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Original Research Article

Reappraising the Role of Enterocele in the Obstructed Defecation Syndrome: Is Radiological Impaired Rectal Emptying Significant in Enterocele?

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Abstract

Objectives: The role of enterocele in the obstructed defecation syndrome (ODS) has remained to be controversial, as patients with enterocele frequently exhibit multiple risk factors, including aging, parity, concomitant different abnormalities, previous histories of pelvic surgery, and incomplete emptying of the rectum. Thus, in this study, we aimed to investigate the association between enterocele and ODS using multivariate analysis.

Methods: Between June 2013 and June 2021, 336 women underwent defecography as they had symptoms of ODS. Of those, 293 women (87%) who had anatomical abnormalities were included in this study.

Results: Enterocele was detected in 104 (36%) patients. More women with enterocele had histories of hysterectomy compared to those without enterocele (29% vs. 10%, $P < 0.0001$). The frequency of radiological incomplete emptying was found to be significantly lower in women with enterocele (36%) than in those without enterocele (50%), whereas the mean (95% confidence interval) ODS scores in women with enterocele were significantly higher than those without enterocele [12.1 (11.0-13.3) versus 10.8 (10.5-11.5), $P = 0.023$]. As per the results of our multivariate analysis, it was determined that the presence of enterocele was associated with higher ODS scores ($P = 0.028$). However, the small differences in the mean score (1.3) would be clinically negligible. The specific radiological type of enterocele which compressed the rectal ampulla at the beginning of defecation was not associated with the increased ODS scores.

Conclusions: The presence of enterocele may not be a primary cause of ODS. Other anatomical abnormalities combined with enterocele, or the hernia itself, may have a role in causing ODS.

Keywords

defecography, enterocele, impaired defecation, obstructed defecation syndrome, obstructive enterocele

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Introduction

Obstructed defecation syndrome (ODS) is defined as one's inability to completely evacuate the contents from the rectum, which may be caused by anatomical or functional defects. Anatomical causes include rectocele, rectal intussusception, descending perineum syndrome, and pelvic organ prolapse. The functional defects include pelvic floor dyssynergia, inadequate defecatory propulsion, and disorders of rectal sensation[1].

Enterocele is a herniation of the peritoneal sac between the posterior vaginal wall and the anterior rectal wall with the small bowel or sigmoid colon as its contents. Enterocele occurs frequently in elderly and multiparous women, and it has a strong association with hysterectomy, which leaves the pouch of Douglas exposed. However, it remains controversial whether an enterocele is a cause of ODS or whether it is merely associated with OD[2]. In 1952, Wallden[3] sug-

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gested that mechanical compression on the anterior aspects of the rectum might cause constipation. However, Halligan et al.[4] demonstrated that most patients with enterocele evacuated more rapidly and completely and suggested that the presence of enterocele is not necessarily associated with an impaired rectal evacuation. More recently, Morandi et al.[5] proposed a new defecographic classification of enterocele based on function, whereby the so-called "obstructive enterocele" was associated with impaired defecation.

The etiology of enterocele often involves multiple factors including age, parity, previous histories of pelvic surgery, concomitant different anatomical abnormalities, and excessive pelvic floor descent[2,4,6]. However, none of these studies have evaluated whether the presence of enterocele may cause ODS using multivariate analysis. Thus, we aimed to investigate whether the presence of enterocele may cause ODS using multivariate analysis, where the severity of OD was assessed using the symptom scores. In addition, the symptom scores were compared among patients with different types of enterocele based on the new radiological classification described above[5].

Methods

Participants

Patients attending the proctology clinic with symptoms of rectal evacuatory disorder who underwent defecography as a part of the investigation protocol were screened for this study. Between June 2013 and June 2021, 802 patients underwent defecography, and data for these patients were prospectively entered into a pelvic floor database. Symptoms of ODS include incomplete evacuation, straining, digitation, sensation of incomplete evacuation, and repetitive visits to the toilet. Bowel function was evaluated using two different scores: the Constipation Scoring System (CSS)[7] and Obstructed Defecation Syndrome (ODS)[8]. The CSS score quantifies constipation on a scale of 0-30 points and the ODS score on a scale of 0-31 points, both with a higher score indicating worse constipation. The parity and the history of previous pelvic surgery were then recorded.

