RECTOCELE REPAIR

IN WOMEN WITH OBSTRUCTED DEFECATION

J.H. van Dam

Omslag: "Blue Nude", Charo Aymerich
Tekeningen: Charo Aymerich

RECTOCELE REPAIR
IN WOMEN WITH OBSTRUCTED DEFECATION

OPERATIEF HERSTEL VAN RECTOCELES
BIJ VROUWEN MET EEN BEMOEILIJKTE STOELGANG

PROEFSCHRIFT

TER VERKRIJGING VAN DE GRAAD VAN DOCTOR AAN DE
ERASMUS UNIVERSITEIT ROTTERDAM OP GEZAG VAN DE
RECTOR MAGNIFICUS

PROF. DR P.W.C. AKKERMANS M.A.

EN VOLGENS BESLUIT VAN HET COLLEGE VOOR PROMOTIES

DE OPENBARE VERDEDIGING ZAL PLAATSVINDEN OP
6 OKTOBER 1999 OM 13.45 UUR

DOOR

JOHANNA HENDRIKA VAN DAM

GEBOREN TE GOUDA

PROMOTIECOMMISSIE

PROMOTOREN:	Prof. dr H.A. Bruining
	Prof. dr H.W. Tilanus
OVERIGE LEDEN:	Prof. dr T.J.M. Helmerhorst
	Prof. dr C.G.M.I. Baeten
	Prof. dr J.S. Laméris
CO-PROMOTOR:	Dr W.R. Schouten

ISBN: 90-9012923-5

This thesis was financially supported by: Sanofi-Synthelabo, Novartis Pharma BV, Johnson & Johnson Medical BV, Schering-Plough BV, Oudshoorn Chirurgische Techniek BV, AstraZeneca.

voor mijn vader

CONTENTS

CHAPTER 1

General introduction and aims of the study

INTRODUCTION

Constipation is a symptom of many diseases of mixed origins and mechanisms. Although endocrine, metabolic, pharmacological, psychogenic and organic abnormalities may play a role in the pathogenesis of constipation, it is widely accepted that the main causes of constipation are a low fiber intake and sedentary work.

Size of stool and stool consistency, decreased defecation frequency and obstructed defecation have been used to define constipation. However, size and consistency of stool are impractical to quantify, and although obstructed defecation has been defined as straining during attempted defecation in more than 25 percent of the time, this definition is limited by its subjectivity[1,2]. Defecation frequency is the most easy parameter to evaluate and it is generally accepted that in western countries a 'normal' defecation frequency is three or more times per week. If the criterion of defecation frequency is applied, the estimated prevalence of constipation in the United States is two percent[3]. Besides differences in prevalence of constipation in different age groups and different cultures, gender plays an important role. Studies of patients with severe constipation show that women comprise the overwhelming majority of patients, in aging people, women being three times more affected than men[3-5].

Many subjects with constipation can be managed by simple measurements such as dietary changes, increased fluid intake, addition of bulk, regular physical exercise and use of laxatives and stool softeners. When these measurements are not successful and no causative abnormalities can be detected by conventional investigative procedures, further evaluation is necessary, as surgical treatment might be a therapeutic option.

The colorectal laboratory is a collection of dynamic tests, developed to study the function and mechanisms of the colon, rectum, anal canal and the pelvic floor muscles. In studying constipation, especially anorectal manometry, defecography, electromyography of the pelvic floor, balloon expulsion tests and colonic transit time studies have been used.

Applying the colorectal laboratory, it has become generally accepted that two main types of constipation can be distinguished: colonic inertia and obstructed defecation[6].

Colonic inertia seems to be the result of a primary colonic abnormality. In these patients, colonic transit time studies show a delayed passage of ingested radioopaque markers through the colon[5]. These patients, almost exclusively women, present with severe constipation, with

defecation frequencies of less than once per week. Most of these patients have no urge to defecate, although the act of defecation itself can be normal. Myenteric plexus abnormalities have been detected in these patients and include a decrease in argyrophilic neurons and either normal or increased numbers of Schwann cells[7-9]. These changes have been demonstrated in resected colonic specimens, and may involve the whole colon or be limited to the left colon, while damage limited to the right colon only has never been observed[10]. These neural changes result in an impaired or dyscoordinated peristalsis. Surgical treatment of colonic inertia by subtotal colectomy was first described in 1908 by Sir Arbuthnot Lane[11]. Currently, subtotal colectomy and ileorectal anastomosis are advocated as the most preferable option in patients with colonic inertia[12].

Obstructed defecation or anorectal outlet obstruction, implies that the fecal stream does reach the rectum, but that rectal emptying is difficult and sometimes impossible. This does suggest that in some patients with constipation, the cause is located in the lower rectum rather than in the colon and can therefore be considered as a disorder of fecal excretion rather than as an impairment of colonic motility. Patients with obstructed defecation can have a daily urge to defecate, if the transit of fecal material through their colon is normal. Despite a daily call to stool, it is extremely difficult for them to empty the rectum, resulting in frequent and prolonged straining during attempted evacuation, feelings of incomplete evacuation and a continuous feeling of an urge to defecate. Many patients with obstructed defecation have to empty the rectum digitally. Not seldom the patients are embarrassed to mention this and one has to ask specifically for this act.

Although it has been suggested that several anatomical abnormalities, such as solitary rectal ulcer, intussusception, complete rectal prolapse, enterocele and rectocele, can give rise to obstructed defecation, it is generally accepted that paradoxical activity of the pelvic floor is the major cause of obstructed defecation[13-23]. This phenomenon, also known as anismus or spastic pelvic floor syndrome, implies contraction rather than relaxation of the pelvic floor during straining. On defecography anismus is characterized by a lack of increase of the anorectal angle during attempted evacuation of contrast. Electromyography of the pelvic floor shows an increase in activity of the puborectal muscle during straining. Many patients with obstructed defecation are not able to evacuate an air or water filled balloon. However, recently, doubt has been raised upon the clinical significance of anismus, in view of the

prevalence of anismus in healthy subjects and the lack of agreement between the different diagnostic tests[24-31]. Futhermore, as rectocele repair has reported to be beneficial for the majority of patients with obstructed defecation, increasingly more surgeons regard rectoceles as an important cause of obstructed defecation[32-40].

Patients with anismus frequently present with a concomitant rectocele[17-23,41]. The treatment of these patients is focused on the paradoxical activity of the pelvic floor[41]. This strategy is mainly based on the assumption that anismus is the principal cause of obstructed defecation[24]. Some authors even suggest that anismus contributes to the formation of rectoceles. Based on these aspects most surgeons hesitate to perform rectocele repair in patients with concomitant anismus. A similar controversy exists regarding the optimum treatment of patients with both symptomatic rectocele and colonic inertia[41,43].

AIMS OF THE STUDY

A cohort of women with a rectocele and obstructed defecation was prospectively studied in order to answer the following questions:

1. Are rectoceles a major cause of obstructed defecation?
2. Do rectoceles give rise to vaginal symptoms?
3. Is combined transvaginal/transanal rectocele repair beneficial for women with obstructed defecation?
4. What are the side-effects of rectocele repair?
5. Is rectocele repair beneficial for women with concomitant anismus?
6. Is rectocele repair beneficial for women with both obstructed defecation and colonic inertia?
7. Can we modify the diagnostic work-up in selecting patients for surgery in order to improve results?
8. Can we identify factors predicting the outcome of rectocele repair?

REFERENCES

1. Drossman DA, Sandler RS, McKee DC, Lovitz AJ. *Bowel patterns among subjects not seeking health care.* Gastroenterology 1982;83:529-34.
2. Thompson WS, Heaton KW. *Functional bowel disorders in apparently healthy people.* Gastroenterology 1980;79:283-8.
3. Sonneberg A, Koch T. *Epidemiology of constipation in the united states.* Dis Colon Rectum 1989;32:1-8.
4. Vasilevsky CA, Nemer FD, Balcos EG, Christenson CE, Goldberg SM. *Is subtotal colectomy a viable option in the management of chronic constipation?* Dis Colon Rectum 1988;31:679-81.
5. Preston DM, Lennard-Jones JE. *Severe chronic constipation of young women: "idiopathic slow transit constipation".* Gut 1986;27:41-8.
6. Vanheuverzwijn R, van Wymersch T, Melange M, Dive C. *Chronic idiopathic constipation with outlet obstruction (review).* Hepatogastroent. 1990;37:585-7.
7. Preston DM, Butler MG, Smith B, Lennard-Jones JE. *Neuropathology of slow transit constipation.* Gut 1989;24:997A.
8. Krishnamurthy S, Schuffler MD, Rohrman CA, Pope CE. *Severe idiopathic constipation is associated with a distinctive abnormality of the colonic myenteric plexus.* Gastroenterology 1985;88:26-34.
9. Schouten WR, ten Kate FJ, de Graaf EJ, Gilberts EC, Simons JL, Kluck P. *Visceral neuropathy in slow transit constipation: an immunohistochemical investigation with monoclonal antibodies against neurofilament.* Dis Colon Rectum 1993;36:112-7.
10 Penninckx F, Lestar B, Kerremans R. *Surgery for constipation: Irrational things for desperate people?* Hepatogastroenteroly 1990;37:580-4.
11. Arbuthnot Lane W. *The results of operative treatment of chronic constipation.* Br Med J 1908;1:126-30.
12. Preston DM, Hawley PR, Lennard-Jones JE, Todd IP. *Results of colectomy for severe idiopathic in women.* Br J Surg 1984;71:547-52.
13. Mellgren A, Bremmer S, Johansson C, Dolk A, Uden R, Ahlback SO, Holmstrom B. *Defecography; Results of investigations in 2,816 patients.* Dis Colon Rectum 1994;37:1133-41.

14. Johansson C, Ihre T, Ahlbäck SO. *Disturbances in the defecation mechanism with special reference to intussusception of the rectum (internal procidentia).* Dis Colon Rectum 1985;28:920-4.

15. Mahieu P, Pringot J, Bodart P. *Defecography: II. Contribution to the diagnosis of defecation disorders.* Gastrointest Radiol 1984;9:253-61.

16. Turnbull GK, Bartram CI, Lennard-Jones JE. *Radiologic studies of rectal evacuation in adults with idiopathic constipation.* Dis Colon Rectum 1988;31:190-7.

17. Siproudhis L, Robert A, Lucas J, Reoul JL, Hereshbach D, Bretagne JF, Gosselin M. *Defecatory disorders, anorectal and pelvic floor dysfunction: a polygamy?* Int J Colorect Dis 1992;7:102-7.

18. Bartolo DC, Roe AM, Virjee J, Mortensen NJ, Locke-Edmunds JC. *An analysis of rectal morphology in obstructed defecation.* Int J Colorectal Dis 1988;3:17-22.

19. Bartram CI, Turnbull GK, Lennard-Jones JE. *Evacuation proctography; an investigation of rectal expulsion in 20 subjects without defecatory disturbance.* Gastroint Radiology 1988;13:72-80.

20. Ekberg O, Nylander G, Fork FT. *Defecography.* Radiology 1985;155:45-8.

21. Hiltunen KM, Kolehmainene H, Matikainen M. *Does defecography help in diagnosis and clinical decision-making in defecation disorders?* Abdom Imaging 1994;19:355-8.

22. Duthie HL. *Defecation and the anal sphincters.* Clin Gastroenterol 1982;11:621-31.

23. Preston DM, Lennard-Jones JE. *Anismus in chronic constipation.* Dig Dis Scie 1985;30:413-8.

24 Schouten WR, Briel JW, Auwerda JJA, van Dam JH, Gosselink MJ, Ginai AZ, Hop WCJ. *Anismus: fact or fiction?* Dis Colon Rectum 1997;40:1033-41.

25. Fink RL, Roberts LJ, Scott M. *The role of manometry, electromyography and radiology in the assessment of intractable constipation.* Aust N Z J Surg 1991;61:959-64.

26. Jorge JMN, Wexner SD, Ger GC, Salanga VD, Nogueras JJ, Jagelman DG. *Cinedefecography and electromyography in the diagnosis of nonrelaxing puborectalis syndrome. Dis Colon Rectum* 1993;36:668-76.

27. Bartolo DCC, Roe AM, Virjee J, Mortensen NJ, Locke-Edmunds JC. *An analysis of rectal morphology in obstructed defecation.* Int J Colorect Dis 1988;3:17-22.

28. Read NW, Timms JM, Barfield LJ. *Impairment of defecation in young women with severe constipation.* Gastroenterol 1986;90:53-60.

29. Roe AM, Bartolo DCC, Mortensen NJ. *Slow transit constipation. Comparison between patients with or without previous hysterectomy.* Dig Dis Sci 1988;33:1159-63.

