and clamps were reapplied to the distal edge of the rectum, which delivered the prolapse as a single loop of exteriorized bowel. By a continuous suture to obliterate the sac, the peritoneum was repaired. In the posterior levatorplasty procedure, the levator ani muscle was plicated posteriorly to the bowel with interrupted long-term absorbable sutures. At the resection point, the redundant intestine was then divided in half through anterior and posterior incisions, and the intestine was transected obliquely and progressively to complete the anastomosis of the intestinal wall to the distal rectum ring in each quadrant before suturing with interrupted long-term absorbable sutures.[10]

The following data were extracted from the medical records: the patients' demographics, such as age, gender, and body mass index (BMI); the number of normal vaginal deliveries (NVD); the chief complaints, including bleeding, incontinence (wexner score), constipation, diarrhea, protrusion and its size, pelvic pain, urinary problems, difficult defecation, sexual dysfunction, and duration of symptoms; history of diabetes mellitus, chronic obstructive pulmonary disorder (COPD), asthma, hypothyroidism, and sedentary lifestyle; and type of operation (with or without posterior levatorplasty). Then, the incontinence scores 12 months after surgery were compared against the baseline values between the two groups: with and without posterior levatorplasty. The postoperative complications, including abdominal pain, frequency of infection, bleeding, constipation, and pruritus were also recorded and compared between the groups.

The medical records contained the preoperative Wexner score, but some patients operated between 2014 and 2016 could not remember exactly the Wexner score 12 months postoperatively, so we considered this a bias.

The descriptive results were presented by frequency (percentages) for the categorical variables. The one-sample Kolmogorov–Smirnov test was used to test the normal distribution of the numerical variables, the results of which showed normal distribution. Therefore, the continuous variables were expressed as means and standard deviations (SDs) and compared between the groups using the Student *t*-test. The Wexner scores 12 months after the surgery were compared with the baseline values using repeated measures analysis of variance (ANOVA), and pairwise comparisons were performed using the dependent samples *t* test. On the other hand, the categorical variables were compared using the Chi-squared test. For the statistical analysis, the Statistical Package for the Social Sciences (SPSS, IBM Corp., Armonk, NY, US) software, version 21.0 for Windows, was used. Values of $p < 0.05$ were considered statistically significant.

Results

The total number of patients who completed the study was 53 (17 men: 32.1%; and 36 women: 67.9%). In total, 1 (1.88%) man and 13 (24.52%) women had been submitted to posterior levatorplasty. The mean age of the sample was 55.23 ± 18.24 years. The distributions of the demographic and clinical characteristics are shown in ►**Table 1**; the gender distribution of the groups was different ($p = 0.02$) between the groups, and the frequency of postoperative complications was higher in the group without posterior levatorplasty (35.7% versus 10.3%; $p = 0.03$), while the mean age of the patients, the number of NVDs and admissions, and the duration of the disease were not significantly different between the groups ($p > 0.05$).

The grade of protrusion was < 2 cm in 2 patients (3.8%), between 2 cm and 5 cm in 23 patients (43.4%), and > 5 cm in 28 (52.8%) patients. The frequency of symptoms (recorded as the patients' chief complaint) were as follows: bleeding (47.2%), fecal incontinence (52.8%), constipation (49.1%), diarrhea (20.8%), pelvic pain (34%), urinary incontinence (13.2%), urinary obstruction (5.7%), urinary incontinence + obstruction (1.9%), difficult defecation (16.6%), and sexual dysfunction (1.8%).

The mean preoperative Wexner score was of 7.11 ± 6.64; postoperatively, it was of 7.64 ± 6.81 ($p = 0.478$). The associations of pre- and postoperative Wexner score categories are shown in ►**Table 2**.

All patients underwent the Altemeier procedure (14 [26.4%] with posterior levatorplasty, and 39 [73.6%] without posterior levatorplasty). The comparison of Wexner scores between the groups is shown in ►**Table 3**. As indicated, neither the mean preoperative nor the postoperative Wexner scores differed significantly between the groups with and without posterior levatorplasty ($p = 0.911$ and 0.965 respectively). The difference in the Wexner score was calculated for each patient by subtracting the postoperative and preoperative values, and the results showed no significant difference between the groups ($p = 0.846$); this difference

 © 2021. Sociedade Brasileira de Coloproctologia. All rights reserved.