This study was approved by the Ethical Committee of Kameda Medical Center (approved number: 21-033). Information of this study was made public, and patients were ensured that they could withdraw consent. However, no patients or their relatives subsequently refused to participate in the study.

Defecography

A standardized defecography technique was used in this study. The small bowel was opacified with a mixture containing 100 mL barium sulfate (100% w/w) and 10 mL Urografin (60% w/w), ingested 2 h prior to the procedure. Enterocele or sigmoidocele was diagnosed when the extension of the loop of the bowel was located between the vagina and rectum. Using the criteria proposed by Morandi et al.[5], the following three types of enterocele were distinguished: type A, when the small bowel descends to the pubococcygeal line (PLC) during straining and returns to PLC at the end of the straining attempt without compressing the rectal ampulla or compressing it from above with no obstruction (Supplement file 1); type B, when the enterocele descends beyond the PCL to the perineum through the rectovaginal space to compress the rectal ampulla at the end of the evacuation process (Supplement file 2); and type C, when the enterocele descends beyond the PCL to the perineum through the rectovaginal space to compress the rectal ampulla at the beginning of the evacuation process (Figure 1).

Rectal prolapse was diagnosed when the full thickness of the rectum protruded from the anal orifice. Rectal intussusception was defined as a circumferential descent of the entire thickness of the rectal wall, which might extend into the anal canal but not through the anal verge. A rectocele greater than 2 cm in diameter was regarded as abnormal. The size was calculated anterioposteriorly in the standard fashion by measuring the distance between the most ventral part of the anterior rectal wall and an extrapolated line indicating the expected position of the rectal wall[9]. Pelvic floor descent (PFD) during defecation was estimated by the degree of the anorectal junction in relation to the inferior margin of the ischial tuberosity. A radiological incomplete emptying during defecation was then recorded. Images from defecography were analyzed by one of the authors (T. T.), who has experience in this evaluation and was blinded at that time to the symptomatology of the individual patients.

Statistics

Statistical analysis was performed using SPSS v26 (IBM Corp., Armonk, NY, USA). Continuous variables are expressed as mean (95% confidence interval [CI]). Analysis was performed using Student's *t*-test or analysis of variance model for continuous variables. Univariate associations were analyzed using Pearson's correlation analysis for continuous variables and the chi-square or Fisher's exact test for categorical variables. Stepwise multiple regression analysis was used to establish which variables best predicted the increasing symptom scores. In the regression analysis, the CSS score or the ODS score was selected as the dependent variable. Independent variables included age, parity, PFD, history of pelvic surgeries, presence of enterocele, and radiological incomplete emptying. A value of $P < 0.05$ was considered significant for all tests.

