

ORIGINAL RESEARCH ARTICLE

Proctographic findings and symptoms in patients with anterior rectoanal intussusception

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Abstract:

Objectives: Rectoanal intussusception (RAI) is a common finding on defecography in patients with defecation disorders. This study aimed to compare the proctographic findings and symptoms between patients with anterior RAI and those with circular RAI. **Methods:** We included 208 patients who were diagnosed as having RAI on defecography. Anorectal function was evaluated using Constipation Scoring System (CSS) and Fecal Incontinence Severity Index (FISI). **Results:** Twenty-four patients had anterior RAI and 184 had circular RAI. While the anterior intussusception descent or pelvic floor descent was significantly smaller in patients with anterior RAI than those with circular RAI [14.3 vs. 18.5 mm, $p=0.004$; 12.4 vs. 21.6 mm, $p=0.005$], there were no significant differences in incidences of obstructed defecation (OD) and fecal incontinence (FI) between the groups. Sixteen patients with anterior RAI and 137 patients with circular RAI had OD. There was no significant difference in the CSS scores between the groups. Twelve patients with anterior RAI and 108 patients with circular RAI had FI. No significant difference in the FISI scores between the groups. **Conclusions:** Approximately one tenth of the whole RAI was anterior in location, and symptoms in patients with anterior RAI were similar to those with circular RAI.

Keywords:

rectoanal intussusception, morphology, evacuation proctography, fecal incontinence, obstructed defecation

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Introduction

Rectal intussusception (RI) is an infolding of the rectal wall onto or into the anal canal (sphincter) that may occur during defecation. In patients with disordered anorectal function, RI is a common finding on evacuation proctology¹⁾, the current “gold standard” investigation for its demonstration²⁾. RI may cause symptoms of obstructed defecation (OD) and fecal incontinence (FI)¹⁻³⁾. RI can be classified into recto-rectal intussusception and rectoanal intussusception (RAI), and the latter is further divided into level I (descends onto the sphincter/anal canal) and level II (descends into the sphincter/anal canal)⁴⁾. In patients with RAI failing conservative treatment, surgery is considered^{5,6)}.

Rectal intussusception (RI) has been seen in asymptomatic individuals at proctography⁴⁾, and the clinical and pathological significance of this finding has been questioned⁷⁾. Recent studies have addressed the differences in

anorectal morphology during defecation between patients with evacuation disorder and asymptomatic individuals, and intussusception thickness was significantly greater in patients with symptomatic RI^{7,8)}.

According to the grading system for mucosal prolapse and intussusception described by Shorvon et al.⁴⁾, non-circumferential recto-rectal infolding of 3 mm or greater is fit for grade 3, but RAI which is allocated to grade 4 or 5, is circumferential infolding. Although most of RAI is circumferential infolding, it can be anterior in location. Dvorkin et al.⁹⁾ noted that in patients with isolated RI, 22 percent were anterior in origin. However, it remains unclear whether the symptom profiles of patients with anterior RAI are different from those with circumferential or circular RAI. The aim of the study was to compare the proctographic findings and symptoms between patients with anterior RAI and those with circular RAI.