30. Lubowski DZ, King DW, Finlay IG. *Electromyography of the pubococcygeus muscles in patients with obstructed defecation.* Int J Colorect Dis 1992;7: 184-7.

31. Dahl J, Lindquist BL, Tysk C, Leissner P, Philipson L, Jarnerot G. *Behavioural medicine treatment in chronic constipation with paradoxical anal sphincter contraction.* Dis Colon Rectum 1991;34:769-76.

32. Meligren A, Anzen B, Nilsson BY, Johansson C, Dolk A, Gillgren P, Bremmer S, Holmström B. *Results of rectocele repair. A prospective study.* Dis Colon Rectum 1995;38:7-13.

33. Pitchford CA. *Rectocele: a cause of anorectal pathologic changes in women.* Dis Colon Rectum 1967;10:464-467.

34. Sullivan ES, Leaverton GH, Hardwick CE. *Transrectal perineal repair: an adjunct to improved function after anorectal surgery.* Dis Colon Rectum 1968;11:106-14.

35. Capps WF. *Rectoplasty and perineoplasty for the symptomatic rectocele: a report of fifty cases.* Dis Colon Rectum 1975;18:237-44.

36. Khubchandani IT, Sheets JA, Stasik JJ, Hakki AR. *Endorectal repair of rectocele.* Dis Colon Rectum 1983;26:792-6.

37. Sehapayak S. *Transrectal repair of rectocele: an extended armamentarium of colorectal surgeons. A report of 355 cases.* Dis Colon Rectum 1985;28:422-33.

38. Block IR. *Transrectal repair of rectocele using obliterative sutures.* Dis Colon Rectum 1986;29:707-11.

39. Sarles JC, Arnaud A, Selezneff I, Olivier S. *Endo-rectal repair of rectocele.* Int J Colorect Dis 1989;4:167-71.

40. Arnold MW, Stewart WRC, Aguilar PS. *Rectocele repair. Four year experience.* Dis Colon Rectum 1990;33:684-7.

41. Johansson C, Nilsson BY, Holmstrom B, Dolk A, Meligren A. *Association between rectocele and paradoxical sphincter response.* Dis Colon Rectum 1992;35:503-9.

42. Mellgren A, Anzen B, Nilsson BY, Johansson C, Dolk A, Gillgren P, Bremmer S, Holmstrom B. *Results of rectocele repair. A prospective study.* Dis Colon Rectum 1995;38:7-13.

43. Infantino A, Masin A, Melega E, Dodi G, Lise M. *Does surgery resolve outlet obstruction from rectocele?* Int J Colorectal Dis 1995;10:97-100.

CHAPTER 2

Anatomy of the pelvic floor, the rectovaginal septum and the perineal body

THE PELVIC FLOOR

The pelvic floor maintains its position in the body by constant dynamic activity. It acts in conjunction with the striated muscles of the anterior abdominal wall and does not only support the pelvic and abdominal contents, but also contributes to the maintenance of intra-abdominal pressure. In the embalmed cadaver, the pelvic floor is a hollow, concave and bowl-shaped structure that has been distended downward by the loss of neuromuscular activity and the pressure of the abdominal contents. When examined in living persons, the pelvic floor is a convex, dynamic structure that has to expand and contract continually in response to different stimuli and conditions[1]. It has to contract in order to maintain urinary and fecal continence, and yet it must relax to allow the expulsion of urine and feces. During child-birth it has to distend considerably to allow the passage of a full-term fetus, yet it has to contract again postpartum to permit all of the normal functions to be maintained. The pelvic floor is formed by overlapping paired musculotendinous sheets of predominantly striated fibers known as the levator ani muscles[2-4]. The major components of this pelvic diaphragm are the iliococcygeus, the pubococcygeus and the puborectalis muscles, although the posteriorly situated coccygeus muscles are sometimes included in this group. The iliococcygeus arises from the arcus tendineus of the fascia of the internal obturator muscle posterior and caudal to the origin of the pubococcygeus. The fibers run posteromedially, where they merge and insert into the anococcygeal ligament and the last two segments of the sacrum[2,4]. The second and more important part of the levator complex, also denominated as the pubovisceral part, consists of two muscles: the pubococcygeus muscle and the puborectalis muscle[2,5,6]. This pubovisceral part consists of a thick U-shaped band of muscle that arises from the pubic bones and attaches to the lateral walls of the vagina and rectum. Fibers from this muscle band then go behind the rectum to form a supporting sling. This sling pulls the rectum toward the pubic bones when these muscles contract. The pubococcygeus muscle originates from the posterior inferior aspect of the pubic bone, the obturator fascia, and of the arcus tendineus, and runs horizontally backwards fusing with the iliococcygeus muscle and with its counterparts, which can be observed in figure 1. They merge in a broad fibrous band which, in turn, is inserted in the anterior aspects of the sacrum and the first part of the coccyx. Specific bundles extend medially and contribute to the posterior musculature of the urethra, and join the puborectalis muscle to provide a slinglike posterior support to the rectum. The fusion of the right and left

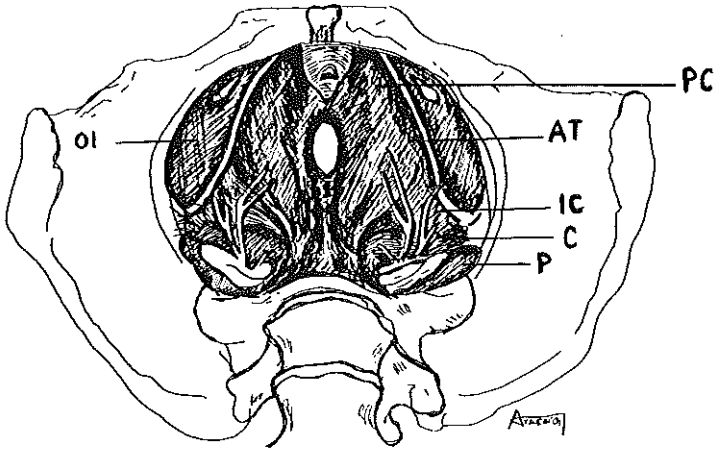

Figure 1

View of the pelvic floor from above. *OI*= obturator internus muscle; *PC*= pubococcygeus muscle; *AT*= arcus tendineus; *IC*= iliococcygeus muscle; *C*= coccygeus muscle; *P*= piriformis muscle.

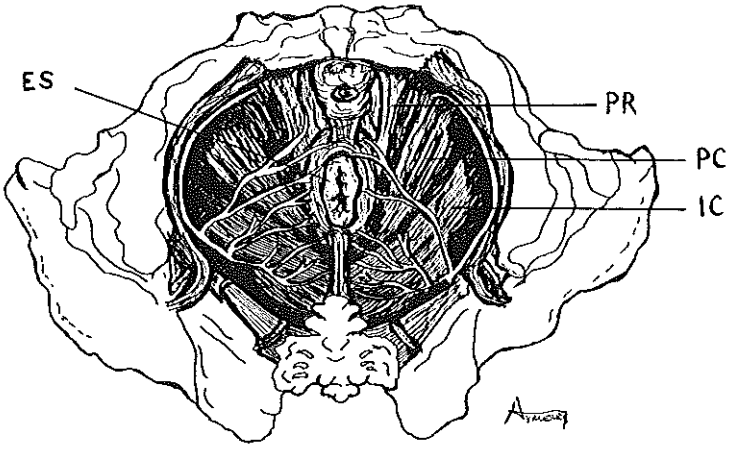

Figure 2

View of the pelvic floor from below. *PR*= puborectalis muscle; *PC*= pubococcygeus muscle; *IC*= iliococcygeus muscle; *ES*= external anal sphincter muscles.

pubococcygeus muscle posterior to the rectum is called the "levator plate". The puborectalis muscle is the most caudal component of the levator ani complex. It arises from the posterior aspects of the body of the pubis, the inferior pubic ramus, the superior fascia of the urogenital diaphragm, and the adjacent obturator internus fascia and loops around the rectum posteriorly to form a strong, slinglike band, as can be seen in figure 2.

The lowermost portion of this band becomes intimately fused with the deep bundles of the external anal sphincter. Anterior to the rectum, the puborectalis muscle is not inserted in the anterior rectal wall and its two slings do not approach each other along a distance of three to four centimeters, creating a gap, often denominated as the "levator gap". This gap is partly closed by the accessory pelvic diaphragm or triangular ligament and rests caudally on the external anal muscle.

THE RECTOVAGINAL SEPTUM

The relationship of the vagina to the juxtaposed organs and structures such as the urethra, the bladder, the rectum and the perineal body, has been extensively studied. Although the rectovesical fascia in males is composed of dense tissue separating the rectum from the seminal vesicles and prostate, as described by Denonvillier in 1839, anatomists and gynecologists have debated the existence of a similar structure in females[2]. During surgery, no substance resembling a fascia can be recognized and the rectovaginal fascial space seems to consist of a layer of loose areolar tissue, beginning approximately at the anorectal junction and ending where the rectum comes into contact with the cul-de-sac peritoneal reflection.

A "fascia" between the rectum and the vagina was first mentioned in 1883 by Emmet as being part of a pelvic fascia, surrounding and supporting the pelvic organs[7]. Based on specimen dissections of the fetal and female pelvis, the rectovaginal fascia, which is considered as a peritoneal remnant corresponding to the male rectovesical septum, is formed in the fourteenth week of gestation by peritoneal fusion[8-11]. It contains collagen which is quite dense in some spots, some strands of smooth muscle, and a very dense network of elastic fibers. Since the rectovaginal fascia is closely adherent to the vaginal wall, it seems likely that surgeons, in performing posterior colporrhaphy, do not get into the space between the vaginal fascia and the rectovaginal septum, but into the space between the rectovaginal septum and the rectal fascia[9,12].

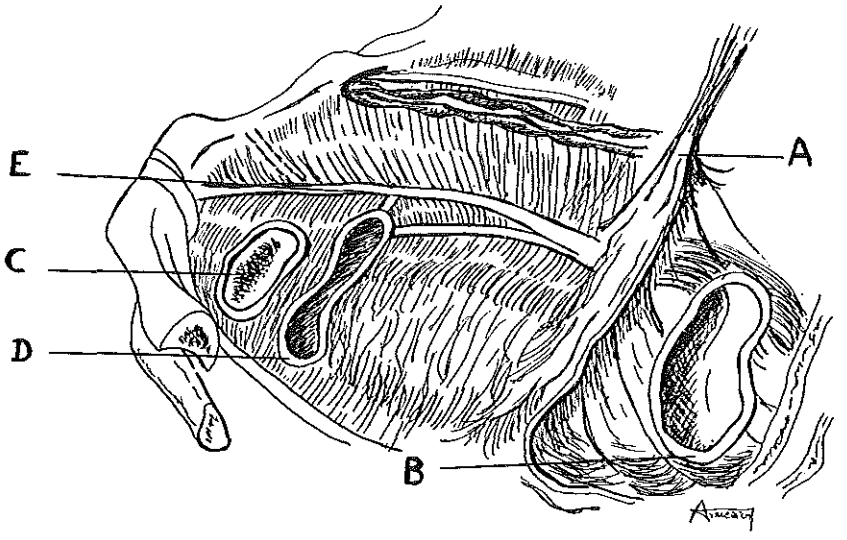

Figure 3

The rectovaginal fascia (A) as viewed from above as it lies over the rectum (B), with the bladder (C), uterus and the entire upper two-thirds of the vagina (D) removed. It should be noted that laterally this layer merges into the fascial covering of the iliococcygeus and pubococcygeus muscles, along a line immediately below the arcus tendineus fascia pelvis, or white line (E).

The rectovaginal fascia has a diaphragm-like configuration with its principal attachments located peripherally, as is shown in figure 3. Cranially it is attached to the uterosacral ligaments and the base of the cardinal ligaments and to the peritoneum at the bottom of the pouch of Douglas by two diverging limbs, indicative of its origin from two peritoneal leaves. Laterally it fuses with the fascia of the levator muscle, and distally it merges into the perineal body [13]. It may be apparent that the rectovaginal septum, together with the uterosacral ligaments, constitutes a continuous layer of support extending from the sacrum above to the perineal body below[12].