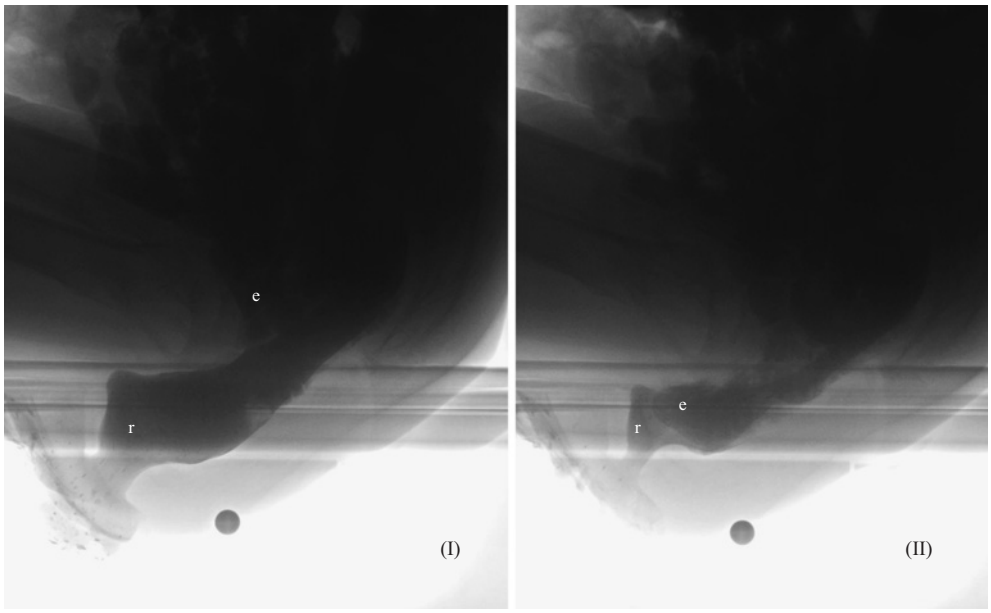

Figure 1. Type C enterocele. Enterocele compress the rectal ampulla at the beginning of voiding (II). No evidence of associated anatomical abnormalities. e, enterocele; r, rectal ampulla.

Table 1. Characteristics of Patients with Obstructed Defecation Syndrome (ODS).

	Patients with enterocele (*n*=104)	Patients without enterocele (*n*=189)	*P* value
Symptoms			
OD alone	45	101	0.10#
OD + fecal incontinence	59	88	
Age	72 (70–75)	68 (66–70)	0.03*
Parity	2.0 (1.7–2.2)	1.8 (1.6–2.0)	0.3*
Hysterectomy	30 (28.8%)	18 (9.5%)	<0.0001#
Perineal repair for POP	1 (1.0%)	6 (3.2%)	0.24#
Abdominal repair for POP	3 (2.9%)	0	0.019#
Excision of pelvic tumor	1 (1.0%)	0	0.18#
Previous surgery for ODS	7 (6.7%)	2 (1.1%)	0.011#
Perineal repair for rectocele	4 (3.8%)	0	0.015#
Abdominal rectopexy	2 (1.9%)	0	0.12#
Perineal repair for rectal prolapse	1 (1.0%)	2 (1.1%)	1.00#
CSS scores	12.3 (11.4–13.1) (*n*=93†)	11.6 (11.1–12.2) (*n*=171†)	0.20*
ODS scores	12.1 (11.0–13.2) (*n*=82†)	10.8 (10.1–11.5) (*n*=146†)	0.023*

Values are expressed as mean (95% CI) unless otherwise indicated. POP, pelvic organ prolapse; CSS, constipation scoring system; †Number of assessed women; Analyzed by *Studen's *t*-test and #chi-square test.

Results

Of the 802 patients who underwent defecography, male patients (n = 258) and female patients with fecal incontinence alone (n = 179), mucus discharge alone (n = 9), and other symptoms (n = 20) were excluded. The remaining 336 female patients had symptoms of ODS. Of those, 43 patients without evidence of anatomical abnormalities on defecography [inadequate defecatory propulsion (n = 16), dyssynergic defecation (n = 2), rectal tumor (n = 2), slow transit (n = 1), anal stenosis (n = 1), and unknown (n = 21)] were excluded. The remaining 293 female patients with ODS were included in this study.

Table 1 shows the characteristics of patients with or without enterocele. Enterocele was determined in 104 (35.5%) patients. The mean age for women with enterocele was significantly older than those without enterocele. The incidence of previous hysterectomy, sacrocolpopexy for pelvic organ prolapse, or perineal rectocele repair was significantly greater in patients with enterocele. The ODS scores in pa-

