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Defecography: Results in 55 Patients and Impact on Clinical Management

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Abstract. We reviewed the medical records and defecograms in 55 consecutive patients to determine the impact of results of defecography on clinical management. Main indication for defecography was constipation, present in 40 (73%) of 55 patients. In the remaining 15 patients, indications included obstructed defecation (5), incontinence (5), and miscellaneous symptoms (5). Defecography evaluated pelvic floor motion by assessing changes in the anorectal angle (ARA) and anorectal junction (ARJ) during various maneuvers, extent of evacuation, and structural abnormalities. Patients were grouped based on results of defecography as being normal (26) or abnormal (29). Comparison of measurements of the ARA and ARJ with various maneuvers showed no significant differences between the two groups. Clinical impact was determined by analyzing therapy done following defecography and subsequent patient response. In the normal group, 15 patients were managed medically, seven surgically, and four lost to follow-up. Clinical improvement occurred in 13 (59%) of 22 patients, with similar results between medical (60%) and surgical (57%) therapy. In the abnormal group, 16 had medical management, seven surgical therapy, and six lost to follow-up. Clinical improvement occurred in 13 (57%) of 23 patients but surgical therapy showed more improvement. In conclusion, most standard measurements of the ARA and ARJ were of no value in determining abnormality. Results of defecography did not alter selection of medical or surgical therapy, and had little impact on patient response to therapy.

Key words: Defecography, technique—Anorectal disorders, management.

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In recent years, there has been an increased interest in the diagnosis and management of anorectal disorders. Defecography has had an important role in evaluating patients with anorectal complaints, and is unique in providing anatomic depiction of the anal canal and rectum and also functional information about the movement of the pelvic floor [1–4]. Considerable debate persists, however, on the specific techniques used to perform defecography and on interpretation of certain anatomic and functional abnormalities, especially related to analysis of changes in the anorectal angle and pelvic floor position. The clinical importance of the findings of defecography and their impact on patient management is less certain. Consequently, we reviewed 55 patients who had defecography to determine the value of the standard measurements made during the examination and the impact of the results on clinical management of the patient.

Materials and Methods

We reviewed the medical records and defecograms in 55 consecutive patients (48 women; 7 men; mean age, 47 years). The main indication for defecography was constipation, present in 40 (73%) of 55 patients. Other major complaints in the remaining 15 patients included obstructed defecation (5), fecal incontinence (5), and miscellaneous symptoms (5; rectal pain, bleeding or diarrhea).

Defecography was performed using remote-control equipment. Bowel preparation was not used. With the patient on a stretcher in the fluoroscopic room, approximately 200 cc of a commercial barium paste (Anatrast; E-Z-EM, Westbury, NY, USA) were injected into the rectum using a caulk gun. A contrast-soaked vaginal tampon was inserted in most female patients. The patient was then placed sitting in the lateral position on a special commode attached to the footboard of the fluoroscopic machine. The commode was designed to avoid technical problems caused by overexposure of the anorectal region by using several small water-filled rubber tubes [1].

Anorectal anatomy and pelvic floor motion were evaluated by assessing changes in the anorectal angle (ARA) and anorectal junction