Table 1 Demographic and clinical characteristics of the study population and comparison between the study groups

Variable	Category	Total	With posterior levatorplasty	Without posterior levatorplasty	*p*-value
Age (years; mean ± standard deviation)		55.23 ± 18.24	58.57 ± 13.40	54.03 ± 19.70	0.429*
Gender: n (%)	Female	36 (67.9%)	13 (92.9%)	23 (59%)	0.020†
	Male	17 (32.1%)	1 (7.1%)	16 (41%)	
Normal vaginal delivery (mean ± standard deviation)		4.36 ± 4.35	6.46 ± 3.52	6.13 ± 4.26	0.101*
Postoperative complications: n (%)		9 (17%)	4 (10.3%)	5 (35.7%)	0.030†
Number of admissions (mean ± standard deviation)		5.72 ± 2.12	5.67 ± 2.20	5.86 ± 1.95	0.668*
Disease duration: n (%)	< 1 years	15 (28.3%)	3.25 ± 2.50	8.18 ± 7.16	0.679‡
	1-3 years	11 (20.8%)	11.25 ± 7.08	9.71 ± 6.77	
	> 3 years	27 (50.9%)	8.00 ± 7.04	6.71 ± 7.16	

Notes: *Independent *t*-test
†Chi-squared test
‡one-way analysis of variance (ANOVA).

Table 2 Association of categories of pre-operative Wexner scores with postoperative Wexner scores.

Variable	Category	≤10	>10	Total
Pre-operative Wexner score	≤ 10	36 (85.7%)	5 (5.3%)	35 (100%)
Post-operative Wexner score	≤ 10	5 (27.8%)	13 (72.2%)	18 (100%)
	Total	35 (66.0%)	18 (34.0%)	p-value* = 0.478

Note: *McNemar test.

Table 3 The difference in the Wexner scores based on the study groups

	With posterior levatorplasty	Without posterior levatorplasty	*p*-value*
Preoperative Wexner score (mean ± standard deviation)	7.05 ± 6.97	7.29 ± 5.85	0.911
Postoperative Wexner scores (mean ± standard deviation)	7.67 ± 7.00	7.57 ± 6.48	0.965
Difference in Wexner score (mean ± standard deviation)	0.61 ± 5.72	-0.28 ± 4.48	0.846

Note: *Independent *t*-test.

was also insignificant among the patients with different disease duration ($p = 0.09$; data not shown). There was no difference in postoperative hospitalization between the two groups ($p = 0.777$).

In ►**Table 4**, the mean pre- and postoperative Wexner scores and their differences are compared and categorized according to the duration of the disease.

Discussion

In the present study, the status of fecal incontinence following the Altemeier procedure with or without posterior levatorplasty was studied according to the Wexner score. The results showed that the mean Wexner score did not change considerably in either group. Additionally, the comparison of the results between the two groups showed no statistically significant difference.

The first important finding of the present study was the high prevalence of fecal incontinence before the surgery, indicated by a rate of ~ 53% of fecal incontinence as one of the patients' chief complaints and by the finding that 51% of the preoperative Wexner scores were ≥ 7. Previous studies[1,11,12] have highlighted fecal incontinence as the most common symptom in patients suffering from rectal prolapse. Several surgical procedures have been suggested for the correction of rectal prolapse and perineal resection of the sigmoid colon and rectum. The Altemeier procedure is considered an appropriate surgical procedure with favorable outcomes; however, different postoperative complications and recurrence rates have been reported for this procedure in the presence or absence of levatorplasty.[13,14]

In the present study, we compared the pre- and postoperative scores of patients using the Wexner scale, and the results showed that the score did not change in 50% of the cases. The mean preoperative score was similar between the groups,

 © 2021. Sociedade Brasileira de Coloproctologia. All rights reserved.

Table 4 Difference in Wexner scores between the groups according to disease duration and history of pelvic surgery

		Preoperative Wexner score (mean ± standard deviation)		Postoperative Wexner score (mean ± standard deviation)		Difference in Wexner score (mean ± standard deviation)	
		With posterior levatorplasty	Without posterior levatorplasty	With posterior levatorplasty	Without posterior levatorplasty	With posterior l evatorplasty	Without posterior levatorplasty
Disease duration	< 1 year	5.75 ± 4.64	10.00 ± 5.58	3.25 ± 2.50	8.18 ± 7.16	2.50 ± 2.38	1.81 ± 5.96
	1-3 years	7.00 ± 6.58	8.86 ± 7.01	11.25 ± 7.08	9.71 ± 6.77	-4.25 ± 5.85	-0.85 ± 3.13
	> 3 years	8.50 ± 6.80	4.90 ± 7.16	8.00 ± 7.04	6.71 ± 7.16	0.50 ± 2.95	-1.81 ± 6.06
	Total	7.29 ± 5.85	7.05 ± 6.97	7.57 ± 6.49	7.67 ± 7.01	-0.28 ± 4.48	-0.61 ± 5.72
p-value*		0.791	0.108	0.225	0.605	0.076	0.238
Previous pelvic surgery	Yes	7.56 ± 5.98	7.11 ± 7.02	9.11 ± 6.95	7.47 ± 7.11	1.55 ± 4.85	0.36 ± 5.64
	No	6.80 ± 6.26	6.33 ± 7.77	4.80 ± 5.02	10.00 ± 6.24	-2.00 ± 2.83	3.67 ± 7.02
p-value†		0.827	0.856	0.249	0.555	0.163	0.343