THE PERINEAL BODY

In its caudal part, the vagina is separated from the anal canal by the perineal body and the anal sphincter complex. Together they have the shape of a pyramid. The perineal body consists of a mass of fibrous tissue and muscular tissue. It is inserted by muscle fibers from the urogenital diaphragm, which is composed of the deep transverse perinei muscle and its fascial coverings, fibers from the superficial transverse perinei muscle, the bulbocavernosus muscle and from the external anal sphincter. The most important and strongest supporting element of the perineal body is the puborectal portion of the levator ani, with its mid-line decussations of fibrous tissue, which is in direct continuity with the rectovaginal fascia, as is shown in figure 4. These insertions into the normally intact perineum constitutes a fixed point[14,15]. In fact, the perineal body is suspended from the sacrum by the uterosacral ligaments and the rectovaginal septum, constituting a chain of support[12].

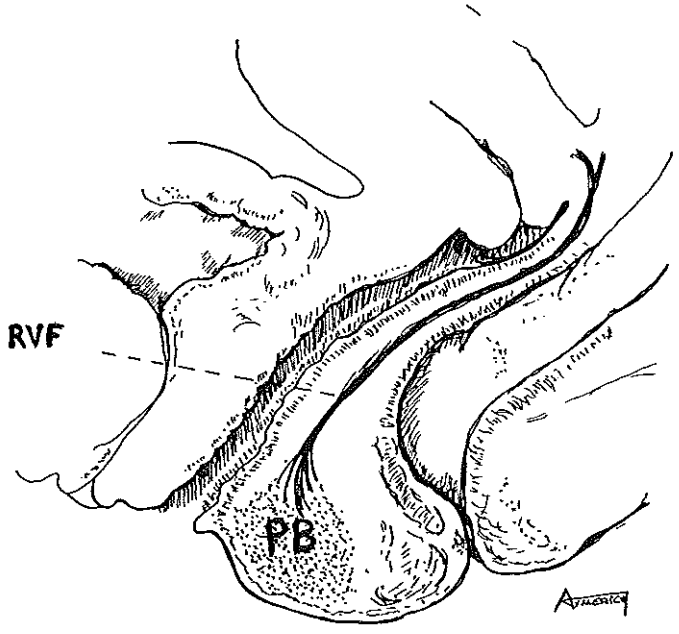

Figure 4.

The perineal body (PB) is shown in the sagittal section. Its cranial attachments to the rectovaginal fascia (RVF) can be seen.

REFERENCES

1. Huguosson, Jorulf H, Lingman G, Jacobsson B. *Morphology of the pelvic floor.* Lancet 1991;337:367-72.
2. Nichols DH. *Surgery for pelvic floor disorders.* Surg Clin North Am 1991;71:927-46.
3. Lucas DL, Landy LB. *The gynaecologist's approach to anterior rectoceles.* Sem Colon Rectal Surg 1992;3:138-43.
4. Lewis Wall L. *The muscles of the pelvic floor.* Clin Obstet Gynecol 1993;36:910-25.
5. Goff BH. *A histologic study of the perivaginal fascia in nulliparae.* Surg Gyn and Obst 1931;52:32-42.
6. Lawson JON. *Pelvic anatomy, I: pelvic floor muscles.* Ann R Coll Surg Engl. 1974;54:244-52.
7. Emmet TA. *A study of the etiology of perineal laceration with a new method for its proper repair.* Trans Am Gyn Soc 1883;8:210-6.
8. Kaupilla O, Punnonen R, Teisala K. *Prolapse of the vagina after hysterectomy.* Surg Gynaecol Obstet 1985;161:9-11.
9. Uhlenhuth E, Nolley GW. *Vaginal fascia, a myth?* Obstet and Gynec 1957;10:349-58.
10. Milley PS, Nichols DH. *A correlative investigation of the human rectovaginal septum.* Anat Rec 1968;163:443-52.
11. Tobin CE, Benjamin JA. *Anatomical and surgical restudy of Denonvillier's fascia.* Surg Gynaecol Obst 1945;80:373-88.
12. Richardson AC. *The rectovaginal septum revisited; its relationship to rectocele and its importance in rectocele repair.* Clin Obst Gynecol 1993;36:976-83.
13. Nichols DH, Milley PS. *Surgical significance of the rectovaginal septum.* Am J Obstet Gynecol 1970;108:215-20.
14. Capps WF. *Rectoplasty and perineoplasty for the symptomatic rectocele: a report of fifty cases.* Dis Colon Rectum 1975;18:237-44.
15. Sullivan Es, Leaverton GH, Hardwick CE. *Transrectal perineal repair: an adjunct to improved function after anorectal surgery.* Dis Colon Rectum

1992;35:235-7.

CHAPTER 3

Rectocele; pathogenesis, symptoms, diagnosis and a review of surgical treatment.

PATHOGENESIS

A rectocele is a herniation of the anterior rectal wall into the lumen of the vagina. In "normal" conditions, the vagina is separated from the upper fourth part of the rectum by the recto-uterine excavation, from the middle half part of the rectum by the rectovaginal septum, and from the anal canal by the perineal body. A rectocele only develops when weakening or laceration of these structures occurs. Several factors contribute to this process.The most common cause of injury to the pelvic floor is childbirth[1-3]. The dynamic effects of the weight of the uterine contents and the pregnancy-induced changes of the soft tissues of the pelvis have impact on the pelvic structures in the future non-pregnant state. The parturition itself causes injury to the pelvic structures and can be classified into general relaxation and injury of the pelvic floor, injury to the rectovaginal septum and injury to the perineum[4] .

General relaxation and injury to the pelvic floor. The function of the levator ani muscles can be compromised due to damage to the pelvic floor musculature occurring during vaginal delivery. Besides direct injury, partial denervation of the muscles may result in atrophy with myopathic changes, alteration of the type and proportion of fiber types and changes in the size of muscle fibers. Neurophysiological studies have demonstrated that pelvic floor weakness in genito-urinary prolapse and stress incontinence of urine in addition to rectal prolapse and fecal incontinence is associated with partial denervation of the pelvic floor muscles[5-8]. It has been demonstrated that most women have some evidence of pelvic floor denervation after childbirth and women who delivered a larger than average baby or who pushed for more than one hour in the second stage of labor suffered a greater degree of injury [7]. Elective Cesarean section appears to protect the pelvic floor from injury[7]. Snooks *et al* showed that forceps delivery is associated with more denervation injury. This effect is cumulative with further deliveries [9]. Direct injury or partial denervation gives rise to elongation of the pelvic floor. It is important to note that in the normal situation, the longitudinal axis of both the vagina and the rectum are directed posteriorly, supported by the almost horizontal levator plate. If there has been elongation of the pelvic floor muscles, these muscles become more vertical, with an increasing tendency for the rectum to encroach upon the vagina.

Injury to the rectovaginal septum. The rectovaginal septum assists normal defecation by preventing the rectum from herniating into the vagina. The rectovaginal septum is elongated during parturition[2]. Besides this stretching, laceration of the septum may also occur. Such a

laceration most often occurs at or near the junction of the rectovaginal septum with the perineal body and predisposes to the formation of a rectocele. Richardson demonstrated in patients with a rectocele isolated tears in the rectovaginal septum[10]. According to this author, the most common break in the rectovaginal septum resulting in a rectocele, is a transverse separation immediately above its attachment to the perineal body[10]. The support of the rectovaginal septum during defecation is lost if there is a localized defect or if there is stretching of the septum.

Injury to the perineum. Injury to the perineum can lead to disruption of the attachments of the levator ani and the bulbocavernosus muscle to the perineum. This can give rise to the formation of a supra-sphincteric pocket. It seems obvious that the longer and the more difficult the process of giving birth is, the more severe the injury to these pelvic structures will be, although no specific data on this issue are available.

Besides childbirth, the aging process is also an etiologic factor. Lack of estrogenic hormone support in menopausal woman contributes to loss of elasticity of the supporting tissues of the uterus. Both estrogen and progesterone receptors have been detected with monoclonal antibody assay techniques in the nuclei of connective tissue cells and striated muscle cells in the pelvic floor muscles as well as in the nuclei of smooth muscle cells in the round ligament[11,12]. These findings do suggest that the reduction in estrogen level contributes to the increased incidence of prolapse after menopause. During menopause, the uterus atrophies and is able to descend more readily. Prolapse of the uterus usually gives rise to the formation of a cystocele because of the strong adherence of the bladder to the anterior rectal wall[13]. Although the adherence of the vagina to the rectum is much less firm, prolapse of the uterus in general also leads to the formation of a rectocele. It is noted that rectoceles can also occur in nulliparous women after menopause. This can only be accounted on the tendency to weakening of supportive structures in the later period of life.

A high number of patients with symptomatic rectocele have undergone a hysterectomy previously[14-16]. The exact role of hysterectomy in the formation of a rectocele is unknown[17]. Besides damage to the inferior hypogastric plexus, giving rise to a larger diameter of the rectum, increased rectal compliance, and impaired rectal sensory function, anatomical changes can be of importance[18-19]. Hysterectomy may give rise to thinning of the rectovaginal septum, which contributes to the development of a rectocele[19]. Patients who underwent a hysterectomy

for prolapse of the uterus, frequently develop a prolapse of the posterior vaginal wall after this procedure, since prolapse of the uterus is often associated with relaxation of the posterior pelvic compartment[20].

SYMPTOMS

It is generally accepted that rectoceles can give rise to feelings of vaginal prolapse. It is not known how rectoceles cause these feelings. This may be accounted for by the fact that in patients with a rectocele, often other gynecological abnormalities are present.

It was Redding who first described the association of rectoceles and anorectal pathology[21]. Since then, it has become clear that rectoceles are frequently observed in patients with difficulty in stool evacuation. Patients with obstructed defecation can have a daily urge to defecate, if the transit of fecal material through their colon is normal. Despite a daily call to stool, it is extremely difficult for them to empty the rectum, resulting in frequent and prolonged straining during attempted evacuation, feelings of incomplete evacuation and a continuous feeling of an urge to defecate. Many patients with obstructed defecation have to empty the rectum digitally. Not seldom the patients are embarrassed to mention this, and one has to ask specifically about this act.

It is still debated whether rectoceles *per se* can give rise to obstructed defecation[16,19,,22]. Rectoceles have been observed in women with a normal defecation pattern[3,23,24]. The prevalence of obstructed defecation in an unselected group of women with a rectocele on physical examination varies between the 23 and 70 percent[3,23,24]. Defecography, performed in asymptomatic women, has revealed an anterior bulge of the rectal wall in 15 to 80 percent[25-30]. However, these rectoceles are small and exceed two cm only in a minority of cases[25-30,32,40,41].

In patients with a rectocele, other possible causes of obstructed defecation, such as intussusception and anismus, are a frequent finding[31-34]. In such cases it is unclear whether the symptoms of obstructed defecation are due to the rectocele or to other abnormalities.

DIAGNOSIS

Clinical features.

Pelvic floor weakness can give rise to many symptoms, such as pelvic pain, a feeling of pressure, urinary symptoms, dyspareunia and feelings of vaginal prolapse. These symptoms

may lead to gynecological or urological referral, whereas constipation and fecal soiling will bring the patient to the colorectal surgeon.

Obstructed defecation manifests in various ways. Some patients complain of constipation, saying that, "the movement comes right down, but I can't get it out, there is a blockage of outlet". Others have to utilize manual pressure on the side or the front of the rectal outlet and against the posterior wall of the vagina in order to empty the bowel. A constant feeling of pressure, and a sensation of incomplete evacuation after defecation are often mentioned. Symptoms related to associated anorectal pathology such as bleeding, hemorrhoidal swelling, pain, soiling and problems of control ranging from poor control to complete incontinence should be evaluated. Since impairment of colonic function may coexist in these patients, defecation frequency, (ab)use of laxatives, and daily urge to defecate should be asked about specifically.

Physical examination

A thorough physical examination is essential in diagnosing rectocele. Rectovaginal examination can be performed with the patient either in the prone, left lateral, or the supine position. The perineum is inspected, in particular noting the amount of perineal descent, the presence of scars related to previous obstetric tears and episiotomies and the state of the vaginal introitus. A rectocele can be diagnosed by palpation with the patient in prone or left lateral position. A hooked finger pressed on the anterior rectal wall can detect the weakness or pocket quite easily. Sometimes the rectocele is large enough to be seen or felt in the vaginal introitus, and often retained fecal material can be palpated in the rectocele. It is useful to perform the physical examination bimanually. Introduction of a finger into the rectum alone is frequently misleading[42]. If any doubt remains, the examination should be performed bimanually with the patient in the supine position. It is important to ask the patient to bear down. Examination in this position is also useful in order to detect concomitant abnormalities such as a cystocele, an enterocele and prolapse of the uterus. It has been stated that physical examination alone is sufficient to diagnose rectoceles[43-46]. However, in women with a lax introitus, it is quite easy to display a normal vaginal wall, giving the illusion of a rectocele. Most often it is not possible to distinguish rectocele from an enterocele by physical examination alone[47]. The use of a bivalve speculum and trans-illumination of the rectovaginal septum facilitate the differentiation

between rectocele and enterocele[48]. The observation of peristalsis in the posterior vaginal wall is pathognomonic for an enterocele.