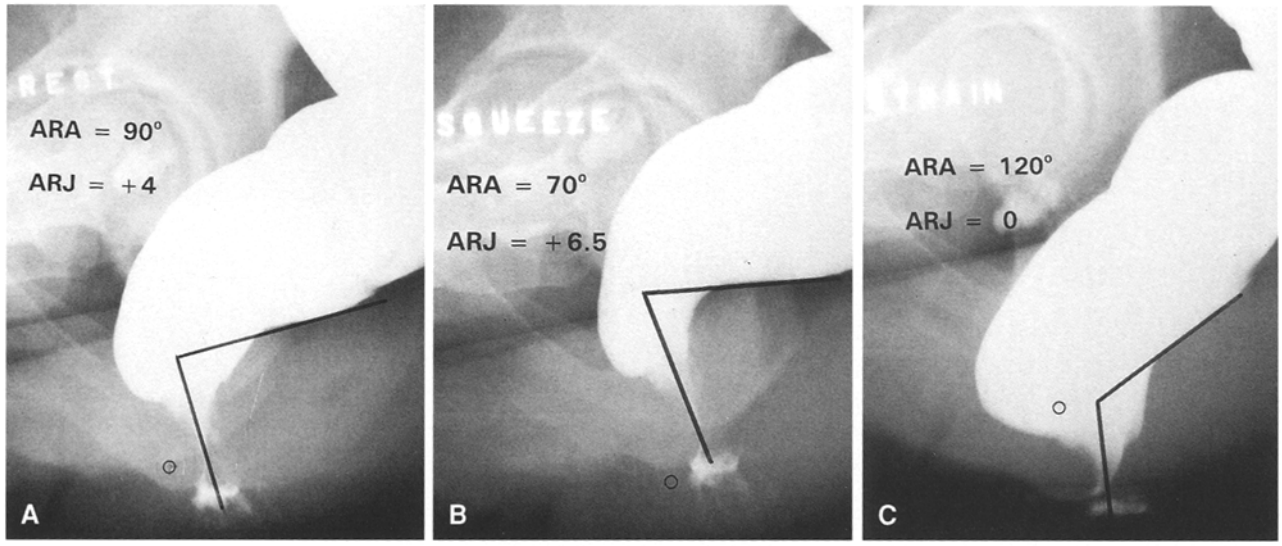


Fig. 1. Normal defecogram. **A** At rest, ARA defined by line through anal axis and line along posterior wall of rectum. Level of ARJ measured relative to ischial tuberosity (○) with junction defined as apex of ARA. Positive (*above*) and negative (*below*) distances (cm) relative to ischial tuberosity correspond to level of ARJ. **B, C** Expected normal changes of ARA and ARJ on squeezing (B) and straining (C) maneuvers.

(ARJ) during rest and on squeezing and straining maneuvers, extent of evacuation, and structural abnormalities. The ARA was measured by the intersection of a line drawn through the axis of the anal canal with a line drawn parallel to the posterior lower edge of the rectum just above the impression from the puborectalis muscle. The apex of the ARA was defined as the ARJ and maximal pelvic floor motion was measured as the distance between the ARJ on the squeezing and straining maneuvers relative to the tip of an ischial tuberosity. Static films were obtained in the resting position and during squeezing, straining, and evacuation (Fig. 1). The anal canal caliber was also measured at its maximal diameter. Motion recording was not used routinely.

Criteria for abnormal defecograms included limited or excessive pelvic floor motion (Figs. 2 and 3), marked incomplete evacuation, large retentive rectoceles (Fig. 4), moderate to severe rectal intussusception (Fig. 5), rectal prolapse, or anal incontinence. Mild internal intussusception and rectoceles which did not retain contrast material were considered normal variants [5–8]. Abnormal pelvic floor motion was usually found in association with other abnormalities, such as persistent impression from the puborectalis muscle, anal incontinence, or incomplete evacuation. Anal incontinence was defined as an open anal canal at rest with loss of contrast material. Incomplete evacuation was defined as retention of a substantial amount of contrast paste after two or more attempts at defecation.

Medical records were reviewed on all patients to determine the impact of the results of defecography on clinical management. The type of therapy was divided into medical or surgical categories, and the symptomatic outcome of the patient as improved or unimproved relative to the therapeutic categories. Of the 55 patients, 26 had a colonic transit study using radiopaque markers and 24 had anal manometry, but only 12 patients had all three examinations and correlation was not done.

Results

Patients were divided into two groups based on the results of defecography using the previously described criteria (Table 1). There were 26 patients classified as having normal defecograms and 29 patients as having abnormal examinations. The sex (Fischer's exact test) and age (Student *t*-test) distribution of the two groups were not significantly different ($p > .05$). However, patients with normal defecograms were more likely to have constipation as their major indication for the study ($p < .01$; Fischer's exact test).