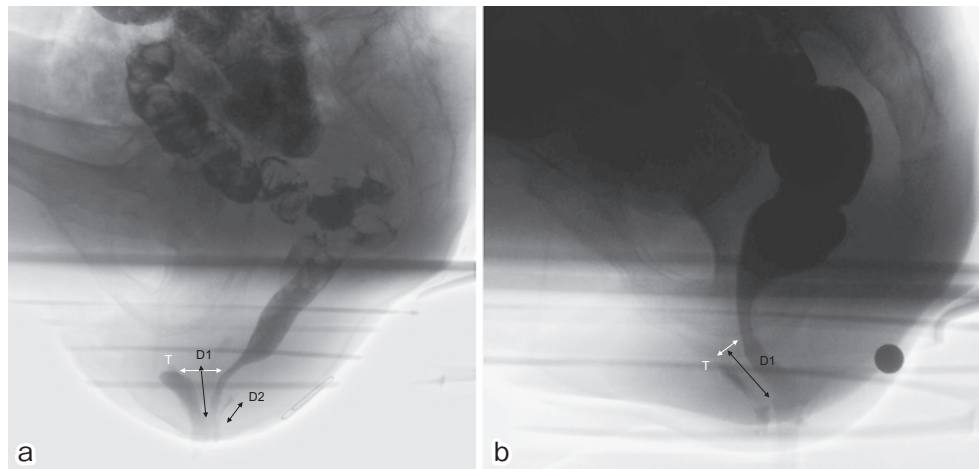


Figure 1. Evacuation proctography showing a circular rectoanal intussusception and b anterior rectoanal intussusception. *T*, intussusception thickness; *D1*, anterior intussusception descent; *D2*, posterior intussusception descent.

Methods

Patients attending a proctology clinic with symptoms of rectal evacuatory disorder underwent evacuation proctography as part of the investigation protocol. Data for the patients with RAI were prospectively entered into a pelvic floor database. Symptoms of OD include incomplete evacuation, straining, digitation, sensation of anorectal obstruction, and repetitive visits to the toilet. The level of RAI was divided into level I or level II. Anorectal function was evaluated using 2 different scores: the Constipation Scoring System (CSS) score¹⁰ and the Fecal Incontinence Severity Index (FISI) score¹¹. Patients who had FI underwent manometric study. Examinations were performed with the patient in the lateral position, and no bowel preparation was used. Anal pressure was measured with a catheter-tip pressure transducer. A tansanal ultrasound was not performed routinely.

Proctography technique was standardized. The small bowel was opacified with a mixture containing 100 mL Barister™ (Barium sulfate 100% w/w; Fushimi Health Care Ltd., Kagawa, Japan) and 10-mL Urografin (60% w/w; Bayer Pharmaceutical Ltd. Japan), ingested 30 min prior to the procedure. The patient was placed in the left lateral position on the fluoroscopic table; barium installation (50 mL) and air insufflation were performed to improve the quality of the contrast image. Synthetic stool consisting of barium sulphate, porridge oats, and water was inserted into the rectum using a 50-mL bladder syringe. A total of 150 mL was introduced. The patient was then seated on a radiolucent commode on a fluoroscopic X-ray table. Resting, squeezing, and pushing positions were used to take lateral radiographs of the pelvis. The patient was then asked to bear down maximally during evacuation. Images from proctography were analyzed by one of the authors (T. T.), who is experienced in the evaluation¹² and was blinded at that time to the symptomatology of individual patients. Measurements were taken using the X-ray flat panel detector (Toshiba Ultimax,

Toshiba Medical Systems, Japan) calibrated to a metal globe or a paper clip of known dimensions screened within the image field during proctography.

The following morphological parameters were measured according to the study by Dvorkin et al.⁸: (1) thickness of both the anterior and posterior components of the intussusception, measured at the upper point of invagination between the intussusciens edge and the intussusception contour (Figure 1a, 1b, *T*), with thickness greater than 3 mm diagnosed as a full-thickness intussusception (less than 3 mm was designated as a mucosal prolapse); and (2) intussusception descent taken from the point of “take-off” to the most distal point of the intussusception (Figure 1a, *D1*, *D2*; Figure 1b, *D1*). Circular RAI is defined when it has both the anterior and posterior components of the intussusception in the lateral radiographs of the pelvis, and anterior RAI is defined when it has only the anterior component of the intussusception.

All measurements were taken from the maximal straining image during defecation. In addition, pelvic floor descent during defecation was estimated by the degree of the anorectal junction in relation to the inferior margin of the ischial tuberosity. A rectocele greater than 2 cm in diameter was regarded as abnormal. The size was calculated in a standard fashion in the anterior posterior dimension by measuring the distance between the actual most ventral part of the anterior rectal wall and an extrapolated line of the expected portion of the rectal wall¹³. Enterocoele was diagnosed when the extension of the loop of the small bowel was located between vagina and rectum¹. Informed consent was obtained from all patients. This study was approved by the regional Ethical Committee.

Statistical analysis

Statistical analysis was performed using SPSS version 11.0 (SPSS Inc., Chicago, IL, USA). The continuous variables were expressed as the median (range). Analysis was

Table 1. Characteristics of Patients.