Although physical examination is sufficient to diagnose a rectocele, it neither quantitates, nor estimates emptying ability accurately[47,49]. Numerous grading schemes have been proposed to quantify the size of the vaginal prolapse. The most recent accepted international standard, the current ICS (International Continence Society) system, incorporates direct measurements of the degree of vaginal prolapse in relation to the hymen during straining[50,51]. It provides more precise information than the traditional first/second/third degree or mild/moderate/severe classification. However, this system does not attempt to identify the structures behind the vaginal wall, nor does it quantify the size of the rectocele from the rectal side. An objective clinical grading system for the rectal side does not exist.

Imaging and physiological studies

Defecography

Defecography provides a useful tool for the objective assessment of rectoceles. Not only their size, but also the degree of contrast retention within the rectocele can be visualized. Other aspects such as rectal evacuation during defecation and perineal descent can be assessed. Defecography also enables the detection of anatomic abnormalities such as rectal intussusception, enterocele and/or sigmoidocele. Additional information concerning the surrounding structures may be obtained by insertion of contrast into the vagina and bladder, opacification of small bowel by the swallowing of contrast and by injecting contrast into the peritoneal cavity. Since it is a dynamic investigation, movement of the pelvic floor during defecation and signs of anismus can be evaluated. Siproudhis *et al* evaluated the accuracy of clinical examination in patients complaining of obstructed defecation[52]. They concluded that clinical evaluation was very helpful to diagnose a rectocele, with excellent sensitivity and good negative predictive values (96 and 94% respectively). Agreement between clinical diagnosis and defecography was noted in 80 percent of cases. Other authors showed that in up to 20 percent of patients with a rectocele on defecography, physical examination could not verify this finding[15].

Figure 1 shows a defecography with a rectocele and a concomitant enterocele.

Figure 1

A rectocele and a concomitant enterocele of the small bowel. The vaginal wall is coated with contrast.

Scintigraphic defecography

In scintigraphic defecography artificial stool containing technetium-99m is injected into the rectum. In seated position, during attempted defecation in front of a gamma camera, dynamic images are taken every 2-5 seconds[53-55]. This method of investigation provides more precise quantitative data about evacuation rate, and completeness of rectal emptying. Furthermore, this technique gives a lower radiation dose. Disadvantages of this technique are its lack of anatomic detail and inability to image other pelvic floor structures.

Anal Endosonography

In patients incontinent for feces, anal endosonography is indicated to demonstrate defects in the internal and external anal sphincters[56]. Rectoceles can not be visualized with anal endosonography, however, enteroceles can be shown easily with this modality[57].

Colonic transit time study

In patients with obstructed defecation who have no daily urge to defecate, a colonic transit time study is necessary to obtain information about colonic functioning. Analyzing the data of studies on patients with symptomatic rectocele, delayed colonic transit has been reported in up to 39 percent[15,29,58]. The outcome of rectocele repair in patients with delayed colonic transit can be disappointing[15,29]. However, caution must be taken in evaluating patients with delayed transit of radiopaque markers in the distal part of the colon. As reported by Karlbom, rectal emptying seems to improve after rectocele repair[58]. This finding does suggest that the entrapment of feces in the anterior rectal outbulge is the cause of impaired rectal emptying. It seems likely that after successful rectocele repair the transit through the distal part of the colon will be faster.

Electromyography of the pelvic floor.

Most colorectal surgeons perform an EMG in patients with symptomatic rectocele to evaluate signs of anismus, since symptoms due to anismus are assumed to be identical to those resulting from rectocele. EMG of the pelvic floor is considered as the golden standard to diagnose anismus, however, no single diagnostic test has been proven to be pathognomonic for anismus or superior to others. Recently, doubt has been raised on the clinical significance of anismus. EMG studies performed in control subjects have shown a high prevalence of anismus[59]. It has been stated that because of the left lateral position during this investigation, straining, after the insertion of a painful needle and without a natural desire to defecate is rather unphysiologic, and as a result the true prevalence of anismus can be overestimated[59]. Results of EMG measurements are shown in figure 2.

Balloon expulsion test

Balloon expulsion test (BET) is another method that is commonly used to reach the diagnosis anismus. Different techniques to perform this test are described, with the patient positioned in the left lateral or sitting position, or with an air or water filled balloon. It is however questionable, whether the inability to expel a balloon represents anismus, since it is often observed that control subjects are not able to expel a balloon. Several studies have shown a lack of agreement between not only EMG and BET, but also defecography and BET[59].

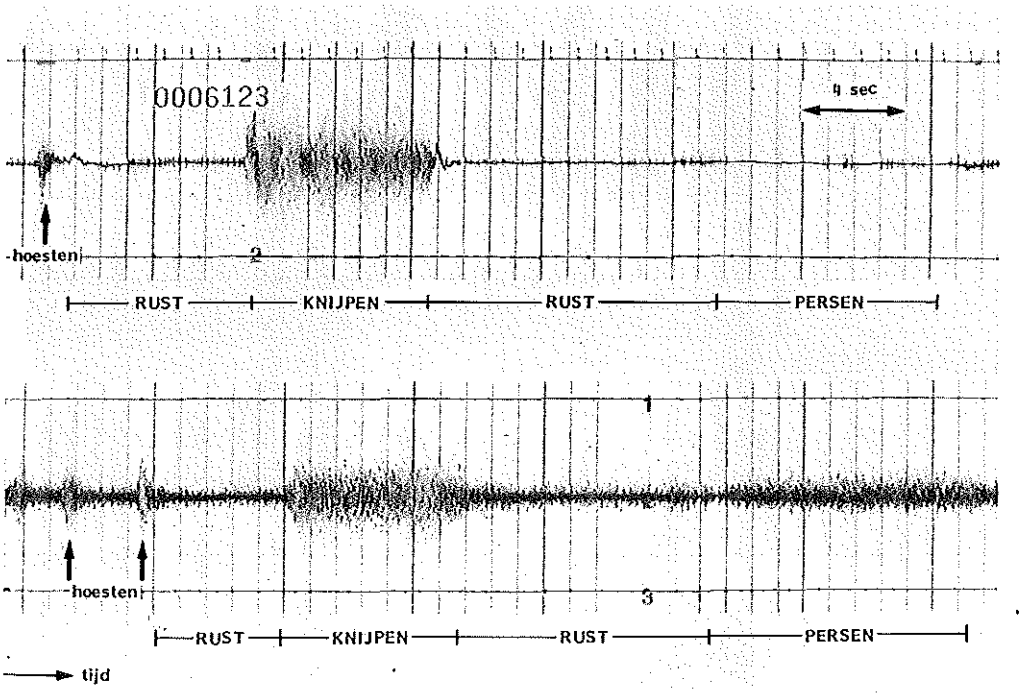

Figure 2

The upper part of the figure shows a "normal" EMG measurement; an increase in activity of the pelvic floor muscles is observed during squeezing (knijpen), whereas during straining (persen) no activity of the pelvic floor muscles is recorded. The lower part of the figure show EMG results of a patient in whom anismus was diagnosed; an increase in activity of the pelvic floor muscles is observed during squeezing (knijpen), also during straining (persen) an *increase* in activity of the pelvic floor muscles is recorded

Anorectal manometry

Anorectal manometry in patients with obstructed defecation is performed to exclude the presence of Hirschsprung's disease, since in these patients no anal inhibitory reflex is observed. Other indications to perform anorectal manometry are to diagnose anismus and to evaluate the function of the anal sphincter complex.

Table 1

Summary of the literature on transanal rectocele repair.

Author (reference)	Study design	Number of pts	Indications	Follow-up (median)	Results	Comments
Sullivan 1968 (42)	Retrospective	151	Pain (46%), bleeding (44%), difficulty in evacuation (43%), prolapse (28%), soiling (39%)	3 months-4.5 years (18.5 months)	Excellent 22.5% Good 57% Fair 18% Poor 2.5%	Patients with enterocele, cystocele and/or uterine prolapse excluded
Capps 1975 (63)	Retrospective	50	Constipation (76%), manual assistance (39%), pain (23%)	?	Excellent 76% Good 18% Fair 4% Poor 2%	Patients with enterocele, cystocele and/or uterine prolapse excluded
Khubchandani 1983 (46)	Retrospective	59	Not mentioned	(18.8 months)	Excellent 63% Good 17% Fair 14% Poor 7%	Only the low variety of rectocele No perineal repair
Schapayak 1985 (45)	Retrospective	204	Constipation (82%), pain (70%), bleeding (63%)	?	Excellent 50% Good 35% Fair 14% Poor 1.5%	Only the low variety of rectocele
Block 1986 (66)	Retrospective	60	Only 14 patients had anorectal symptoms	1.5-4 years	Improved 100%	Only the mid-vaginal rectoceles
Sarles 1989 (65)	Retrospective	16	Difficult evacuation (100%), digitation (75%)	?	Good 69% Fair 25% Poor 6%	Only intermediate rectoceles Only if digitation Intussusception excluded
Arnold 1990 (69)	Retrospective	35	Constipation (75%)	>24 months	Good 83%	
Janssen 1994 (61)	Prospective	64	Difficult evacuation (72%), fecal incontinence (40%). Also males with intussusception included	3-8 years	Excellent 50% Fair 32%	
Infantino 1995 (16)	Retrospective	13	Difficult evacuation (100%)	2 months-2 years (18.8 months)	Excellent 50% Fair 25% Poor 25%	Patients with anismus, enterocele or intussusception excluded
Murthy 1996 (64)	Retrospective	33	Vaginal mass/bulge (58%), retention of rectocele on defecography (55%)	5-64 months (31 months)	Excellent 8% Good 54% Fair 31% Poor 8%	
Karlbom 1997 (58)	Prospective	34	Constipation and difficulty in evacuation (100%)	2-60 months (10 months)	Good 79% Poor 21%	
Khubchandani 1997 (62)	Retrospective	123	Not mentioned	1-108 months (38 months)	Excellent 82% Poor 19%	
Yik-Ho 1998 (67)	Prospective	21	Severe straining (90%), vaginal digitation (76%)	36.7 months	Improved 100%	Patients with slow transit on marker study excluded

Dynamic MR imaging

Dynamic MRI has been performed in patients with a rectocele[60]. Advantage of this technique is the visualisation of all the compartments of the pelvis. Furthermore, MR imaging is non-invasive and lacks the risk of X-ray exposure. The disadvantage of this technique however, is the technical impossibility to allow a patient being studied in the sitting position. The fact that the anorectum is not filled during MR imaging is another technical problem. Filling the rectum with air will not have the same effect as filling with thickened barium contrast, however thickened paramagnetic contrast might improve the quality of assessment of the anorectal physiology in the future. Currently, dynamic MR imaging in prone position is an imaging technique not capable to detect rectoceles with the same accuracy as defecography[60].

SURGICAL TREATMENT; A REVIEW

Transanal repair

Redding has emphasized that rectoceles adversely affect defecation[21]. He observed a high incidence of continued or renewed symptoms in patients when the rectocele was not corrected surgically. Sullivan was the first who reported on the transanal approach of the rectocele[42]. The procedure, as described by Sullivan, was performed with the patient in prone position. It included a radial incision on the ventral side, extending from the anal opening upward for a distance of 7 to 9 cm, followed by a submucosal dissection, developing the plane of the internal sphincter and the circular muscle of the rectum. The repair, from below upward, was performed using chromic catgut. The sutures were introduced through the entire thickness of the rectal wall on either side, with the upper suture at the upper level of the levator sling. Then the mobilized and prolapsed mucosa was excised and the mucosal and anodermal defect was closed. Sullivan retrospectively analyzed the results of transanal rectocele repair in 151 patients. Main indications for surgery were pain (46%), bleeding (44%), and difficulty in expelling feces (43%). Complete relieve of symptoms was noted in 22.5 percent of the patients, whereas 57 percent of the patients mentioned a significant improvement. The transanal approach for rectocele repair has become the 'standard' procedure in patients with obstructed defecation due to a rectocele. Several authors have various modifications such as plication of the rectal wall in two directions and imbrication of the rectal wall transversely without mucosal dissection[16,45,46,58,61-68]. Table 1 gives an overview of the studies aimed at evaluating the

transanal approach. Most studies are retrospective. Comparisons are difficult to make since indications for repair and exclusion criteria vary. Patients without symptoms of constipation before surgery are often included, and these patients had improved the outcome. In most studies large prolapsed, 'mid' and 'high' rectoceles are referred to gynecologists for transvaginal repair. Regarding the outcome of transanal repair, most studies are difficult to compare since definitions of success were unclear and mostly subjective.