Mean measurements (±SD) of the ARA and ARJ during the various maneuvers relative to the results of defecography are shown in Table 2. The ARA during rest and on squeezing and straining maneuvers were not significantly different between the normal and abnormal groups. However, the difference between the ARA on squeezing and straining was significantly less in patients with abnormal defecograms. The level of the ARJ during all maneuvers was also not significantly different in the normal and abnormal groups. In the 29 patients with abnormal defecograms, a total of 55 findings were present for an average of 1.9 abnormalities per individual. Absent or excessive movement of the pelvic floor was seen as an isolated finding in only seven patients. Anal incontinence and incomplete evacuation were sole abnormalities in two and four patients, respectively. The remaining patients had a combination of two or more abnormalities.

Clinical outcome of patients was evaluated by review of the medical records and telephone contact in 45 patients (Tables 3 and 4). Ten patients were lost to follow-up and their clinical course was not known. In both groups of patients, comparison of medical vs. surgical treatment and clinical response showed no significant

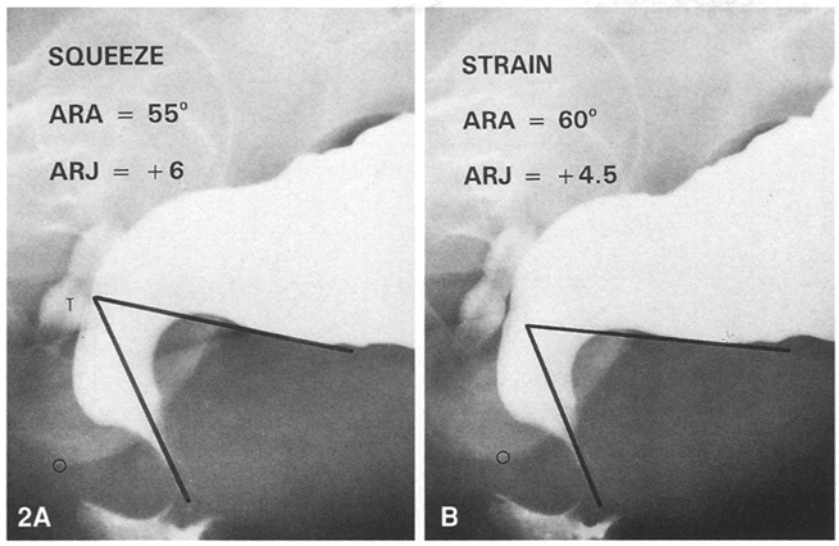
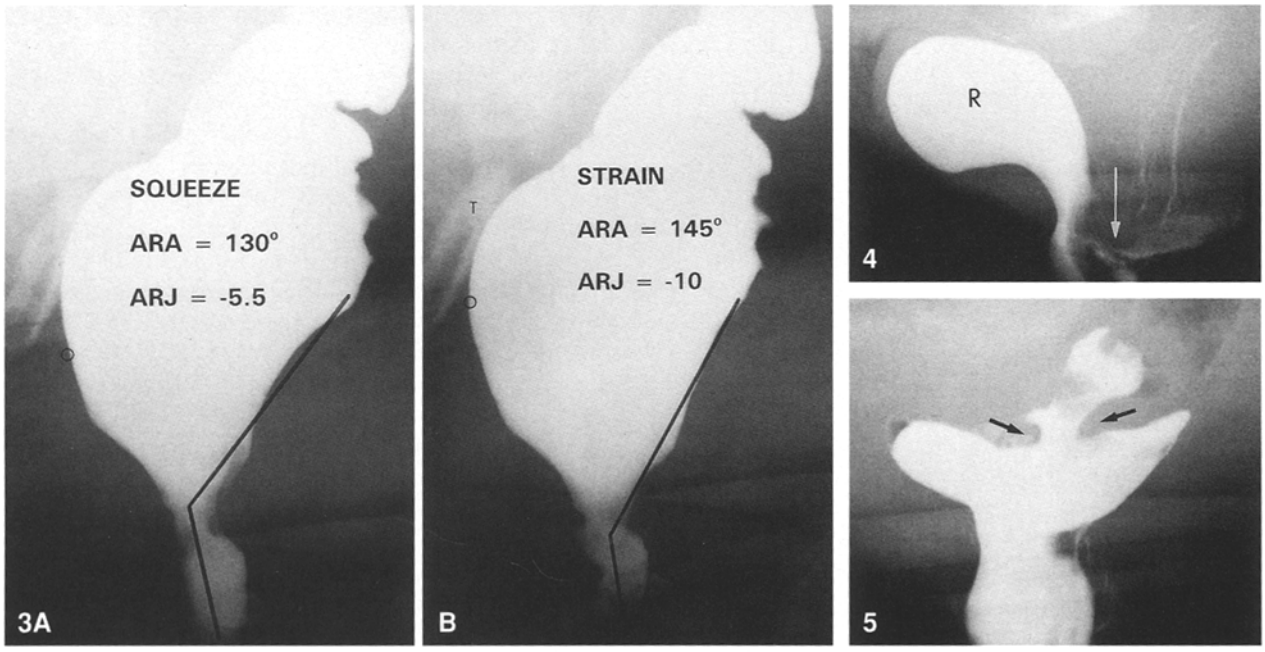