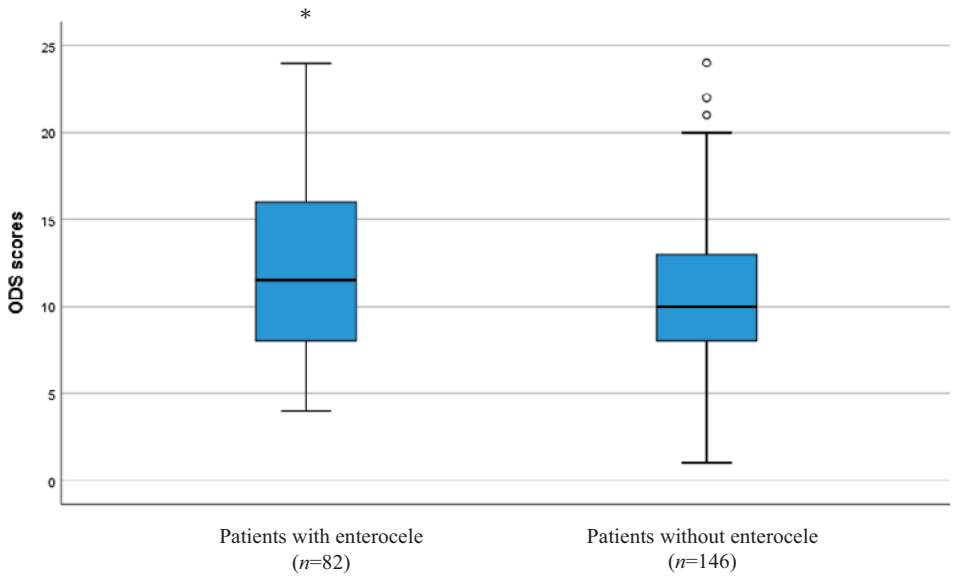

Figure 2. The Obstructed defecation syndrome (ODS) scores in patients with and without enterocele. *Boxes* show median values with upper and lower quartiles. The *vertical line* extends from the minimum to the maximum values. **P*=0.023, versus patients without enterocele (Student's *t*-test)

Table 2. Defecographic Findings in Women with or without Enterocele.

	Patients with enterocele (*n*=104)	Patients without enterocele (*n*=189)	*P* value
Enterocele	104	0	–
Rectal intussusception	35 (33.7%)	106 (56.1%)	<0.0001[#]
Rectocele	41 (39.4%)	71 (37.6%)	0.75[#]
Rectal prolapse	40 (38.5%)	34 (18.0%)	<0.0001[#]
Mean (95% CI) pelvic floor descent (mm)	26.9 (24.2–29.6)	25.7 (23.8–27.6)	0.25*
Radiological incomplete emptying	37 (35.6%)	94 (49.7%)	0.020[#]

Values in parentheses are in percentages unless otherwise indicated.
Analyzed by *Studen's *t*-test and [#]chi-square test

tients with enterocele were significantly greater than in those without enterocele (P = 0.023) (Figure 2). Anatomical abnormalities in patients without enterocele included rectal intussusception alone (n = 68), rectocele alone (n = 49), rectal intussusception plus rectocele (n = 38), rectal prolapse alone (n = 32), and rectal prolapse plus rectocele (n = 2).

Table 2 shows the defecographic findings in women with and without enterocele. The frequency of rectal intussusception was significantly higher in women without enterocele (56.1%) than in those with enterocele (33.7%). The frequency of rectal prolapse was significantly higher in women with enterocele (38.5%) than in those without enterocele (18.0%). The incidence of radiological incomplete emptying was significantly higher in women without enterocele (49.7%) than in those with enterocele.

Table 3 shows the defecographic findings additional to enterocele, according to the types of enterocele. The incidence of rectal prolapse additional to enterocele was significantly greater in type A enterocele than that in other types of enterocele [26/53 (49.1%) vs. 7/51 (13.7%), P = 0.0003].

The correlations between the CSS scores, demographic findings, and morphological parameters are shown in Table 4. None of the variables was significantly associated with the CSS scores. Table 5 shows the correlations between the ODS scores, demographic findings, and morphological parameters. The presence of enterocele was significantly associated with the increasing ODS scores (P = 0.023). The results of stepwise multiple regression analysis showed that the presence of enterocele was significantly associated with the increasing ODS scores (P = 0.028) (Table 6).

Table 7 shows the results of variables by types of enterocele. The incidence of previous surgeries for ODS in type C enterocele was significantly greater than that in other types of enterocele [5/23 (21.7%) vs. 2/81 (2.5%), P = 0.006].

