Indian Journal of Gastroenterology (March–April 2019) 38(2):173–177
https://doi.org/10.1007/s12664-018-0927-9

SHORT REPORT

Fecal evacuation disorders in anal fissure, hemorrhoids, and solitary rectal ulcer syndrome

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Received: 10 August 2018 / Accepted: 15 December 2018 / Published online: 1 February 2019

Abstract

The causative factors for hemorrhoids, anal fissure, and solitary rectal ulcer syndrome (SRUS) are poorly understood. The study was done to identify the prevalence of fecal evacuation disorders in patients with anal fissure, hemorrhoids, and SRUS using anorectal manometry (ARM). Retrospective analysis of ARM data from three centers across India was done. Baseline demographic details and symptoms pertaining to bowel movements were noted. Limited colonoscopy details pertaining to hemorrhoids, fissure-in-ano, and SRUS were noted. The patients were divided into two groups—group I (those with fissure, hemorrhoids, or solitary rectal ulcer) and group II (normal study). ARM parameters of resting anal pressure, squeeze pressure, dyssynergic defecation, and abnormal balloon expulsion were compared between the two groups. Sub-analysis was done for ARM metric differences between those with hemorrhoids, chronic fissure, and SRUS. Appropriate statistical tests were used. A p-value of < 0.05 was considered significant. There were more men in group I (87%; p-value 0.01) with a higher resting anal pressure (80 vs. 69 mmHg, p-value 0.03). Functional evacuation disorders ($p < 0.0001$), dyssynergic defecation (77.2% vs. 46.8%, $p < 0.0001$) and abnormal balloon expulsion (66.7% vs. 20.3%, $p < 0.0001$) were significantly higher in group I. These were significantly more common in patients with anal fissure and SRUS compared to those with hemorrhoids (p-value 0.028). Functional evacuation disorders are frequently noted in patients with hemorrhoids, anal fissure, and SRUS.

Bullet points of the study highlights

What is already known?

- Hemorrhoids, anal fissure, and solitary rectal ulcer syndrome (SRUS) are benign ano-rectal problems with significant morbidity.
- Studies from India have shown that a fifth of cases with dyssynergic defecation have anal fissure, hemorrhoids or SRUS.
- Fifty percent of Indian patients with SRUS have dyssynergic defecation.

What is new in this study?

- This study shows presence of fecal evacuation disorders in patients with hemorrhoids and fissure-in-ano.
- These findings are more pronounced in those with anal fissures and SRUS compared to hemorrhoids.

What are the future clinical and research implications of the study findings?

- Fecal evacuation disorders may be the cause or an effect of these anorectal disorders. Prospective studies are required to prove or disprove our observations.
- These findings may suggest the role of toilet training and biofeedback to prevent recurrence of these conditions.

Keywords Fissure · Hemorrhoids · Manometry · Rectum

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Introduction

Hemorrhoids, anal fissure, and solitary rectal ulcer syndrome (SRUS) are benign anorectal disorders that present with bleeding per rectum in a background of chronic constipation, straining, and sense of incomplete evacuation. Pathophysiologic mechanisms of these disorders are poorly understood and the diagnosis is fundamentally based on clinical and endoscopic assessment, with histology providing an additional role in the diagnosis of SRUS.

Anorectal manometry (ARM) is an essential tool to assess the functional status of the anorectum. Dyssynergic defecation may play role in patients with above-mentioned disorders. We have in our earlier studies reported that nearly a fifth of patients with dyssynergic defecation have anal fissures, hemorrhoids, or SRUS [1, 2]. Whether these disorders were secondary to dyssynergic defecation or were responsible for the abnormal defecatory act remains conjectural. We hypothesized that anal fissure, hemorrhoids, and SRUS may be related to evacuation disorders.

This multicentre study included three centers (Choithram Hospital and Research Centre, Indore, Pushpavati Singhania Hospital and Research Centre, New Delhi, and Gleneagles Global Health City, Chennai) and was a retrospective analysis of data collected between 2011 and 2017 with an aim to understand the physiological changes that may play role in these disorders.

Methods

Data retrieved from records included baseline demography, symptoms pertaining to bowel movement (frequency, abdominal pain, bleeding per rectum), indication for ARM and observations at the digital rectal examination, colonoscopy/sigmoidoscopy, colonic transit study (when available), and ARM.

Definitions

1. Chronic constipation—was classified as functional constipation (FC) and irritable bowel syndrome with constipation (IBS-C) based on Rome IV criteria [3]
2. Functional evacuation disorders (Rome IV) [3]—patients with FC or IBS-C with

    - Abnormal balloon expulsion
    - Radiological imaging showing inadequate evacuation or abnormal anorectal function documented by ARM or surface electromyography

3. Hemorrhoids [4]—were divided as internal and external and classified as

    Stage I Enlarged and bleeding
    Stage II Protrusion with spontaneous reduction
    Stage III Protrusion with manual reduction
    Stage IV Irreducible protrusion

4. Anal fissure—crack in the skin lining the anal opening on anterior or posterior aspect presenting with severe pain, perianal burning sensation, and bleeding. Fissures lasting for > 6 weeks were described as chronic fissures [4].