	Anterior RAI	Circular RAI	<i>p</i>
Number of patients	24	184	
Sex (female/male)	14/10	143/41	0.04*
Age (years)	76 (40-88)	72 (25-95)	0.14§
Level I/Level II	18/6	82/102	0.01*
Previous surgery			0.35*
hysterectomy	5	7	
transvaginal repair of POP	2	3	
repair of retroflexed uterus	0	2	
transsacral resection of the rectum	0	1	
hemorrhoidectomy	3	22	
fistulotomy	0	3	
sphincter repair	0	1	

Values are shown as median (range). *RAI*, rectoanal intussusception; *Level I*, descent onto the anal sphincter/anal canal; *Level II*, descent into the anal sphincter/anal canal; *POP*, pelvic organ prolapse

*chi-square test, §Mann-Whitney *U* test

Table 2. Morphology of Rectoanal Intussusception.

	Anterior RAI (<i>n</i> =24)	Circular RAI (<i>n</i> =184)	<i>p</i>
Intussusception descent (mm)			
Anterior	14.3 (7.3-37.5)	18.5 (4.9-41.9)	0.01*
Posterior	-	19.1 (53.9-45.0)	-
Intussusception thickness (mm)			
Anterior	9.6 (3.7-25.9)	8.6 (3.1-32.6)	0.32*
Posterior	-	5.2 (2.6-11.6)	-
Pelvic floor descent (mm)	12.4 (-21.1-40.3)	21.6 (-16.1-50.9)	0.01*
Rectocele (<i>n</i>)	1	39	0.09§
Enterocoele (<i>n</i>)	2	16	0.74§
Sigmoidocoele	1	2	0.78§
Dyssynergic defecation	1	0	0.23§
Incomplete rectal emptying	9	74	0.80#

Values are shown as median (range). *RAI*, rectoanal intussusception

*Mann-Whitney *U* test, §Fisher' exact test, #chi-square test

performed using the Mann-Whitney *U* test for unpaired data and the chi-square or Fisher's exact test for categorical variables. A *p* value <0.05 was taken as significant for all tests.

Results

Characteristics of patients

Between June 2011 and September 2016, 510 patients underwent evacuation proctography, and 208 (41%) were found to have RAI. Table 1 shows the characteristics of patients. Twenty-four (12%) patients had anterior RAI and 184 had circular RAI. The proportion of male to female was significantly higher in the patients with anterior RAI than those with circular RAI. The incidence of level I RAI was significantly greater in patients with anterior RAI than those with circular RAI [18/24 vs. 82/184, *p*=0.005]. There was no sig-

nificant difference in the parity between the groups.

Intussusception morphology

The morphology of the intussusception is shown in Table 2. There was no significant difference in the anterior intussusception thickness between the groups. Whereas, the anterior intussusception descent was significantly smaller in patients with anterior RAI than those with circular RAI. The number of rectocele tended to be significantly fewer in patients with anterior RAI. Only one of the 24 patients with anterior RAI had a significant rectocele which was greater than 2 cm in diameter. The incidence of enterocoele, sigmoidocoele, dyssynergic defecation, and incomplete rectal emptying was not significantly different between the groups, respectively. Pelvic floor descent was significantly smaller in patients with anterior RAI than those with circular RAI.

Table 3. Obstructed Defecation and Fecal Incontinence.

	Anterior RAI (n=24)	Circular RAI (n=184)	<i>p</i> *
OD alone	11	70	0.30
OD and FI	5	67	
FI alone	8	41	
Neither OD or FI	0	6	

RAI, rectoanal intussusception; OD, obstructed defecation; FI, fecal incontinence

*chi-square test

Table 4. Associated Symptoms.