Fig. 2. Spastic pelvic floor syndrome with minimal change in the ARA and ARJ between the squeeze (**A**) and strain (**B**) maneuvers. Persistent impression from the puborectalis sling on straining (*O*, ischial tuberosity; *T*, vaginal tampon).

Fig. 3. Marked pelvic floor laxity in descending perineum syndrome with open ARA and markedly low ARJ on both squeeze (**A**) and strain (**B**) maneuvers. Anal incontinence was also present (*O*, ischial tuberosity; *T*, vaginal tampon).

Fig. 4. Large rectocele (*R*) with retention of barium paste associated with mild rectal prolapse (*arrow*).

Fig. 5. Internal intussusception (*arrows*) of moderate severity.



differences of results ($p > .05$; Fischer's exact test). Also, the clinical response of the patients regardless of the type of therapy performed was not significantly different ($p > .05$; χ^2 test) whether the patients had normal or abnormal defecograms. In summary, the clinical decision as to the type of treatment and the response of the patient to therapy was not related to the results of defecography.

Discussion

Defecography evaluates the anatomy and function of the anal canal and rectum and assesses movements of the pelvic floor. The main clinical indications for defecography are constipation, feeling of incomplete rectal evacuation (i.e., obstructed defecation), anal incontinence, and various less specific anorectal complaints. Despite improvements in the technique for performing defecography and better understanding of anorectal disorders, the role of defecography in defining anorectal abnormalities and its impact on patient management need to be clarified.

The techniques used for performing defecography and the criteria for defining an abnormal examination have varied [1, 2, 6]. In this study, we categorized patients by the results of defecography to evaluate the standard measurements made from the examinations and the impact of the radiologic results on the clinical

Table 1. Comparison of sex, age, and symptoms of patients with normal and abnormal defecography

Findings	Normal	Abnormal
No.	26	29
Sex (F:M)	23:3	25:4
Age (±SD)	44 ± 16 years	49 ± 15 years
Symptoms		
Constipation	24 (94%)	16 (55%)
Obstruction	1 (4%)	4 (14%)
Incontinence	1 (4%)	4 (14%)
Miscellaneous	—	5 (17%)

Table 2. Comparison of measurements of mean anorectal angle (ARA) and mean anorectal junction (ARJ) relative to results of defecography

Measurement	Normal[a]	Abnormal[a]	Significance[b]
ARA (°)			
Rest	91 ± 17	92 ± 23	NS
Squeeze	79 ± 17	83 ± 27	NS
Strain	110 ± 24	109 ± 31	NS
Difference	37 ± 18	26 ± 20	$p < .05$
ARJ (cm)			
Rest	1.3 ± 2.2	0.6 ± 2.5	NS
Squeeze	3.3 ± 2.6	2.1 ± 3.8	NS
Strain	−1.5 ± 2.2	−3.0 ± 3.6	NS
Difference	4.8 ± 2.6	5.6 ± 3.3	NS

[a] ARA in degrees; ARJ in cm relative to level of ischial tuberosity.
[b] Two-tailed *t*-tests; NS, not significant at $p > .05$.