    - SRUS—the endoscopic spectrum of SRUS ranges from hyperemic mucosa to small or giant ulcers to broad-based polypoid lesions with histological confirmation of fibromuscular obliteration, surface ulceration, crypts, and mucosal gland distortion and hyperplasia, splaying of smooth muscle cells and fibrosis of the lamina propria [5–7].

All the patients, as per the Motility Unit protocol, had a digital examination of the anorectum, sigmoidoscopy/colonoscopy (to rule out mechanical obstruction and other sources of hematochezia), and an ARM. Patients with fissure-in-ano had procedures (sigmoidoscopy and ARM) after treatment with sitz bath, stool softeners, diltiazem or nitroglycerine local application, and analgesics. Anorectal manometry was done in the left lateral position with hips flexed using high-resolution manometry. Intra-luminal pressures were measured using a 16-channel silicone-rubber water perfusion manometric assembly (G Hebbard, Australia). Data were recorded at 25 Hz and analyzed using specialized software (Trace Version 1.3v, Hebbard, Melbourne, Australia). During each study, following metrics were assessed in a chronological order: anorectal pressure at rest (60 s), during squeeze (three attempts for a maximum duration of 20 s each), recto-anal inhibitory reflex, and rectal sensation with 10-mL increments of air in intra-rectal

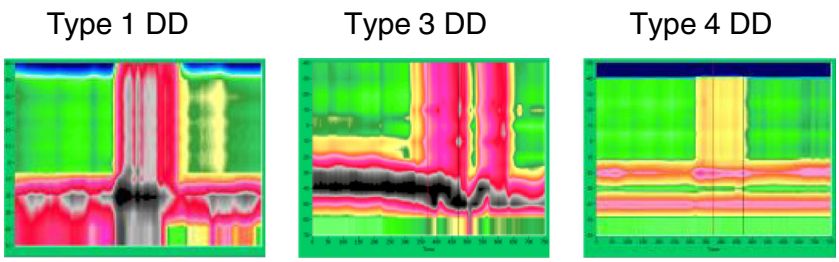

Fig. 1 Type 1 dyssynergic defecation (DD)—patient is able to generate adequate pushing force with paradoxical rise in anal sphincter pressure; type 3 DD—adequate pushing force with incomplete anal sphincter relaxation; type 4—inadequate push with incomplete anal relaxation

Table 1 Comparison of demographic parameters and manometry findings in groups I and II

Parameters	Group I, $n = 57$	Group II, $n = 369$	p-value
Age in years (median, range)	44.2 (18–82)	46 (18–78)	0.27
Sex (males)	50 (87%)	268 (72.6%)	0.01
Clinical diagnosis			
FC	43 (75.4%)	274 (74.3%)	0.85
IBS-C	14 (24.6%)	95 (25.7%)	
Anal canal length (cm; mean, SD)	2.72 (0.82)	2.67 (0.76)	0.64
Resting anal pressure (mmHg)	80 (56–144)	69 (45–120)	0.03
Squeeze pressures (mmHg)	118 (90–185)	110 (77–164)	0.68
Functional evacuation disorders	38 (66.7%)	75 (20.3%)	< 0.0001
Dyssynergic defecation	44 (77.2%)	173 (46.8%)	< 0.0001
Abnormal balloon expulsion	38 (66.7%)	75 (20.3%)	< 0.0001

FC functional constipation, *IBS-C* irritable bowel syndrome with constipation

balloon from 0 to 400 mL. Threshold volumes for first sensation, urgency, and maximum discomfort were recorded. Balloon expulsion test was done using 50-mL air in the balloon and asking the patient to expel the same in left lateral position [2] (normal expulsion time: 2 min).

Patients were categorized as group I (fissure, hemorrhoids, or solitary rectal ulcer) and group II (normal study). Baseline information and ARM parameters were compared between the two groups. The latter included a comparison of resting anal pressure, squeeze pressure, dyssynergic defecation and abnormal balloon expulsion between the two groups. Further subgroup analysis for the same parameters was done for patients with hemorrhoids, chronic fissure, and SRUS.

Dyssynergic defecation [8, 9] and balloon expulsion time were taken as ARM metrics for defining an evacuation disorder. The former is characterized by either paradoxical increase in anal sphincter pressure (anal contraction), less than 20% relaxation of the resting anal sphincter pressure, or an inadequate propulsive force during ARM (Fig. 1). Balloon expulsion time [8, 9] exceeding 2 min was taken as abnormal.

Patients below 18 years of age, fecal incontinence, grades 3 and 4 hemorrhoids, post hemorrhoidectomy or fissurectomy, hemorrhoid banding, thrombosed hemorrhoids, acute fissures, rectal strictures, and perianal Crohn's disease were excluded.

This retrospective analysis was approved by the Institutional Ethics committee (ref no. HR/2018/MS/024).