Table 3. Defecographic Findings Additional to the Enterocele.

	Type A (*n*=53)	Type B (*n*=24)	Type C (*n*=23)	Sigmoidocele (*n*=4)	*P* value[#]
None	2	5	4	0	0.25
Rectal prolapse (RP)	26	3	4	0	0.007
Rectocele	5	7	5	1	0.32
Rectal intussusception (RI)	7	4	3	1	0.99
RP+rectocele	0	3	3	0	0.20
RI+rectocele	13	2	4	0	0.55
RP+enterocele+sigmoidocele	0	0	0	1	0.10
RI+enterocele+sigmoidocele	0	0	0	1	0.10

Type A, No compressing the rectal ampulla or compressing it with no obstruction; Type B, Compress the rectal ampulla at the end of defecation; Type C, Compress the rectal ampulla at the beginning of defecation.
Analyzed by [#]chi-square test.

Table 4. Pearson's Correlation Coefficients between the CSS Scores and Variables (*n*=264).

	Coefficients	*P* value
Age (years)	–0.065	0.29
Parity	–0.124	0.06
Previous pelvic surgery (no, yes)	–0.052	0.40
Enterocele (no, yes)	0.080	0.20
Pelvic floor descent (mm)	0.004	0.95
Radiological incomplete emptying (no, yes)	–0.029	0.64

Table 5. Pearson's Correlation Coefficients between the ODS Scores and Variables (*n*=224).

	Coefficients	*P* value
Age (years)	0.018	0.79
Parity	0.023	0.74
Previous pelvic surgery (no, yes)	0.046	0.49
Enterocele (no, yes)	0.151	0.023
Pelvic floor descent (mm)	0.077	0.25
Radiological incomplete emptying (no, yes)	–0.029	0.64

Five women in type C enterocele underwent either perineal rectocele repair (*n* = 2), abdominal rectopexy (*n* = 2), or perineal repair of rectal prolapse (*n* = 1), while two women in type B enterocele underwent perineal rectocele repair. The frequency of radiological incomplete emptying was significantly higher in women with type C enterocele than in women with other types of enterocele (13/23 vs. 24/81, *P* = 0.017). However, no significant differences were noted in either the CSS or ODS scores among the groups. Additionally, no significant differences in either the CSS or ODS scores were noted between patients with rectal prolapse syndrome (rectal intussusception and rectal prolapse) in addition to enterocele and those without rectal prolapse syndrome in addition to enterocele [CSS scores: 12.2 (11.2-13.2) vs. 12.5 (10.8-14.1), *P*=0.750 (*n* = 93); ODS scores: 11.5 (10.3-12.7) vs. 13.5 (11.3-15.7), *P*=0.082 (*n* = 81)]. Furthermore, there were no significant differences in either the CSS or ODS scores between patients with rectocele in addition to enterocele and those without rectocele in addition to enterocele [CSS scores: 12.2 (10.6-13.9) vs. 12.3 (11.4-13.1), *P* = 0.994 (*n* = 93); ODS scores: 12.5 (10.6-14.3) vs. 12.0 (10.6-13.4), *P* = 0.686 (*n* = 81)].

Of the 293 women with ODS, 160 had an isolated anatomical abnormality. To examine the possible overlap of symptoms in women with coexisting abnormalities, we classified participants according to the presence of enterocele alone (*n* = 11), rectal prolapse alone (*n* = 32), rectal intussusception alone (*n* = 68), and rectocele alone (*n* = 49) (Table 8). There were no significant differences in either the CSS or ODS scores among the groups. The results of subanalyses showed that the ODS scores were significantly higher in women with enterocele alone than in those with rectal intussusception alone or rectal prolapse alone, despite the small number of women with enterocele alone (*n* = 9) [14.3 (9.9-18.8) vs. 10.6 (9.2-11.9), *P* = 0.033 and 10.7 (9.0-12.3), *P* = 0.046, respectively].