Transvaginal repair

In 1867 Simon originated the term 'posterior colporrhaphy' to describe the operation in order to support the uterus in case of prolapse[69]. Nowadays, a posterior colporrhaphy, or transvaginal rectocele repair is the accepted gynecologic approach to rectocele, and the basic principle underlying this procedure is to maintain free movement of the posterior vaginal wall from the underlying rectal wall. This transvaginal rectocele repair is mostly combined with concomitant anterior repair of cystocele. The effect of transvaginal rectocele repair on bowel function was not evaluated until 1987 by Heslop[43]. In a group of 15 patients who presented with bleeding hemorrhoids and a rectocele on physical examination, he performed a transvaginal rectocele repair after a hemorrhoidectomy. Before surgery all patients had a history of severe constipation. He achieved in all cases a satisfactory cure of their symptoms and, in particular, of their difficulty in stool evacuation[43]. In 1990 Arnold retrospectively analyzed the outcome of transvaginal rectocele repair in 29 patients[68]. Main indications for surgery were constipation (75%), rectal bleeding (34%), rectal pain (23%) and vaginal digitation (20%). After a minimum duration of follow up of two years, 80 percent of the patients encountered improvement. In this study, however, only 72 percent of the patients was successfully contacted for follow up. Moreover, many patients still complained of constipation (54%), whereas 36 percent of the patients mentioned various degrees of incontinence for stool. In 1995, Infantino retrospectively analyzed the data of 8 patients in which posterior colporrhaphy was performed because of obstructed defecation[16]. After a mean duration of follow up of 37 months, in 6 patients improvement or cure was achieved. A recurrent rectocele was observed in two patients (25%). Kahn retrospectively analyzed data of 171 women, operated upon because of obstructed defecation, with a mean duration of follow up of 43 months[70]. The most common symptoms after surgery were constipation (33%), vaginal digitation (33%), incomplete rectal emptying

(27%), rectal digitalization (23%) and incontinence for flatus (19%). Recurrent or persistent rectoceles were observed in 24 percent of the patients. To date, the only study in which the effect of posterior colporrhaphy on bowel function is evaluated prospectively has been performed by Mellgren[15]. In twenty-five patients with obstructed defecation, a posterior colporrhaphy was performed and mean duration of follow up was 1.0 (0.3-2.7) year. Before and after surgery, medical history was obtained using a standardized questionnaire, and physical examination, defecography, colonic transit time studies, anorectal manometry and electrophysiology were performed. After surgery, symptoms of constipation had disappeared in 50 percent of the patients and had improved in 38 percent of the patients. Recurrent rectoceles, diagnosed by defecography, were observed in 20 percent of the patients.

Combined transvaginal/transanal rectocele repair

Marks recognized that correction of the vaginal deformity alone did not provide sufficient relieve of symptoms because the rectal side of the rectocele still rested to be a source of complaints. Since the loose inner lining of the rectocele remained in the rectal ampulla, it could act as a mass in the rectum, stimulating the impulse to defecate[71]. He therefore advocated surgical correction of both vaginal and rectal portion of the rectocele[71]. This combined repair was evaluated retrospectively by Sullivan in a group of 28 patients[42]. In 7 out of 28 patients re-operation was necessary because of persistent anorectal symptoms: in one patient a rectovaginal fistula developed and in six patients he describes a failure[42]. He abandoned the combined repair and introduced the transanal repair. Since his publication no further studies have been performed to evaluate the results of combined rectovaginal rectocele repair.

Reinforcement of the rectovaginal septum

In 1981 Øster and Astrup described a new technique to reinforce the rectovaginal septum using a skin transplant from the thigh in 15 patients with recurrent and large rectoceles[72]. They reported a successful outcome in all patients. Recently reinforcement of the rectovaginal septum using a Marlex mesh has been described, either via a transperineal approach or via laparoscopy[73,74]. Both procedures were successful in most patients, although the number of patients in these studies are small (15 and 9 respectively). No long-term results of these new techniques are available.

Rectovaginopexy

In 1998 Silvis described the rectovaginopexy in patients with different combinations of defecation and micturition disorders and anatomical abnormalities such as rectocele, internal rectal intussusception, enterocele and/or vaginal vault or utero-vaginal prolapse[75]. He performed this procedure in 25 patients, 10 of these patients had constipation as the primary symptom and 15 patients fecal incontinence, 8 patients had constipation in combination with fecal incontinence. In 22 patients urinary incontinence was a secondary symptom. Rectovaginopexy was performed by midline laparotomy and laparoscopically in a later stage. Twelve months postoperatively, in 14 of 18 patients constipation improved, in 11 out of 16 patients fecal continence improved and overall urinary incontinence improved in 11 out of 22 patients. In 10 out of 20 patients with a rectocele before surgery, a rectocele was found on defecography, only one of these rectoceles was greater than 2 cm[75].

Comparisons of techniques for rectocele repair

Two retrospective studies have been conducted in order to compare the transanal rectocele repair with the transvaginal repair[16,68]. Those patients who underwent transvaginal repair experienced more pain. Besides this aspect, no significant differences in clinical outcome were reported. The number of patients in theses studies was small[16,68]. The surprising part of these studies was the number of patients complaining of vaginal tightness and sexual dysfunction after transanal rectocele repair (21 percent)[68].

Selection criteria

Attempts have been made to define criteria for better selection of patients with symptomatic rectocele in order to improve the outcome of repair. It has been argued that rectocele repair is not beneficial for patients with anismus because of the dissatisfying results[23]. According to others, caution must be taken in performing rectocele repair in patients with delayed colonic transit[15]. Some authors believe that rectocele repair is only beneficial for patients in whom defecography reveals retention of contrast in the rectocele during straining[15,64,65]. Vaginal digitation is also considered a useful selection criterion[64,65,73]. Until now it is not clear which criteria can be applied to select those patients that will benefit from surgery.

REFERENCES

1. Zacharin RF. *Pulsion enterocele: review of functional anatomy of the pelvic floor.* Obstet Gynecol 1980;55:135-40.
2. Kuhn RJP, Hollyock VE. *Observations on the anatomy of the rectovaginal pouch and septum.* Obstet Gynecol 1982;59:445-7.
3. Block IR. *Transrectal repair of rectocele using obliterative sutures.* Dis Colon Rectum 1986;29:707-11.
4. Nichols DH. *Surgery for pelvic floor disorders.* Surg Clin North Am 1991;71:927-46.
5. Smith ARB, Hosker G, Warrell DW. *The role of partial denervation of the pelvic floor in the aetiology of genito-urinary prolapse and stress incontinence- a neurophysiological study.* Br J Obstet Gynaecol 1989;96:24-8.
6. Gilpin SA, Gosling JA, Smith ARB, Warrell DW. *The pathogenesis of genito-urinary prolapse and stress incontinence of urine. A histological and histochemical study.* Br J Obstet Gynaecol 1989;96:15-23.
7. Allen RE, Hosker GL, Smith ARB, Warrell DW. *Pelvic floor damage and childbirth: a neurophysiological study.* Br J Obstet Gynaecol 1990;97:770-9.
8. DeLancey JOL. *Anatomy and biomechanics of genital prolapse.* Clin Obstet Gynecol 1993;36:897-909.
9. Snooks SJ, Swash M, Setchell M, Henry MM. *Injury to innervation of pelvic floor and sphincter musculature in childbirth.* Lancet 1984;2:546-50.
10. Richardson AC. *The rectovaginal septum revisited: its relationship to rectocele and its importance in rectocele repair.* Clin Obstet Gynecol 1993;36:976-83.
11. Smith P. Estrogens and the urogenital tract. *Studies on steroid hormone receptors and a clinical study on a new estradiol-releasing vaginal ring.* Acta Obstet Gynecol Scand Suppl 1993;157:1-26
12. Smith P, Heimer G, Norgren A, Ulmsten U. *Localization of steroid hormone receptors in the pelvic muscles.* Eur J Obstet Gynecol Reprod Biol. 1993;50:83-5.
13. Danielson CO. *Anatomy of the supporting apparatus of the uterus and vagina.* Acta Obstet Gynecol Scand 1957;36:7-17.
14. Arnold MW, Stewart WR, Aguilar PS. *Rectocele repair. Four years experience.* Dis

Colon rectum 1990;33:684-7.

15. Mellgren A, Anzen B, Nilsson B, Johansson C, Dolk A, Gillgren P, Bremmer S, Holmström B. *Results of rectocele repair. A prospective study.* Dis Colon rectum 1995;38:7-13.
16. Infantino A, Masin A, Melega E, Dodi G, Lise M. *Does surgery resolve outlet obstruction from rectocele?* Int J Colorectal Dis 1995;10:97-100.
17. van Dam JH, Gosselink MJ, Drogendijk AC, Hop WCJ, Schouten WR. *Changes in bowel function after hysterectomy.* Dis Colon Rectum 1997;40:1342-7.
18. Smith AN, Varma JS, Binnie NR, Papachrysostomou M. *Disordered colorectal motility in intractable constipation following hysterectomy.* Br J Surg 1990;77:1361-6.
19. Siproudhis L, Dautreme S, Ropert A, Betagne JF, Heresbach D, Raoul JL, Gosselin M. *Dyschezia and rectocele-a marriage of convenience? Physiologic evaluation of the rectocele in a group of 52 women complaining of difficulty in evacuation.* Dis Colon Rectum 1993;36:1030-6.
20. Nichols DH, Genadry RR. *Pelvic relaxation of the posterior compartment.* Curr Opin Obstet Gynecol 1993;5:458-64.
21. Redding MD. *The relaxed perineum and anorectal disease.* Dis Colon Rectum 1965;28:279-82.
22. Preston DM, Lennard-Jones JE. *Anismus in chronic constipation.* Dig Dis Sciences 1085;30:413-8.
23. Johansson C, Nillson BY, Holmström Dolk A, Mellgren A.. *Association between rectocele and paradoxical sphincter response.* Dis Colon Rectum 1992:35:503-9.
24. Yoshioka K, Matsui Y, Yamada O. *Physiologic and anatomic assessment of patients with rectocele.* Dis Colon Rectum 1991;34:704-8.
25. Turnbull GK, Bartram CI, Lennard-Jones JE. *Radiologic studies of rectal evacuation in adults with idiopathic constipation.* Dis Colon Rectum 1988;31:190-7.
26. Mahieu P, Pringot J, Bodart P. Defecography: I. *Description of a new procedure and results in normal patients.* Gastrointest Radiol 1984;9:247-51.
27. Shorvon PJ, McHugh S, Diamant NE, Somers S, Stevenson GW. *Defecography in normal volunteers: results and implications.* Gut 1989;30:1737-49.

28. Selvaggi F, Pesce G, Scotto Di Carlo E, Maffettone V, Canonico S. *Evaluation of normal subjects by defecographic techniques.* Dis Colon Rectum 1990;33:698-702.

29. Freimanis MG, Wald A, Caruana B, Bauman DH. *Evacuation proctography in normal volunteers.* Invest Rad 1991;26:581-5.

30. Bartram CI, Turnbull GK, Lennard-Jones JE. *Evacuation proctography; an investigation of rectal expulsion in 20 subjects without defecatory disturbance.* Gastrointest Radiol 1988;13:72-80.

31. Mellgren A, Bremmer S, Johansson C. *Defecography. Results of investigations in 2,816 patients.* Dis Colon Rectum 1994;37:1133-41.

32. Mahieu P, Pringot J, Bodart P. *Defecography: II. Contribution to the diagnosis of defecation disorders.* Gastrointest Radiol 1984;9:253-61.

33. Bartolo DC, Roe AM, Virjee J, Mortensen NJ, Locke-Edmunds JC. *An analysis of rectal morphology in obstructed defecation.* Int J Colorectal Dis 1988;3:17-22.

34. Ekberg O, Nylander G, Fork FT. *Defecography.* Radiology 1985;155:45-8.

35. Felt-Bersma RJ, Luth WJ, Janssen JJ, Meuwissen SG. *Defecography in patients with anorectal disorders: which findings are clinically relevant?* Dis Colon Rectum 1990;33:277-84.

36. Skomorowska E, Henrichsen S, Hegedus V. *Videodefaecography combined with measurement of the anorectal angle and of perineal descent.* Acta Radiol 1987;28:-559-62.

37. Fleshman JW, Kodner IJ, Fry RD. *Internal intussusception of the rectum: a changing perspective.* Neth J Surg 1989;41:145-8.