Note: *Independent *t*-test; †one-way analysis of variance (ANOVA).

which indicated that they were comparable; however, the results of the statistical analyses showed that neither the difference in the pre-and postoperative scores nor the absolute postoperative scores were significantly different between the two groups. Our results indicated that Altemeier procedure, with or without posterior levatorplasty, could not improve the patients' fecal incontinence.

In the study by Trompetto et al.[15] (2019), 43 female patients with rectal prolapse underwent the Altemeier procedure (half of them with levatorplasty), and the patients' fecal incontinence rates were evaluated by the Vaizey score. The results showed that the fecal incontinence improved in 11 patients, worsened in 10, and remained unchanged in 13; there was no significant change in the Vaizey score for any of the patients, and levatorplasty had no significant effect on the Vaizey score. Even though Trompetto et al.[15] used a different score, their results are consistent with those of the present study. Contrary to these findings, some researchers[17,18] have reported improved fecal incontinence after the Altemeier procedure. In the study by Cirosso[17] on 103 patients undergoing the Altemeier procedure, approximately half of the patients had preoperative fecal incontinence, which improved in 85% of the cases. Senapti et al.[18] also reported that fecal incontinence improved in patients after they were submitted to the Altemeier procedure. Elagili et al.[19] investigated the postoperative complication rates of 75 patients undergoing the Altemeier procedure for rectal prolapse, and they reported that there was no significant difference in the fecal incontinence status (according to the Fecal Incontinence Quality of Life Scale) among the patients of the groups undergoing the different procedures, with neither procedure leading to a significant improvement in this parameter. Although the assessment tool in that study differed from the one used in the present study, the results did not differ much, as both studies indicated that the Altemeier procedure could not improve fecal incontinence in patients with rectal prolapse. In the present study, the mean Wexner score increased after surgery (similar to the results reported by Elagili et al.[19]), but we did not find any statistically significant change in the fecal incontinence scores in either of the study groups.

The results obtained in the present study are in line with the results of other studies, indicating impaired rectal function after the Altemeier procedure,[20] which can be justified by the fact that this procedure uses a perineal approach and thus reduces the capacity of the rectum as well as the compliance of the rectal wall;[21] therefore, fecal incontinence is expected to increase after this type of surgery. As the results of the present study indicate, this complication could not be improved, even by combining the Altemeier procedure with posterior levatorplasty. Although abdominal approaches may not impair rectal function as much as perineal approaches, the higher rate of mortality, morbidity and recurrence has resulted in preference towards perineal approaches.[21,22] Hence, a search for interventions that can reduce the adverse effect of perineal approaches on rectal function and improve fecal incontinence is required.

The present study has a few limitations. Firstly, the cross-sectional nature of the study limited the suggestion of causal relationships between the variables, and we could only suggest possible associations. Secondly, the patients' enrollment in the study and in the groups was not randomized, which could increase the chance of bias in the results, although the patients' baseline scores were not significantly different between the groups. In addition, there are no obvious relationships involving the time of the surgery, the size of the prolapse, and the pre- and postoperative continence status.

Conclusion

In conclusion, the results of the present study show that more than half of the patients with rectal prolapse had fecal incontinence before the surgery, which did not significantly improve after the Altemeier procedure. The combination of this procedure with posterior levatorplasty was also unable to improve this symptom. Further studies are required to search for interventions that can reduce the rate of this

 © 2021. Sociedade Brasileira de Coloproctologia. All rights reserved.

important complication following this popular procedure. However, early surgical management seems to be one factor that improves the continent status.

Funding/Support
The present study was funded by the Shiraz University of Medical Sciences. The study was presented at the ESCP 2019 Congress (Vienna, Austria) as a poster abstract. However, the final result and list of authors were partially changed following the second statistical analysis.

Conflict of Interests
The authors have no conflict of interests to declare.

Acknowledgements
The authors would like to sincerely thank Mrs. Seyedeh Fatemeh Enjavi Amiri for helping with the data collection.