Discussion

Using multivariate analysis, this study demonstrates that the presence of enterocele was significantly associated with higher ODS scores (*P* = 0.028). However, not only the type I errors were not associated with OD, but also the calculated difference in the mean (median) score between women with and without enterocele was 1.3 (1.5), which is clinically irrelevant when assessing the severity of ODS. There were no significant differences in either the CSS or ODS scores among the types of enterocele.

It remains unclear whether enterocele is a primary cause of OD or is only associated with anatomical findings addi-

Table 6. Stepwise Multiple Regression.

Variable included in equation	Unstandardized regression weight	t value	*P* value	Variance explained
Enterocele (no, yes)	1.503	2.22	0.028	2.4%

Table 7. Results of Variables by Types of Enterocele and Sigmoidocele.

	Type A (*n*=53)	Type B (*n*=24)	Type C (*n*=23)	Sigmoidocele (*n*=4)	*P* value
Age (years)	74 (71–78)	71 (67–76)	70 (63–76)	61 (33–89)	0.16*
Parity	1.9 (1.5–2.3)	2.2 (1.7–2.8)	1.9 (1.5–2.4)	1.0 (0–2.8)	0.32*
Hysterectomy	13 (24.5%)	9 (37.5%)	7 (30.4%)	1 (25.0%)	0.70#
Previous surgery for ODS	0	2 (8.3%)	5 (21.7%)	0	0.006#
CSS scores	12.1 (10.8–13.4)	12.0 (10.2–13.8)	12.5 (10.8–14.1)	14.3 (8.1–20.4)	0.76*
ODS scores	11.6 (10.1–13.1)	13.7 (10.6–16.9)	12.2 (10.1–14.2)	11.8 (9.4–14.1)	0.50*
Pelvic floor descent (mm)	28.1 (24.1–32.0)	26.8 (21.7–31.9)	24.6 (18.8–30.5)	42.8 (19.0–66.5)	0.10*
Radiological incomplete emptying	12 (22.6%)	11 (45.8%)	13 (56.5%)	1 (25.0%)	0.023#

Type A, No compressing the rectal ampulla or compressing it with no obstruction; Type B, Compress the rectal ampulla at the end of defecation; Type C, Compress the rectal ampulla at the beginning of defecation.
Analyzed by *ANOVA and #chi-square test

Table 8. Symptom Scores in Women with Various Isolated Abnormalities.

	Women diagnosed radiologically	CSS scores	Women assessed	*P* value*	ODS scores	Women assessed	*P* value*
Enterocele	11	11.6 (9.0–14.1)	9	0.98	14.3 (9.9–18.8)	9	0.128
Rectal intussusception	68	11.9 (11.1–12.8)	61		10.6 (9.2–11.9)	44	
Rectocele	49	11.7 (10.5–12.9)	44		11.5 (10.1–13.0)	41	
Rectal prolapse	32	11.8 (10.8–12.8)	29		10.7 (9.0–12.3)	28	

CSS, constipation scoring system; ODS, obstructed defecation syndrome.
*Analyzed by ANOVA.

tional to the enterocele or a preexisting functional defecation disorder. Symptoms of incomplete evacuation and anterior pressure on the rectum from enterocele have been attributed to an impaired rectal emptying, especially on radiological views[3,5]. However, in this study, a radiological incomplete emptying was more frequently reported in women without enterocele than in those with enterocele. Based on the findings at surgery, Chou et al[10] reported that there were no significant differences in terms of frequency of OD between 77 women with enterocele and 233 women without enterocele. Other anatomical abnormalities associated with enterocele such as rectocele, rectal intussusception, and rectal prolapse may have a role on ODS, or the symptoms that occur are associated with the hernia itself. Deformity and distension of pelvic floor structures by an enterocele sac may create the urge of passing stool from the rectum, even when the rectum itself is empty[11]. Moreover, previous studies demonstrated that the surgical repair for enterocele did not modify the incidence of constipation[12-14].