	Anterior RAI (n=24)	Circular RAI (n=184)	<i>p</i> *
Bleeding	10	72	0.81
Anal pain	8	68	0.73
Feeling of prolapse	11	107	0.25
Pruritus (itch)	4	53	0.33
Mucus discharge	7	75	0.27
Tenesmus	8	62	0.97
Urge	11/22	62/161	0.30

RAI, rectoanal intussusception

*chi-square test or Fisher' exact test

Symptoms

The symptoms of OD and FI are shown in Table 3. Sixteen patients with anterior RAI and 137 patients with circular RAI had OD. There were no significant differences in the CSS scores between the groups [11 (3-20) vs. 12 (3-19), $p=0.76$]. Twelve patients with anterior RAI and 108 patients with circular RAI had FI. No significant differences in the FISI scores were found between the groups [18 (7-42) vs. 23 (6-50), $p=0.38$]. The associated symptoms are shown in Table 4. There was no significant difference in the incidence of each symptom between the groups. Even if the patients with associated abnormalities including enterocele, sigmoidocele, and dyssynergic defecation were excluded from the subject to compare the symptoms between the patients with isolated anterior RAI (n=19) and those with isolated circular RAI (n=133), there were also no significant differences in the incidence of OD, FI, and the associated symptoms between the groups.

Manometric study in patients with FI

There was no significant difference in either the anal manometric study or rectal volumetric study between the two groups of patients (Table 5). A transanal ultrasound scan was examined in 7 patients (58%) with anterior RAI, and 40 patients (37%) with circular RAI. The sphincter defect was not found in the former group, whereas it was detected in 2 (5%) patients in the latter group, who underwent anal fistula surgery previously.

Table 5. Manometric Study in Patients with Fecal Incontinence.

	Anterior RAI (n=13)	Circular RAI (n=108)	<i>p</i>
Sex (female/male)	9/4	91/17	0.24*
Age (years)	79 (59-88)	76 (48-95)	0.24 [§]
Level I/Level II	8/5	38/70	0.08*
MRP (cmH ₂ O)	46 (6-86)	55 (4-140)	0.06 [§]
MSP (cmH ₂ O)	156 (43-291)	166 (43-747)	0.91 [§]
Urge (ml)	80 (45-130)	80 (25-300)	0.63 [§]
MTV (ml)	170 (100-230)	160 (100-400)	0.82 [§]

Values are shown as median (range). RAI, rectoanal intussusception; Level I, descent onto the anal sphincter/anal canal; Level II, descent into the anal sphincter/anal canal; MRP, maximum resting pressure; MSP, maximum squeeze pressure; MTV, maximum tolerated volume

*Fisher' exact test, [§]Mann-Whitney U test

Table 6. Surgical Treatment.

	Anterior RAI (n=11)	Circular RAI (n=78)	<i>p</i> *
STARR	7	15	0.01
LVR	4	53	
Internal Delorme	0	9	

RAI, rectoanal intussusception; STARR, stapled transanal rectal resection; LVR, laparoscopic ventral rectopexy

*chi-square test

Surgical treatment

Eleven patients with anterior RAI (46%) and 78 patients with circular RAI (42%) underwent surgery. Stapled transanal rectal resection (STARR) was performed more frequently in patients with anterior RAI than those with circular RAI [7/11 vs. 15/78, $p=0.001$] (Table 6). Five of the 7 patients who underwent STARR had OD alone before the procedure. The CSS scores preoperatively were 12 (9-16), which was significantly decreased at 6 and 12 months postoperatively [5.5 (4-12) and 6.5 (5-12), vs. preoperative, $p<0.05$]. Three of the 4 patients who underwent laparoscopic ventral rectopexy (LVR) had both OD and FI preoperatively. Because of the short follow-up, an adequate evaluation on postoperative FI or OD was not available.

Discussion

To best of our knowledge, this is the first study to show the proctographic findings and symptoms in patients with anterior RAI. While the anterior intussusception descent or pelvic floor descent was significantly smaller in patients with anterior RAI than those with circular RAI, symptoms were not significantly different between the two groups.

The exact pathophysiology of the anterior RAI remains unclear. It is uncertain whether anterior RAI is a precursor of circular RAI. A loose sacral fixation of the rectum associ-

ated with an underlying connective disorder may be involved in patients with external rectal prolapse or circular RAI^{14,15}. Meantime in patients with anterior RAI, the rectum or the mesorectum may be rather fixed to the sacrum, while only anterior rectal wall may infold during defecation. This may lead to the results that most of the intussusception did not descend into the sphincter/anal canal in the patients with anterior RAI.