38. Goei R, Baeten C. *Rectal intussusception and rectal prolapse: detection and postoperative evaluation with defecography.* Radiology 1990;174:124-6.

39. Pitchford CA. *Rectocele: a cause of anorectal pathologic changes in women.* Dis Colon Rectum 1967;10:464-6.

40. Infantino A, Masin A, Pianon P. *Role of proctography in severe constipation.* Dis Colon Rectum 1990;33:707-12.

41. van Dam, JH, Schouten WR, Ginai AZ, Huisman WM, Hop WCJ. *The impact of anismus on the clinical outcome of rectocele repair.* Int J Colorect Dis 1996;11:238-42.

42. Sullivan ES, Leaverton GH, Hardwick CE. *Transrectal repair: an adjunct to improved function after anorectal surgery.* Dis Colon Rectum 1968;11:106-14.

43. Heslop JH. *Piles and rectoceles.* Aust N Z J 1987;57:935-8.

44. Marti MC. *Les rèctoceles.* Ann Gastroenterol Hepatol 1989;25:309-11.

45. Sehapayak S. *Transrectal repair of rectocele: an extended armamentarium of colorectal surgeons A report of 355 cases.* Dis Colon Rectum 1985;28:422-33.

46. Khubchandani IT, Sheets JA, Stasik JJ, Hakki AR. *Endorectal repair of rectocele.* Dis Colon Rectum 1983;26:792-6.

47. Kelvin FM, Maglinte DD, Hornback JA, Benson JT. *Pelvic prolapse: assessment with evacuation proctography (defecography).* Radiology 1992;184:547-51.

48. Holley RL. *Enterocele; a review.* Obstet Gynecol Surg 1994;49:284-93.

49. Benson JT. *Rectocele, descending perineal syndrome, enterocele.* In: Benson JT, ed. Female pelvic floor disorders: investigation and management. New York: WW Norton 1992:380-9.

50. Bump RC, Mattiasson A, Bø K, Brubaker LP, DeLancey JO, Klarskov P, Shull BL, Smith AR. *The standardization of terminology of female pelvic organ prolapse and pelvic floor dysfunction* Am J Obstet Gynecol 1996;175:10-7.

51. Baden W, Walker T. *Surgical repair of vaginal defects.* Philadelphia: JB Lippincott, 1992

52. Siproudhis L, Ropert A, Vilotte J, Bretagne JF, Heresbach D, Raoul JL, Gosselin. *How accurate is clinical examination in diagnosing and quantifying pelvirectal disorders? A prospective study in a group of 50 patients complaining of defecatory difficulties.* Dis Colon Rectum 1993;36:430-8.

53. Hutchinson R, Mostafa AB, Grant EA, Smith NB, Deen KI, Harding LK, Kumar D. *Scintigraphic defecography: quantitative and dynamic assessment of anorectal function.* Dis Colon Rectum 1993;36:1132-8.

54. Papachrysostomou M, Griffin TMJ, Ferrington C, Merrick MV, Smith AN. *A method of computerized isotope dynamic proctography.* Eur J Nucl Med 1993;19:;431-5.

55. Papachrysostomou M, Stevenson AJM, Ferrington C, Merrick MV, Smith AN. *Evaluation of isotope proctography in constipated patients.* Int J Colorect Dis 1993;8:18-22.

56. Sultan AH, Kamm MA, Hudson CN, Thomas JM, Bartram CI. *Anal-sphincter disruption during vaginal delivery.* N Engl J Med 1993;329:1905-11.

57. Nielsen MR, Rasmussen DD, Pedersen JF, Christiansen J. *Anal endosonography in patients with obstructed defecation.* Acta Rad 1993;34:35-8.

58 Karlbom U, Graf W, Nilsson S, Pahlman L. *Does surgical repair of a rectocele improve rectal emptying?* Dis Colon rectum 1996;39:1296-1302.

59. Schouten Wr, Briel JW, Auwerda JJA, van Dam JH, Gosselink MJ, Ginai AZ, Hop WCJ. *Anismus: Fact or fiction?* Dis Colon Rectum 1997;40:1033-41.

60 Delemarre JB, Kruyt RH, Doornbos J, Buyze Wersterweel M, Trimbos JB, Hermans J, Gooszen HG. *Anterior rectocele: assessment with radiopaque defecography, dynamic magnetic resonance imaging, and physical examination.* Dis Colon Rectum 1994;37:249-59.

61 Janssen LWM, van Dijke CF. *Selection criteria for anterior rectal wall prolapse.* Dis Colon Rectum 1994;37:1100-7.

62 Khubchandani IT, Clancy JP 3rd, Rosen L, Riether RD, Stasik JJ Jr. *Endorectal repair of rectocele revisited.* Br J Surg 1997;84:89-91.

63. Capps WF. *Rectoplasty and perineoplasty for symptomatic rectocele: a report of fifty cases.* Dis Colon Rectum 1975;18:237-44.

64. Murthy VK, Orkin BA, Smith LE, Glassman LM. *Excellent outcome using selective criteria for rectocele repair.* Dis Colon Rectum 1996;39:374-8.

65. Sarles JC, Arnaud A, Selezneff I, Olivier S. *Endo-rectal repair of rectocele.* Int J Colorectal Dis 1989;4:167-71.

66. Block IR. *Transrectal repair of rectocele using obliterative suture.* Dis Colon Rectum 1986;29:707-11.

67. Yik-Hong H, Ang M, Nyam D, Tan M, Seow-Choen F. *Transanal approach to rectocele repair an compromise anal sphincter pressures.* Dis Colon Rectum 1998;41:354-58.

68. Arnold MW, Stewart WR, Aguilar PS. *Rectocele repair. Four years experience.* Dis Colon Rectum 1990;33:684-7.

69. Maurel J, Gignoux M. *Traitement chirurgical des rectoceles sus-levatoriennes interet de l'excision par voie trans-anale a la pince automatique a agraves lineiare.* Ann Chir

1993;47:326-30.

70. Kahn MA, Stanton SL. *Posterior colporrhaphy: its effect on bowel and sexual function.* Br J Obstet Gynaecol 1997;104:82-6.

71. Marks MM. *The rectal side of the rectocele.* Dis Colon Rectum 1967;10:387-8.

72. Øster S, Astrup A. *A new vaginal operation for recurrent and large rectoceles using dermis transplants.* Acta Obstet Gynecol Scand 1981;60:493-5.

73. Watson SJ, Loder PB, Halligan S, Bartram CI, Kamm MA, Philips RK. *Transperineal repair of symptomatic rectocele with marlex mesh: a clinical, physiological and radiologic assessment of treatment.* J Am Coll Surg 1996;183:257-61.

74. Lyons TL, Winer WK. *Laparoscopic rectocele repair using polyglactin mesh.* J Am Assoc Gynecol Laparosc 1997;4:381-4.

75. Silvis R, Gooszen HG, Kahraman T, Groenendijk AG, Lock MT, Italiaander MV, Janssen LW. *Novel approach to combined defaecation and micturition disorders with rectovaginopexy.* Br J Surg 1998;85:813-7.

CHAPTER 4

The role of defecography in predicting the clinical outcome of rectocele repair

JH van Dam[1], AZ Ginai[2], MJ Gosselink[1] , WM Huisman[3], HJ Bonjer[1] , WCJ Hop[4] and WR Schouten[1].

From the Departments of [1]General Surgery, [2]Radiology, [3]Gynecology and [4]Epidemiology and Biostatistics. University Hospital Dijkzigt, Rotterdam, The Netherlands.

Adapted from: "The role of defecography in predicting the clinical outcome of rectocele repair". Published in Diseases of Colon & Rectum 1997;40:201-207.

ABSTRACT

The aim of this study was to evaluate the role of defecography in predicting clinical outcome of rectocele repair. Between January 1988 and July 1996, 85 consecutive patients (median age, 54 (range, 35-79) years) with a rectocele and symptoms of obstructed defecation were studied prospectively. After preoperative evaluation by a standardized questionnaire, physical examination and defecography, a combined transvaginal/transanal rectocele repair was performed. At follow-up all patients had defecography. An independent observer qualified long-term results after a median follow-up of 52 months (range 12-92 months) as "excellent", "good" or "poor". Rectocele repair was considered 'excellent' in 35 patients and 'good' in 24 patients. Defecography 6 months after surgery did not show persistent or recurrent rectocele in any of the patients. Size of the rectocele, barium trapping in the rectocele, internal intussusception, rectal evacuation and perineal descent did not appear to influence clinical outcome. Radiological evidence of anismus did not correlate with long term results of rectocele repair. Combined transanal/transvaginal repair of rectocele is an efficient therapy in patients with obstructed defecation. Various defecographic parameters (size of rectocele, internal intussusception, rectal evacuation, perineal descent, radiological signs of anismus) do not appear to influence clinical outcome of surgery. The main value of defecography is the objective demonstration of a rectocele and any associated abnormalities such as an enterocele preoperatively and again in objective assessment of the postoperative results.

INTRODUCTION

A rectocele is a herniation of the anterior rectal wall into the lumen of the vagina. This abnormality may be associated with severe evacuation disturbances of the rectum and is then referred to as "symptomatic"[1-4]. Retention of feces in the rectocele is probably the cause of disturbed evacuation of rectal contents. The majority of patients with symptomatic rectoceles has a continuous urge to defecate, resulting in chronic straining and a feeling of incomplete evacuation. Most patients admit that they have to remove feces digitally. Although most patients have a daily call to stool, infrequent defecation is a common symptom.

Rectoceles are common in constipated female patients[5-7]. Large size of the rectocele and contrast retention in the rectocele during defecography are frequently observed in patients with symptomatic rectoceles[8,9]. However, little is known about the relationship between size of the

rectocele, degree of contrast retention, and presence of symptoms[9-11]. In patients with obstructed defecation, defecography often shows several abnormalities in addition to a rectocele. The role of rectoceles in the pathogenesis of disturbed defecation remains debatable. It has been suggested that a rectocele is merely the result of a weakened rectovaginal septum due to obstetric trauma and chronic straining[11]. Several studies suggest that rectoceles do not play a primary role in the etiology of defecation disorders[12-14]. Anismus, a contraction instead of relaxation of the puborectal muscle during straining, is frequently observed in patients with defecation disturbances and is also often considered the primary cause of symptoms[13,14].
Objectives of this study were to evaluate the value of various defecographic parameters in patients undergoing surgical repair for symptomatic rectocele.

PATIENTS AND METHODS

Between January 1988 and July 1996, all patients with a symptomatic rectocele were evaluated preoperatively and postoperatively according to a standardized protocol. This included a detailed questionnaire, with special reference to defecation frequency, use of laxatives, excessive straining, digital manipulation during defecation, urgency, sensation of incomplete evacuation, fecal incontinence, urinary symptoms, sexual function disturbances and past history of pelvic surgery. A gynecologist and a surgeon examined all patients preoperatively and postoperatively. Defecography was performed before and six months after rectocele repair. An independent observer performed a final evaluation of the clinical outcome of rectocele repair.

Defecography

Defecography was performed as described by Ginai[15]. With the patient in left lateral position, thickened barium sulfate (ca.200 ml) was injected into the rectum under fluoroscopic control. Before inserting the rectal canula tip in the anal canal, it was dipped in thick barium paste, to coat the anal wall. After filling the rectum with thick barium sulfate the canula was removed. The vaginal wall was coated with barium sulfate utilizing a contrast-soaked gauze, which was removed before starting defecography. The fluoroscopy table was then brought into an upright position with the defecography seat fixed to the foot pedal of the table. A video recording was obtained to define the dynamics during the whole procedure. Spot films were taken at rest, during the simulated act of defecation and at the end of straining efforts. This last film was

important for the evaluation of perineal descent and presence of internal intussusception. The entire procedure took approximately 15 minutes to complete. Defecographic parameters were evaluated independently by two observers.

Analysis of defecography.

Rectocele was defined as an anterior bulge outside the line of the anterior rectal wall occurring during defecation. The size of the rectocele was assessed by measuring the maximum depth of the bulge beyond the expected and extrapolated line of the anterior rectal wall. Contrast evacuation of the rectocele during defecation was assessed. Grade 0 implied no evacuation of contrast. In Grade 1, 2 or 3, evacuation was poor, moderate or subtotal respectively. In Grade 4 there was no contrast retention in the rectocele after defecation.

Internal intussusception was graded according to appearance on the end-evacuation film. Grade 1 was a circumferential infolding of the mucosa remaining intrarectal, as is shown in figure 1.