References

1 Bordeianou L, Hicks CW, Kaiser AM, Alavi K, Sudan R, Wise PE. Rectal prolapse: an overview of clinical features, diagnosis, and patient-specific management strategies. J Gastrointest Surg 2014; 18(05):1059–1069. Doi: 10.1007/s11605-013-2427-7
2 Fox A, Tietze PH, Ramakrishnan K. Anorectal conditions: rectal prolapse. FP Essent 2014;419:28–34
3 Bjerke T, Mynster T. One decade of rectal prolapse surgery: a national study. Int J Colorectal Dis 2018;33(03):299–304. Doi: 10.1007/s00384-017-2944-z
4 Murphy PB, Schlachta CM, Alkhamesi NA. Surgical management for rectal prolapse: an update. Minerva Chir 2015;70(04):273–282
5 Russell MM, Read TE, Roberts PL, et al. Complications after rectal prolapse surgery: does approach matter? Dis Colon Rectum 2012; 55(04):450–458. Doi: 10.1097/DCR.0b013e31823f86b8
6 Kunitake H, Poylin V. Complications Following Anorectal Surgery. Clin Colon Rectal Surg 2016;29(01):14–21. Epub 2016/03/02. doi: 10.1055/s-0035-1568145. PubMed PMID: 26929747; PubMed Central PMCID: PMCPmc4755765
7 Ris F, Colin JF, Chilcott M, Remue C, Jamart J, Kartheuser A. Altemeier's procedure for rectal prolapse: analysis of long-term outcome in 60 patients. Colorectal Dis 2012;14(09):1106–1111
8 Atallah S, Albert M, deBeche-Adams TH, Larach S. The Altemeier procedure using biologic mesh. Tech Coloproctol 2012;16(02): 149–151
9 Giuratrabocchetta S, Giannini I, Di Lena M, Altomare DF. The Altemeier's Procedure for External Rectal Prolapse. Pelvic Floor Disorders: Surgical Approach: Springer; 2014:161–165
10 Lindsey INJ. Rectal Prolapse (Internal and External), Solitary Rectal Ulcer, Descending Perineum Syndrome, and Rectocele. 6th ed. M C, ed. Philadelphia, PA 19103: LWW; 2013:1564
11 Wijffels NA, Jones OM, Cunningham C, Bemelman WA, Lindsey I. What are the symptoms of internal rectal prolapse? Colorectal Dis 2013;15(03):368–373
12 Goldstein SD, Maxwell PJ IV. Rectal prolapse. Clin Colon Rectal Surg 2011;24(01):39–45. Epub 2012/03/02. doi: 10.1055/s-0031-1272822. PubMed PMID: 22379404; PubMed Central PMCID: PMCPmc3140332
13 Shin EJ. Surgical treatment of rectal prolapse. J Korean Soc Coloproctol 2011;27(01):5–12. Epub 2011/03/25. doi: 10.3393/jksc.2011.27.1.5. PubMed PMID: 21431090; PubMed Central PMCID: PMCPmc3053504
14 Hori T, Yasukawa D, Machimoto T, et al. Surgical options for full-thickness rectal prolapse: current status and institutional choice. Ann Gastroenterol 2018;31(02):188–197
15 Trompetto M, Tutino R, Realis Luc A, Novelli E, Gallo G, Clerico G. Altemeier's procedure for complete rectal prolapse; outcome and function in 43 consecutive female patients. BMC Surg 2019;19 (01):1
16 Jorge JMN, Wexner SD. Etiology and management of fecal incontinence. Dis Colon Rectum 1993;36(01):77–97
17 Cirocco WC. The Altemeier procedure for rectal prolapse: an operation for all ages. Dis Colon Rectum 2010;53(12):1618–1623
18 Senapati A, Gray RG, Middleton LJ, et al; PROSPER Collaborative Group. PROSPER: a randomised comparison of surgical treatments for rectal prolapse. Colorectal Dis 2013;15(07):858–868. Epub 2013/03/07. doi: 10.1111/codi.12177. PubMed PMID: 23461778
19 Elagili F, Gurland B, Liu X, Church J, Ozuner G. Comparing perineal repairs for rectal prolapse: Delorme versus Altemeier. Tech Coloproctol 2015;19(09):521–525. Doi: 10.1007/s10151-015-1337-y
20 Xynos E. Functional results after surgery for overt rectal prolaps. Acta Chir Iugosl 2012;59(02):21–24
21 Mik M, Trzcinski R, Kujawski R, Dziki L, Tchorzewski M, Dziki A. Rectal Prolapse in Women-Outcomes of Perineal and Abdominal Approaches. Indian J Surg 2015;77(03, Suppl 3):1121–1125. Epub 2016/03/25. 10.1007/s12262-014-1196-1. PubMed PMID: 27011522; PubMed Central PMCID: PMCPMC4775595
22 Emile SH, Elfeki H, Shalaby M, Sakr A, Sileri P, Wexner SD. Perineal resectional procedures for the treatment of complete rectal prolapse: A systematic review of the literature. Int J Surg 2017; 46:146–154

 © 2021. Sociedade Brasileira de Coloproctologia. All rights reserved.