In this study, the anterior intussusception descent was significantly greater in patients with circular RAI, partly because level II RAI was significantly more frequent in patients with circular RAI (102/184) than those with anterior RAI (6/24). A recent study showed that the anterior intussusception descent was significantly greater in level II than level I RAI¹⁶. Pelvic floor descent was significantly smaller in patients with anterior RAI than those with circular RAI, mainly because the ratio of male to female was relative high in the former (0.7 vs. 0.3). In fact, pelvic floor descent was not significantly different for female patients with anterior and those with circular RAI [18.4 (6.3-40.3) vs. 22.3 (-16.1-50.9), $p=0.35$].

Manometric study showed that maximum resting pressure tended to be significantly lower in the FI patients with anterior RAI than the FI patients with circular RAI. The reason is unclear and further larger study is necessary.

Symptoms were not significantly different between the groups. In this study, associated anatomical abnormalities such as rectocele were included in either group. Dvorkin et al.⁹ reported that the incidence of anorectal pain and the sensation of prolapse were significantly greater in the patients with isolated RI than those with rectocele. Even if symptoms were compared between the 23 patients with isolated anterior RAI and 145 patients with isolated circular RAI in this study, there was no significant difference in the incidence of each symptom between the groups. It must be noted that in our assessment, symptoms were recorded as being present or absent according to standard criteria, and no inquiry was made as to the severity of individual symptoms.

The patients with anterior RAI who had OD alone received laxative and those who had FI and/or OD were given calcium polycarboxophil or loperamide for more than 4 weeks. When such a conservative treatment fails, surgery was advised to patients with anterior RAI. Important thing to note is that the incidence of undergoing surgery in patients with anterior RAI was similar to that with circular RAI. Various surgical procedures have been used to treat RAI such as the Delorme operation¹⁷, and more recently, STARR¹⁸, while perineal procedures are effective in alleviating OD, but are associated with recurrent prolapse, de novo urgency, and incontinence because of alterations in rectal compliance and possible dilatation of the anal sphincter. A consensus conference on the use of STARR¹⁹ considered that anal incontinence was a contraindication to the procedure. In this study, STARR was preferably performed in the patients with anterior RAI, because most of the patients (5/7) had OD alone.

Laparoscopic ventral rectopexy for the treatment of RAI has been reported to improve FI and OD. Fornijne Jonkers et al.²⁰ reported that 157 patients underwent LVR for RAI, and FI improved or was cured in 78% of the patients. Similar functional results were reported by others^{5,6,21}. LVR may be suitable for not only the FI patients with circular RAI but also those with anterior RAI. Further study is needed to confirm the results.

There are certain limitations to this study. In particular, the scale of the study was small and the data on transanal ultrasounds was limited. Also, the interpretation of the effect of morphology of RAI on the symptoms is limited by the fact that factors such as neostool thickness and degree of patient straining at the time of evacuation proctography may have an effect on morphological measurements of RAI.

In conclusion, approximately one tenth of the whole RAI was anterior in location, and symptoms in patients with anterior RAI were similar to those with circular RAI. Clinically, anterior RAI may be identical to circular RAI and surgery can be considered in patients with anterior RAI failing conservative treatment.

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Conflicts of Interest

There are no conflicts of interest.