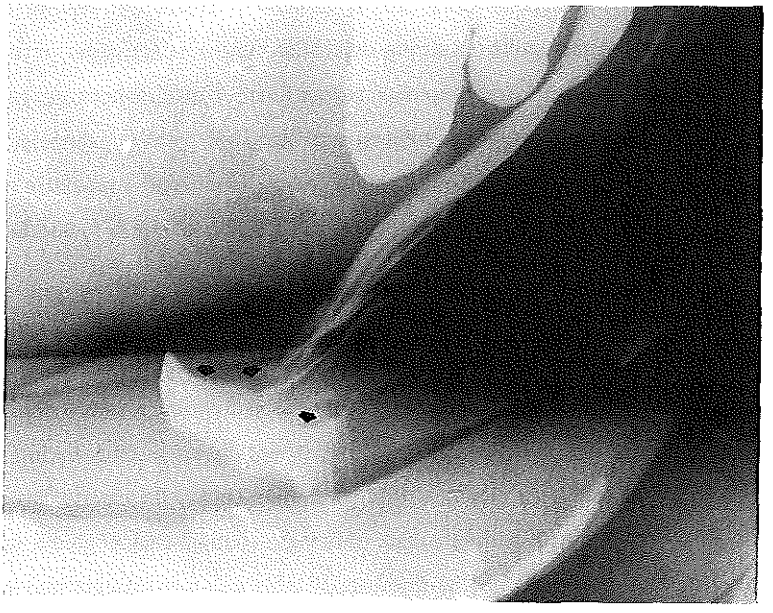

Figure 1

Internal intussusception grade 1.

Grades 2 and 3 implied circumferential infoldings of mucosa in the upper or lower part of the anal canal respectively. Grade 4 was a circumferential infolding of anal mucosa impinging on the anal orifice. Grade 5 was an external prolapse.

During defecation, rectal evacuation was evaluated using a grading system similar to the system described for evacuation of the rectocele.

To measure perineal descent, the site of the anorectal junction was measured at rest and during maximum straining effort with reference to the pubococcygeal line, which is a line drawn from the tip of the os coccyx to the lower part of the pubic bone. Perineal descent was determined by subtracting the measurement in straining from the value at rest. Perineal descent was considered "normal" when less than 40 mm, "increased" when more than 40 and less than 80 mm, and "severely increased" when more than 80 mm.

Anorectal angles were measured by two methods. The posterior anorectal angle (PARA) was defined as the angle between the axis of the anal canal and the tangential line drawn along the posterior wall of the distal part of the rectum. The central anorectal angle (CARA) was represented by the angle between the central axis of the anal canal and central axis of the distal part of the rectum. Both angles were measured at rest and at the end of maximum straining effort. Radiologically, anismus was considered a decrease or insufficient increase (<5 percent) of the anorectal angle, despite adequate straining effort, represented by sufficient perineal descent.

Surgical Procedure

All patients underwent a combined transvaginal/transanal rectocele repair. We choose for this technique for several reasons; Transvaginal rectocele repair seems to be associated with a high rate of persistent and/or recurrent rectoceles. However, since most rectoceles are of a considerable size, extending upward in the rectovaginal septum, it is easier to reach the upper part of the rectovaginal septum and to close the levator gap transvaginally.

Transanal rectocele repair gives a better access to the supra-sphincteric pocket, bulging through the weakened perineal body, and persistent and/or recurrent rectoceles are not frequently observed after transanal rectocele repair. It is however difficult to reach the upper part of the rectovaginal septum. By combining the transvaginal rectocele repair and the transanal rectocele repair, the weakest part in the rectovaginal septum is double-sided

strengthened. Furthermore, also the larger rectoceles can be corrected easier, and associated gynecological pathology can be treated at the same time.

Preoperative bowel preparation was carried out using the laxative Klean-prep ™ (Helsinn Birex Pharmaceuticals Ltd., Dublin, Ireland) administered the day before operation. At induction of anesthesia and during five days postoperatively, cefuroxim and metronidazol were administered parenterally. The combined procedure was started first with a posterior colporrhaphy, performed by the gynecological team, using interrupted Vicryl™ (Ethicon, Somerville, NJ) sutures. After repositioning the patient in prone jackknife position, mucosal redundancy of the anterior rectal wall was removed transanally by the surgeon, followed by a transverse plication of the muscular layer of the rectal wall using interrupted Vicryl™ sutures. Finally the mucosa was repaired with interrupted sutures.

Postoperative evaluation.

The surgeon and gynecologist evaluated clinical outcome every three months postoperatively. Final evaluation of functional results was performed by an independent observer and was based on the five most common symptoms at time of presentation (Table 1). Each symptom was equivalent to one point. Outcome was considered excellent or good when the score was 0 or 1, respectively. Outcome was considered poor when the total score was 2 or more.

Statistical Analysis

Correlation coefficients given are Spearman's. Percentages are compared using the chi-squared test or a test for trend if appropriate. Comparison of graded outcomes between groups was done with Mann-Whitney's test. Agreement between two observers regarding measurements of anorectal angle is expressed by intraclass correlation (r). Two-sided P-values ≤ 0.05 were considered significant.

RESULTS

Eighty-five consecutive females entered the study. Mean age was 54 (range, 35-79) years. Median duration of symptoms was 5 (range, 1-40) years. All but one patient had had one or more vaginal deliveries (range, 0-11, median, 2). Twenty-five patients had undergone a transvaginal prolapse repair (9 anterior, 4 posterior and 12 combined repairs). Two patients

Table 1

Symptoms of 85 patients with obstructed defecation at time of presentation. The most frequent symptoms *(italics)* were used for the scoring system to evaluate the clinical outcome of rectocele repair.

Symptoms	No. of patients	%
Excessive straining during defecation	82	96
Sensation of incomplete evacuation	78	92
Manual assistance	72	84
Regular digitation of the vagina	22	26
Regular digitation of the rectum	28	33
Manual perineal support	22	25
Sense of fullness	73	86
*Constipation**	52	61
Abdominal pain	53	62
Pelvic heaviness	35	17
Blood discharge	14	16
Mucus discharge	11	13
Soiling	3	5
Fecal incontinence	4	5

*Constipation was defined by a defecation frequency of less than three times per week.

had undergone a transrectal rectocele repair previously. Fifty-three patients had had a hysterectomy, and 40 of them indicated that disturbed defecation had started immediately after hysterectomy. None of the other patients could relate symptoms to any specific cause.

Symptoms

Using the scoring system, before surgery 70 patients (82 percent) had a total score of four or five. After a median follow-up of 52 (range, 12-92) months, clinical outcome of rectocele repair was excellent in 34 patients (40 percent) and good in 25 patients (29 percent). Comparing patients with and without previous hysterectomy, results of rectocele repair were

not statistically different (success rates of 66 and 78 percent, respectively). In 26 of 85 patients, results of rectocele repair were considered poor.

Defecography

Rectocele. In 81 patients (95 percent), the rectocele was larger than 30 mm and in 52 percent of the patients its size exceeded 60 mm. Mean size of the rectocele in patients with previous hysterectomy (5.5 cm) was not significantly different (P=0.75) from the value of 5.5 cm in patients without previous hysterectomy. Size of the rectocele showed no significant correlation with results of rectocele repair: in case of successful outcome, mean size was 5.3 cm *vs* 5.6 cm in patients with poor clinical outcome (P= 0.48). After rectocele repair, defecography showed no persistent or recurrent rectoceles. Figure 2 shows a defecography before and after rectocele repair.

Contrast Evacuation of Rectocele. Evacuation of contrast of the rectocele was (almost) complete (Grades 3 and 4) in 28 patients (33 percent), moderate (Grade 2) in 12 patients (14 percent) and poor (Grades 0 and 1) in 45 patients (53 percent). It was evident that larger rectoceles were more likely to retain contrast than smaller rectoceles (grade vs size: r= -0.34; P<0.01). However, the extent of contrast evacuation of the rectocele showed no significant correlation with results of rectocele repair.

Intussusception. Fifty-seven patients showed no signs of intussusception (67 percent). Intrarectal intussusception of the mucosa (Grade 1) was present in 12 patients (14 percent). Intussusception (Grades 2 or 3) was observed in 16 patients (19 percent). Grade 4 intussusception and external prolapse were not seen. Presence and degree of internal intussusception was not significantly related to final outcome of rectocele repair.

Contrast evacuation of the rectum. The degree of rectal contrast evacuation during defecation, summarized in Table 2, did not significantly correlate with clinical outcome of rectocele repair. The extent of contrast evacuation did not significantly differ between patients with or without previous hysterectomy.

Perineal descent. Perineal descent was considered normal in 47 percent of patients, increased in 45 percent and severely increased in 8 percent of patients (Table 3). The degree of perineal descent showed no significant correlation with results of rectocele repair.

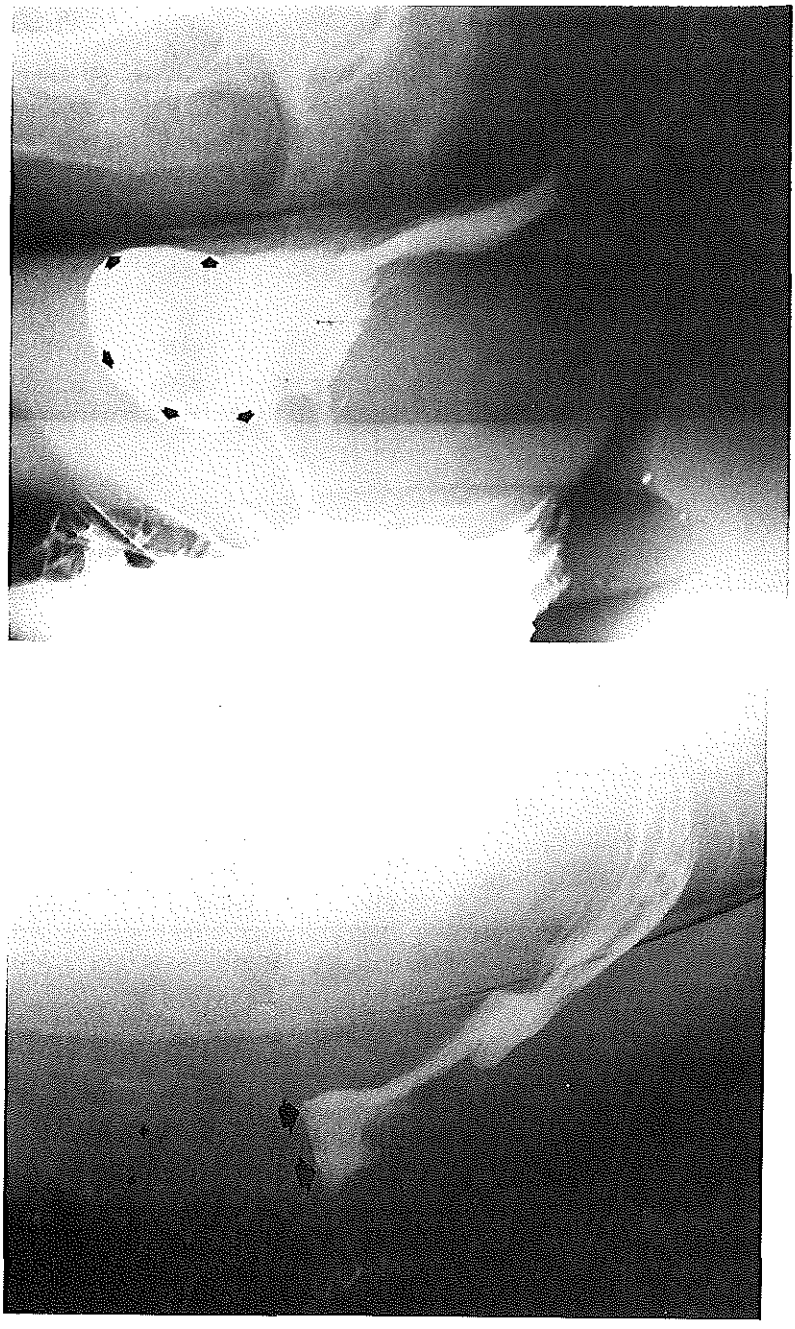

Figure 2

The upper X-ray shows a defecography during straining *before* surgery. The lower X-ray shows a defecography during straining *after* surgery

Table 2

Degree of contrast evacuation of the rectum during simulated defecation in 85 patients with obstructed defecation and associated results of rectocele repair.

	Contrast evacuation of the rectum				
	grade 0	grade 1	grade 2	grade 3	grade 4
No. of patients	2	14	12	32	25
Successful surgery (%)	1 (50)	9 (64)	7 (58)	24 (75)	18 (72)

P=0.34

Table 3

Perineal descent during straining in 85 patients with symptomatic rectocele and corresponding results of rectocele repair.