The finding that type C enterocele was more frequently associated with a radiological incomplete emptying than other types of enterocele[5] is in agreement with the results of our study. Morandi et al.[5] reported that this finding was correlated with higher CSS scores in patients with type C enterocele, but we failed to confirm this association. Previous studies have shown that symptoms of constipation are unrelated to the radiological incomplete emptying[15-17]. In fact, although this finding was more frequently found in women without enterocele than those with enterocele, the ODS scores were not greater in the former group than in the latter group in this study.

The prevalence of enterocele in 36% of the women with ODS in this study is similar to those in the literature, where the frequency rates from 19% to 37%[6,18,19] have been reported. A previous history of hysterectomy predisposed the women with ODS to have an enterocele in this study (Table 1), supporting the results of the previous studies[2,6]. Hysterectomy may lead to a possible iatrogenic disruption of vaginal supportive tissue, which causes a change in vaginal axis or loss of continuing of fibrous connective tissue[10]. The finding that rectal intussusception was more frequently observed in women without enterocele than in those with

enterocele (Table 2) may explain that more women without enterocele had ODS because of the presence of rectal intussusception. A close relation between enterocele and rectal prolapse is supported by this study (Table 2, 3), and 89% (93/104) of women with enterocele had concomitant rectal prolapse, rectocele, or rectal intussusception (Table 3). The finding that more women with type A enterocele exhibited rectal prolapse may explain that compressing or obstructing the rectal ampulla may not occur during defecation in women with enterocele associated with rectal prolapse.

There could be a possible overlap of OD symptoms in women with coexisting abnormalities. It was hypothesized that an isolated enterocele may be an actual cause of ODS, because it presented with radiological incomplete emptying more frequently[5]. Thus, we performed further analyses on the symptom scores among women with an isolated abnormality, but there were no significant differences in the ODS scores among the groups with enterocele alone, rectal prolapse alone, rectal intussusception alone, and rectocele alone. Nevertheless, it is worth mentioning that the mean ODS score was higher in the small number of women with enterocele alone (n = 9) assessed in this study than those with rectal prolapse alone or rectal intussusception alone in this study.

The ODS score seemed to be more sensitive in the assessment of the severity of OD in patients with enterocele than the CSS score. Indeed, while there was no significant correlation between the CSS scores and the presence of enterocele, a significant relationship was found between the ODS scores and the presence of enterocele in this study. These results are expected because the ODS score was developed to assess the severity of ODS, while the CSS score covers all form of constipation.

Our study has several limitations. This was a retrospective study of prospectively collected data. The symptoms of constipation or its severity may have been affected by different factors apart from anatomical abnormalities such as health status and physical limitation. Moreover, the symptom scores were not assessed in all women with ODS. The misclassification of enterocele type could occur. According to the definition[5], type B enterocele descends to the perineum at the end of the evacuation, and type C enterocele does at the beginning. It was sometimes difficult to distinguish these two types, because an enterocele seemed to descend at the perineum at the middle of the evacuation process.

Conclusions

The presence of enterocele is not considered a primary cause of ODS. Other anatomical abnormalities associated with enterocele such as rectocele, rectal intussusception, and rectal prolapse, or the hernia itself may have played a role in ODS. Further larger studies are required to compare the symptom scores among women with various isolated abnormalities.

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Conflicts of Interest

There are no conflicts of interest.

Author Contributions

Akira Tsunoda: the design of the research, acquisition of data, analysis and interpretation of data, drafting of the article, and final approval of the version to be published.

Tomoko Takahashi: acquisition of data, analysis and interpretation of data, critical revision of the article for important intellectual content, and final approval of the version to be published.

Hiroshi Kusanagi: the design of the research, analysis and interpretation of data, critical revision of the article for important intellectual content, and final approval of the version to be published.

Approval by Institutional Review Board (IRB)

Institutional review board: Ethical Committee of Kameda Medical Center

Review board approval number: 21-033

References

1. Khaikin M, Wexner SD. Treatment strategies in obstructed defecation and fecal incontinence. World J Gastroenterol. 2006 May; 12: 3168-73.

2. Takahashi T, Yamana T, Sahara R, et al. Enterocele: what is the clinical implication? Dis Colon Rectum. 2006 Oct; 49(10 Suppl): S75-81.