References

1. Mellgren A, Bremner S, Johansson C, et al. Defecography. Results of investigations in 2,816 patients. *Disease of the colon & rectum*. 1994 Nov; 37(11): 1133-341.
2. Brodén B, Snellman B. Proctodia of the rectum studied with cineradiography. A contribution to the discussion of causative mechanism. *Disease of the colon & rectum*. 1968 Sep-Oct; 11(5): 330-47.
3. Wijffels NA, Jones OM, Cunningham C, et al. What are the symptoms of internal rectal prolapse? *Colorectal Disease*. 2013 Mar; 15(3): 368-73.
4. Shorvon PJ, McHugh S, Diamant NE, Somers S, Stevenson GW. Defecography in normal volunteers: results and implications. *Gut*. 1989 Dec; 30(12): 1737-49.
5. Slawik S, Soulsby R, Carter H, et al. Laparoscopic ventral rectopexy, posterior colporrhaphy and vaginal sacrocolpopexy for the treatment of recto-genital prolapse and mechanical outlet obstruction. *Colorectal Disease*. 2008 Feb; 10(2): 138-43.
6. Collinson R, Wijffels N, Cunningham C, et al. Laparoscopic ventral rectopexy for internal rectal prolapse: short-term functional results. *Colorectal Disease*. 2010 Feb; 12(2): 97-104.
7. Pomerri F, Zuliani M, Mazza C, et al. Defecographic measurements of rectal intussusception and prolapse in patients and in asymptomatic subjects. *American Journal of Roentgenology*. 2001 Mar; 176(3): 641-5.
8. Dvorkin LS, Gladman MA, Epstein J, et al. Rectal intussusception in symptomatic patients is different from that in asymptomatic volunteers. *British journal of surgery*. 2005 Jul; 92(7): 866-72.
9. Dvorkin LS, Knowles CH, Scott SM, et al. Rectal intussusception: characterization of symptomatology. *Disease of the colon & rec-*

- tum. 2005 Apr; 48(4): 824-31.
10. Agachan F, Chen T, Pfeifer J, et al. A constipation scoring system to simplify evaluation and management of constipated patients. *Disease of the colon & rectum*. 1996 Jun; 39(6): 681-5.
 11. Rockwood TH, Church JM, Fleshman JW, et al. Patient and surgeon ranking of the severity of symptoms associated with fecal incontinence: the fecal incontinence severity index. *Disease of the colon & rectum*. 1999 Dec; 42(12): 1525-32.
 12. Takahashi T, Yamana T, Sahara R, et al. Enterocele: what is the clinical implication?. *Disease of the colon & rectum*. 2006 Oct; 49 (10suppl): S75-81.
 13. Bartram CI, Turnbull GK, Lennard-Jones JE. Evacuation proctography: an investigation of rectal expulsion in 20 subjects without defecatory disturbance. *Gastrointestinal Radiology*. 1988 Dec; 13 (1): 72-80.
 14. Rodrigo N, Shek KL, Dietz HP. Rectal intussusception is associated with abnormal levator ani muscle structure and morphometry. *Techniques in Coloproctology*. 2011 Mar; 15(1): 39-43.
 15. Marshman D, Percy J, Fielding I, et al. Rectal prolapse: relationship with joint mobility. *ANZ Journal of Surgery*. 1987 Nov; 57 (11): 827-9.
 16. Tsunoda A, Takahashi T, Ohta T, et al. Anterior intussusception descent during defecation is correlated with the severity of fecal incontinence in patients with rectoanal intussusception. *Techniques in Coloproctology*. 2016 Mar; 20(3): 171-6.
 17. Dippolito A, Esser S, Reed J. Anterior modification of Delorme procedure provides equivalent results to Delorme procedure in treatment of rectal outlet obstruction. *Current Surgery*. 2005 Nov-Dec; 62(6): 609-12.
 18. Boccasanta P, Venturi M, Stuto A, et al. Stapled transanal rectal resection for outlet obstruction: a prospective, multicenter trial. *Disease of the colon & rectum*. 2004 Aug; 47(8): 1285-96.
 19. Corman ML, Carriero A, Hager T, et al. Consensus conference on the stapled transanal rectal resection (STARR) for disordered defaecation. *Colorectal Disease*. 2006 Feb; 8(2): 98-101.
 20. Formijne Jonkers HA, Poierré N, Draaisma WA, et al. Laparoscopic ventral rectopexy for rectal prolapse and symptomatic rectocele: an analysis of 245 consecutive patients. *Colorectal Disease*. 2013 Jun; 15(6): 695-9.
 21. Tsunoda A, Ohta T, Kiyasu Y, et al. Laparoscopic ventral rectopexy for rectoanal intussusception: postoperative evaluation with proctography. *Disease of the colon & rectum*. 2015 Apr; 58(4): 449-56.

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