Statistical analysis

The data were analyzed using SPSS 22.0 Software Package (SPSS for Windows, version 22.0. Chicago: SPSS Inc.). Age, basal and squeeze pressures were expressed as median and range. Continuous variables were analyzed using the Mann-Whitney U and Kruskal-Wallis H tests, respectively. Chi-square test and Fischer's exact test were done for comparison of proportions. P-values less than 0.05 were considered significant.

Results

During the study period, 580 patients had an ARM. One hundred and fifty-four patients (36 patients < 18 years, 56 with

Table 2 Comparison of anorectal manometry parameters in patients with hemorrhoids, chronic fissure, and solitary rectal ulcer syndrome

Parameters	Hemorrhoids ($n = 35$)	Fissure ($n = 16$)	SRUS ($n = 16$)	p-value
Resting anal pressures (mmHg)	77 (56–146)	100 (74–144)	73 (67–83)	0.16
Squeeze pressures (mmHg)	122 (90–185)	124 (90–153)	108 (77–164)	0.14
Functional evacuation disorders	6 (16.7%)	12 (75%)	12 (75%)	0.03
Dyssynergic defecation	20 (57%)	12 (75%)	12 (75%)	0.028
Abnormal balloon expulsion	6 (16.7%)	12 (75%)	12 (75%)	

SRUS solitary rectal ulcer syndrome

fecal incontinence, 46 with post-surgical status, and 16 with incomplete information) were excluded.

Data of 426 patients were analyzed. Fifty-seven patients had either hemorrhoids, chronic fissure, or SRUS (Gp I). There was no difference in age and clinical presentation between the two groups (Table 1). However, there were more men in group I (87%; p-value < 0.01) with a higher resting anal pressure (80 vs. 69 mmHg, p-value < 0.03). Functional evacuation disorders (p 0.0001), dyssynergic defecation (77.2% vs. 46.8%, $p < 0.0001$), and abnormal balloon expulsion (66.7% vs. 20.3%, $p < 0.0001$) were significantly higher in group I than group II. On subgroup analysis (Table 2), there was no significant difference in resting and squeeze pressures among patients with hemorrhoids (35), chronic fissure (16), and SRUS (16). However, dyssynergic defecation and abnormal balloon expulsion were significantly more common in those with a fissure and SRUS compared to hemorrhoids (p-value < 0.028).

Discussion

The present study highlights that nearly two thirds of patients with fissures, hemorrhoids, and SRUS have functional evacuation disorders. The frequency of dyssynergic defecation and abnormal balloon expulsion is higher in these patients compared to those with normal anorectum. The criteria for functional evacuation disorders appears to be fulfilled more often in those with fissure and SRUS, compared to those with hemorrhoids.

Constipation in India is predominantly reported in males. This may be related to greater health-seeking behavior among Indian men [2, 10]. Dyssynergic defecation has been described in the pathogenesis of SRUS [11–13]. Studies from the Indian subcontinent have shown that nearly 50% of patients with SRUS have an evacuation disorder [12, 14].

Earlier studies have shown that in hemorrhoids, abnormal high pressures in the anal canal causes an increase in vascular pressure in the anal cushions [15]. Girardi et al. [16] recommended preoperative assessment of the anal resting tone, squeeze, and sphincter length in patients with hemorrhoids. Lin [17] found higher maximal basal and squeeze pressure amongst those with hemorrhoids and fissures compared to the controls. We also noted higher resting and squeeze pressures in these patients compared to the controls.

There are studies that have focussed on the physiology of anorectum and the changes that take place in those with fissure-in-ano. Schouten et al. [18] observed a low blood flow at the posterior midline than in the rest of the anal canal. The perfusion of the anoderm at the posterior commissure is strongly related to anal pressure; greater the pressure, less is the blood flow. Another notable change in chronic fissure is a sustained increase in internal sphincter tone [19].

Recent studies have focused on the role of biofeedback, especially in SRUS. Forootan et al. have shown that biofeedback therapy improves the clinical symptoms and endoscopic signs of SRUS [20]. However, the impact of biofeedback in patients with fissures and hemorrhoidsis is not known.

In summary, the present study highlights the role of evacuation disorders in the pathogenesis of hemorrhoids, fissure, and SRUS. Dyssynergic defecation and abnormal balloon expulsion are more frequent in chronic anal fissure and SRUS compared to hemorrhoids. Whether these changes are the cause or a secondary effect of the anorectal disorders remains to be evaluated. Toilet training and biofeedback may help prevent recurrence in these patients. Retrospective design is an important limitation of this study. Prospective studies are likely to prove or disapprove our observations.

Compliance with ethical standards

Conflict of interest MJ, RB, MS, and JV declare that they have no conflict of interest.

Ethics statement All procedures performed in studies involving human participants were in accordance with the ethical standards of the institutional and/or national research committee and with the 1964 Helsinki declaration and its later amendments or comparable ethical standards. For this type of study, formal consent is not required.

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