Table 3. Clinical outcome of patients with normal defecograms relative to type of treatment performed

	Method of treatment		
Clinical response	Medical (%)	Surgical (%)	Total case (%)
Improved	9 (60)	4 (57)	13 (59)
Unimproved	6 (40)	3 (43)	9 (41)
Total	15	7	22[a]

[a] Twenty-two of 26 patients evaluated.

Table 4. Clinical outcome of patients with abnormal defecograms relative to type of treatment performed

	Method of treatment		
Clinical response	Medical (%)	Surgical (%)	Total case (%)
Improved	7 (44)	6 (86)	13 (57)
Unimproved	9 (56)	1 (14)	10 (43)
Total	16	7	23[a]

[a] Twenty-three of 29 patients evaluated.

management of the patient. The criteria of a normal defecogram, however, are not well established and include both functional and structural observations [5, 7, 8]. Normal variants, such as small rectoceles and mild internal intussusception, further confuse the definition, particularly when correlation to symptoms is attempted.

Criteria for a normal defecogram must include observations made during the various phases of the examination [1, 5–8]. With the patient at rest in the sitting position, the anal canal is closed, the ARA approximates 90°, and the ARJ is near the level of the ischial tuberosities. With the squeeze maneuver, contraction of the puborectalis muscle produces a more acute ARA and pulls the ARJ superiorly. On straining, the ARA becomes obtuse and the ARJ descends. During evacuation, the anal canal opens maximally and expulsion of most or all of the contrast material occurs with one or several efforts. Thus, diagnosis of a normal defecogram involves both quantitative (e.g., ARA) and subjective (extent of contrast expulsion) criteria.

Abnormal diagnoses on defecography have included intussusception, prolapse, rectocele, spastic pelvic floor syndrome (dyskinetic puborectalis), descending perineum syndrome, and anal incontinence [2, 4, 6]. Problems of defecation may also contribute to the solitary rectal ulcer syndrome [9–11]. Internal rectal intussusception has various stages of severity and milder forms are now considered normal [5, 8]. External rectal prolapse may be evident clinically and is the most severe stage of rectal intussusception. A rectocele represents an outpouching of the anterior rectal wall but is common and unlikely of clinical importance unless large and associated with retention of contrast material. Anal incontinence is defined as a wide open anal canal at rest often associated with other abnormalities.

Spastic pelvic floor syndrome and descending perineum syndrome are more nebulous diagnoses since their criteria involve assessment of pelvic floor motion and extent of rectal contrast expulsion [2, 4, 6, 12–14]. Spastic pelvic floor syndrome likely relates to a dyskinetic puborectalis muscle. With straining, the pelvic floor fails to descend and the ARA may not change or show paradoxical contraction. Repeated straining and incomplete evacuation are common. Unfortunately, the criteria for normal pelvic floor descent have shown wide variation with mean values of 3.0–4.5 cm and a range of 0–7.5 cm reported in various investigations [6–8, 15]. Also, changes in the ARA at rest and with the standard maneuvers have varied widely [2, 5–8, 16]. Skomorowska et al. [17] found no significant differences in the anorectal angle or pelvic floor motion in patients with constipation or incontinence compared to a group of asymptomatic controls. In our study, the anorectal measurements were also similar in patients defined as having normal or abnormal defecography. Thus, an absence of pelvic floor descent and no change

in the ARA or paradoxical elevation of the pelvic floor and closure of the ARA along with retention of contrast material are most suggestive of spastic pelvic floor syndrome.