3. Wallden L. Defecation block in cases of deep rectogenital pouch; a surgical roentgenological and embryological study with special reference to morphological conditions. Acta Chir Scand Suppl. 1952; 165: 1-122.

4. Halligan S, Bartram C, Hall C, et al. Enterocele revealed by simultaneous evacuation proctography and peritoneography: does "defecation block" exist? AJR Am J Roentgenol. 1996 Aug; 167 (2): 461-6.

5. Morandi C, Martellucci J, Talento P, et al. Role of enterocele in the obstructed defecation syndrome (ODS): a new radiological point of view. Colorectal Dis. 2010 Aug; 12(8): 810-6.

6. Mellgren A, Johansson C, Dolk A, et al. Enterocele demonstrated by defaecography is associated with other pelvic floor disorders. Int J Colorectal Dis. 1994 Aug; 9(3): 121-4.

7. Agachan F, Chen T, Pfeifer J, et al. A constipation scoring system to simplify evaluation and management of constipated patients. Dis Colon Rectum. 1996 Jun; 39(6): 681-5.

8. Altomare DF, Spazzafumo L, Rinaldi M, et al. Set-up and statistical validation of a new scoring system for obstructed defaecation syndrome. Colorectal Dis. 2008 Jan; 10(1): 84-8.

9. Bartram CI, Turnbull GK, Lennard-Jones JE. Evacuation proctography: an investigation of rectal expulsion in 20 subjects without defecatory disturbance. Gastrointest Radiol. 1988; 13(1): 72-80.
10. Chou Q, Weber AM, Piedmonte MR. Clinical presentation of enterocele. Obstet Gynecol. 2000 Oct; 96(4): 599-603.
11. Nicholls RJ. Rectal prolapse and the solitary rectal ulcer syndrome. In: Kamm MA, Lennard-Jones J, editors. Constipation. Peterfield, United Kingdom: Wrightson Biomedical; 1994 p. 289-97.
12. Jean F, Tanneau Y, Le Blanc-Louvry I, et al. Treatment of enterocele by abdominal colporectosacropexy - efficacy on pelvic pressure. Colorectal Dis. 2002 Sep; 4(5): 321-5.
13. Oom DM, van Dijl VR, Gosselink MP, et al. Enterocele repair by abdominal obliteration of the pelvic inlet: long-term outcome on obstructed defaecation and symptoms of pelvic discomfort. Colorectal Dis. 2007 Nov; 9(9): 845-50.
14. Mølsted-Pedersen L, Rudnicki M, Lose G. Transvaginal repair of enterocele and vaginal vault prolapse using autologous fascia lata graft. Acta Obstet Gynecol Scand. 2006 Jan; 85(7): 874-8.
15. Halligan S, Bartram CI. Is barium trapping in rectoceles significant? Dis Colon Rectum. 1995 Jul; 38(7): 764-8.
16. Tsunoda A, Takahashi T, Kusanagi H. Transanal repair of rectocele: prospective assessment of functional outcome and quality of life. Colorectal Dis. 2020 Feb; 22(2): 178-86.
17. Ting KH, Mangel E, Eibl-Eibesfeldt B, et al. Is the volume retained after defecation a valuable parameter at defecography? Dis Colon Rectum. 1992 Aug; 35(8): 762-7.
18. Kelvin FM, Hale DS, Maglinte DD, et al. Female pelvic organ prolapse: diagnostic contribution of dynamic cystoproctography and comparison with physical examination. Am J Roentgenol. 1999 Jul; 173(1): 31-7.
19. Hock D, Lombard R, Jehaes C, et al. Colpocystodefecography. Dis Colon Rectum. 1993 Nov; 36(11): 1015-21.

Supplementary Files

Supplement file 1. Type A enterocele. The small bowel descends to the pubococcygeal line during straining without compressing the rectal ampulla.

Supplement file 2. Type B enterocele. The enterocele descends beyond the PCL to the perineum through the rectovaginal space to compress the rectal ampulla at the end of the evacuation process.

Please find supplementary file(s);
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