Descending perineum syndrome represents a diminished muscle tone of the pelvic floor associated with excess straining and eventual incontinence [2, 4, 6, 13–15, 17]. The ARJ is lower than normal and shows excessive motion during straining. The ARA is often obtuse at rest and anal incontinence or incomplete evacuation can occur. As with the spastic pelvic floor syndrome, quantitative measurements are difficult to define except at the various extremes. Reported pelvic floor descent as indicated by changes in the ARJ have varied greatly [6, 8, 15, 18]. Goei [15] found no significant differences between control subjects and symptomatic patients with constipation or incontinence regarding changes in the ARJ during the standard defecographic maneuvers. Similarly, our results of pelvic floor excursions showed no differences. The overlapping measurements in the patients in our series and in recent reports suggest that the standard measurements made on defecography are not reliable indicators by themselves of abnormality.

In both the spastic pelvic floor syndrome and descending perineum syndrome, incomplete evacuation of the contrast material associated with straining are additional criteria of abnormality. Although complete rectal expulsion on one or several attempts is a well-defined normal endpoint, the meaning of incomplete evacuation is less clear [5, 19, 20]. The timing of evacuation, the number of attempts made, and the degree of straining introduce factors that are difficult to assess. Ting et al. [20] studied the volume retained after defecography as a parameter of abnormality. They found that no specific finding on defecography determined a higher or lower amount of remaining volume, and the sense of incomplete evacuation did not depend on the volume retained. Thus, probably only a fairly complete and rapid evacuation on one or several attempts can be used as one criterion of a normal examination.

In our study, the results of defecography had no impact on clinical management of the patients. Medical management included change of diet, use of laxatives, biofeedback, or a combination of these treatments. Surgery was performed in patients presenting with constipation or obstructed defecation, and included partial or complete colectomy. About one third of patients who were followed had surgery, regardless of the findings at defecography. The clinical response of the patients showed no significant differences between treatment groups nor the results of defecography. Unless an obvious abnormality, such as severe rectal intussusception or prolapse is found, results of defecography alone rarely determined clinical management. Clinical presentation, results of other examinations, such as anal manometry and colon transit, patient tolerance of symptoms, and physician preference for the therapy likely impacted on clinical management of patients in our study.

Other investigators have also found poor correlation between defecographic measurements and clinical symptoms [14, 15, 18, 19, 21, 22]. The similarity of radiologic and manometric measurements of anorectal function (i.e., ARA and pelvic floor motion) in patients with defecatory disorders and in asymptomatic subjects question the validity of making abnormal diagnoses based on these measurements alone. Wald et al. [21] found poor correlation of defecographic abnormalities and clinical features with anatomic structural findings also prevalent in patients without symptoms. They caution that surgical intervention to correct anatomic abnormalities in patients with constipation or other defecatory problems be considered only with great caution. The clinical results of our study and the observations made by other investigators suggest the type of management used in patients with defecatory problems not be based solely on the findings at defecography.

The results of this study and the findings in other recent investigations question the role of defecography in evaluating patients with defecation problems. Correlation between symptoms and results of defecography has been poor, and caution of not using defecography alone to decide clinical management suggested. At present, only a few defecographic findings appear to be of relevance. A "normal" defecogram will reassure the clinician in a patient with constipation or obstructed defecation that the problem is unlikely of anorectal origin. Conversely, severe intussusception or rectal prolapse in a patient with appropriate symptoms likely warrants surgical intervention, particularly if associated with other abnormalities, such as enterocele [23]. Between these two extremes, the results of defecography need to be interpreted cautiously.

Further studies need to be done to clarify the role of defecography in the diagnosis and management of patients with anorectal complaints. Additional investigations using a variety of modalities, such as anal manometry, colon transit studies, electromyography, correlation of defecography, and clinical management are needed. In addition, refinement in the technique of defecography is also needed. Radiologic examination is performed in a variety of ways which may impact on its results. Technical variations include the position of the patient (i.e., sitting or lying), type of contrast material used (solid vs. liquid), criteria for measuring the ARA and ARJ, use of static filming vs. motion recording, and assessment of rectal expulsion [2, 5, 6, 24, 25]. Whether a more uniform adoption of specific techniques will provide more relevant conclusions on defecography awaits to be determined.

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