	Perineal Descent During Straining (cm)		
	0<4	4<8	8-12
No. of patients	40	38	7
Successful surgery (%)	25 (63)	30 (79)	4 (57)

P=0.48

Anorectal angle. Measuring CARA and PARA at rest, agreement between the two observers was good (r_I=0.93 and r_I=0.94 respectively). The same applied to measurements during straining (r_I=0.97and r_I=0.95 respectively). Using CARA, anismus was found in 29 patients (34 percent) (Table 4). When measuring the anorectal angle along the posterior rectal border (PARA), signs of anismus were present in 25 patients (29 percent) (Table 4). Defecographic signs of anismus showed no correlation with the final outcome of rectocele repair.

Table 4

Signs of anismus in 85 patients with obstructed defecation using posterior anorectal angle (PARA) and central anorectal angle (CARA), and results of rectocele repair.

	CARA*		PARA#	
	Anismus	No anismus	Anismus	No anismus
No. of patients	29	56	25	60
Successful surgery (%)	17 (59)	42 (75)	16 (64)	43 (72)

(*; P=0.19 : #; P=0.66)

DISCUSSION

Defecography plays an essential role in evaluation of defecation disorders, because it allows morphologic and dynamic evaluation of the defecation act. It is presently probably the only objective means of measurements of anorectal anatomy and function since sitting position for examination is not easily attainable with other methods. Despite improvements in imaging technique and better understanding of anorectal disorders, the exact role of defecography in defining anorectal abnormalities and its impact on therapy remains controversial. Furthermore, the diagnostic value of defecography may vary according to the underlying pathology and indication for evaluation.

The etiology of obstructed defecation appears to be multifactorial. It is difficult to determine whether defecographic findings are the cause or result of excessive straining in patients with obstructed defecation which makes the ultimate therapeutic decision a difficult task. Another problem in the defecographic analysis of patients with obstructed defecation is the fact that "abnormal" defecographic features can also be found in individuals without such symptoms. A meticulous defecography technique and caution in interpretation of findings is therefore essential.

An anterior bulge of the rectal wall has been shown on defecography in 15 to 80 percent of asymptomatic controls[8,16-26]. This phenomenon appears to occur more frequently in aging patients. Rectoceles in controls are, however, usually small and only a minority is larger than 2

cm[8,22,24-26]. Internal intussusception is another frequent finding and has been observed in 13 to 50 percent of controls[17,24,25]. A wide range of normal values of the anorectal angle and perineal descent has been shown, and radiologic evidence of anismus has been observed in 0 to 27 percent of healthy women[8,16-18,21,22,24,25].

In patients with disturbed defecation, internal intussusception appears to be the most frequent finding on defecography, with a prevalence of 28 to 50 percent[5,7,23,27]. Internal intussusception, which appears as a funnel-shaped infolding of the rectum on defecography, is considered to cause symptoms of obstructed defecation[7]. Rectoceles of more than 3 cm have been observed on defecography in 4 to 72 percent of female patients with symptoms of obstructed defecation[5,6,8,10,23,26,28]. Rectoceles have also been reported to coexist with internal intussusception. Several studies showed that on defecography, an intussusception always preceded formation of a rectocele, and it has been suggested that a rectocele is a consequence of intussusception[7,29-32]. In our view rectoceles form a distinct entity because the success of rectocele repair in our group of patients is not affected by the presence of intussusception. The present study shows that a significant correlation exists between size of rectocele and degree of contrast evacuation of rectocele during straining. This has been confirmed by other authors[8,9,33]. During defecation, trapping of feces in the rectocele obstructs evacuation, which may result in the need for prolonged and severe straining. In due course, this may give rise to internal intussusception of the rectal mucosa and increased perineal descent. We believe that rectoceles are an important cause of disturbed defecation. This assumption is supported by the fact that in most controls, rectoceles tend to be small, in contrast to large rectoceles observed in patients with disturbed defecation.

Anismus is considered by many experts as the most important cause of disturbed defecation[13,14,34]. Anismus is considered to cause both rectoceles and intussusception because constant forceful straining results in dissipation of the vector force through the rectovaginal septum [12,13]. Radiologic signs of anismus have been reported in various series from 4 to 45 percent in patients with obstructed defecation[5,7,21,23]. In our study, radiologic signs of anismus were observed in 35 percent of patients. As anismus is known to be present in up to 27 percent of healthy controls, and the observation in the present study that anismus was not correlated with poor outcome of rectocele repair, we wonder whether radiologic signs of anismus have any clinical significance. Furthermore, radiological and electromyographic signs of anismus

correlate poorly, and it is questionable if anismus is a distinct pathologic entity or merely a coincidental finding without therapeutic implications[35-40].

In this study a wide variety of anatomical and functional changes on defecography was observed in patients with a symptomatic rectocele. Although defecography provides objective evaluation of the act of defecation, it remains an unphysiologic procedure. A disadvantage of the procedure is that barium paste does not correspond fully with the condensed feces typical of obstructed defecation, which compromises evaluation of contrast retention in the rectum or rectocele. Normally, the major factor in evacuation of rectal contents is the defecation reflex. This reflex is always associated with an urge to defecate. During defecography, however, barium paste is inserted in the rectal ampulla, and the patient is asked to simulate the defecation process in the absence of an urge to defecate because the rectal ampulla is not fully distended. Furthermore, evacuating feces in front of other people is an embarrassing situation.

Considering these reflections, the additional value of defecography in patients with obstructed defecation is questionable. This study shows that defecography was not valuable in selecting patients with symptomatic rectocele, who would benefit from surgery. The role of defecography in obstructed defecation is limited to the objective demonstration of a rectocele and determination of size of the rectocele, since physical examination is not always accurate in defining size of the rectocele. Furthermore, solely based on physical examination, it is not always possible to diagnose an accompanying enterocele, the presence of which has definite therapeutic implications. Finally, defecography postoperatively is useful in objective demonstration of the result of the surgical procedure. In view of the fact that a considerable number of patients who did not benefit from rectocele repair in retrospect were found to have delayed passage of radiopaque markers through the left colon and rectosigmoid region, the value of a thorough clinical history in patients with obstructed defecation caused by rectocele cannot be overemphasized. In patients with a defecation frequency of less than two times a week, no urge to defecate before having a bowel movement and long-standing symptoms, preoperative determination of colonic transit time as part of the preoperative work-up is advisable to avoid disappointing surgical results.

REFERENCES

1. Cali RL, Christensen MA, Blatchford GJ, Thorson AG. *Rectoceles.* Semin Colon Rectal Surg 1992;3:132-7.
2. Arnold MW, Stewart WR, Aguilar PS. *Rectocele repair: Four years experience.* Dis Colon Rectum 1990;33:684-7.
3. Block IR. *Transrectal repair of rectocele using obliterative suture.* Dis Colon Rectum 1986;29:707-11.
4. Sullivan ES, Leaverton GH, Hardwick CE. *Transrectal perineal repair: an adjunct to improved function after anorectal surgery.* Dis Colon Rectum 1968;11:106-14.
5. Mellgren A, Bremmer S, Johansson C, Dolk A, Uden R, Ahlback SO, Holmström B. *Defecography. Results of investigations in 2,816 patients.* Dis Colon Rectum 1994;37:1133-41.
6. Johansson C, Ihre T, Ahlbäck SO. *Disturbances in the defecation mechanism with special reference to intussusception of the rectum (internal procidentia).* Dis Colon Rectum 1985;28:920-4.
7. Mahieu P, Pringot J, Bodart P. *Defecography: II. Contribution to the diagnosis of defecation disoders.* Gastrointest Radiol 1984;9:253-61.
8. Turnbull GK, Bartram CI, Lennard-Jones JE. *Radiologic studies of rectal evacuation in adults with idiopathic constipation.* Dis Colon Rectum 1988;31:190-7.
9. Kelvin FM, Maglinte DD, Hornback JA. *Pelvic floor prolapse: assessment with evacuation proctography (defecography).* Radiology 1992;184:547-51.
10. Siproudhis L, Robert A, Lucas J, Reoul JL, Hereshbach D, Bretagne JF, Gosselin M. *Defecatory disorders, anorectal and pelvic floor dysfunction: a polygamy?* Int J Colorect Dis 1992;7:102-7.
11. Capps WF Jr. *Rectoplasty and perineoplasty for the symptomatic rectocele: a report of fifty cases.* Dis Colon Rectum 1975;18:237-44.
12. Johansson C, Ihre T, Holmström B, Nordström E, Dolk A, Brodén G. *A combined electromyographic and cineradiologic investigation in patients with defecation disorders.* Dis Colon Rectum 1990;33:1009-13.
13. Johansson C, Nilsson BY, Holmström B, Dolk A, Mellgren A. *Association between rectocele and paradoxical sphincter response.* Dis Colon Rectum 1992;35:503-9.

14. Siproudhis L, Dautrème S, Ropert A, Bretagne JF, Heresbach D, Raoual JL, Gosselin M. *Dyschezia and rectocele--a marriage of convenience?* Dis Colon Rectum 1993;36:1030-6.

15. Ginai AZ. *Technical report: evacuation proctography (defecography) a new seat and method of examination.* Clin Radiol 1990;42:214-6.

16. Mahieu P, Pringot J, Bodart P. *Defecography: I. Description of a new procedure and results in normal patients.* Gastrointest Radiol 1984;9:247-51.

17. Goei R, van Engelshoven J, Schouten H, Baeten C, Stassen C. *Anorectal function: defecographic measurements in asymptomatic subjects.* Radiology 1989;173:137-41.

18. Goei R. *Anorectal function in patients with defecation disorders and asymptomatic subjects: evaluation with defecography.* Radiology 1990;174:121-3.

19. Yoshioka K, Pinho M, Oritz J, Oya M, Hyland G, Keighley MR. *How reliable is measurement of the anorectal angle by videoproctography?* Dis Colon Rectum 1991;34:1010-3.

20. Skomorowska E, Hegedus V. *Sex differences in anorectal angle and perineal descent.* Gastrointest Radiol 1987;12:353-5.

21. Infantino A, Masin A, Pianon P, Dodi G, Del Favero G, Pommeri F, Lise M. *Role of proctography in severe constipation.* Dis Colon Rectum 1990;33:707-12.

22. Shorvon PJ, McHugh S, Diamant NE, Somers S, Stevenson GW. *Defecography in normal volunteers: results and implications.* Gut 1989;30:1737-49.

23. Bartolo DC, Roe AM, Virjee J, Mortensen NJ, Locke-Edmunds JC. *An analysis of rectal morphology in obstructed defecation.* Int J Colorectal Dis 1988;3:17-22.

24. Selvaggi F, Pesce G, Scotto Di Carlo E, Maffettone V, Canonico S. *Evaluation of normal subjects by defecographic techniques.* Dis Colon Rectum 1990;33:698-702.

25. Freimanis MG, Wald A, Caruana B, Bauman DH. *Evacuation proctography in normal volunteers.* Invest Rad 1991;26:581-5.

26. Bartram CI, Turnbull GK, Lennard-Jones JE. *Evacuation proctography; an investigation of rectal expulsion in 20 subjects without defecatory disturbance.* Gastrointest Radiol 1988;13:72-80.

27. Ekberg O, Nylander G, Fork FT. *Defecography.* Radiology 1985;155:45-8.

28. Hiltunen KM, Kolehmainene H, Matikainen M. *Does defecography help in diagnosis*

and clinical decision-making in defecation disorders? Abdom Imaging 1994;19:355-8.

29. Felt-Bersma RJ, Luth WJ, Janssen JJ, Meuwissen SG. *Defecography in patients with anorectal disorders: which findings are clinically relevant?* Dis Colon Rectum 1990;33:277-84.
30. Skomorowska E, Henrichsen S, Hegedus V. *Videodefaecography combined with measurement of the anorectal angle and of perineal descent.* Acta Radiol 1987;28:559-62.
31. Fleshman JW, Kodner IJ, Fry RD. *Internal intussusception of the rectum: a changing perspective.* Neth J Surg 1989;41:145-8.
32. Goei R, Baeten C. *Rectal intussusception and rectal prolapse: detection and postoperative evaluation with defecography.* Radiology 1990;174:124-6.
33. Yang A, Mostwin JL, Rosensheim NB, Zerhouni EA. *Pelvic floor descent in women: dynamic evaluation with fast MRI imaging and cinematic display.* Radiology 1991;179:25-33.
34. Pitchford CA. *Rectocele: a cause of anorectal pathologic changes in women.* Dis Colon Rectum 1967;10:464-6.
35. Schouten WR, Gosselink MJ, Briel JW, Auwerda JJA, van Dam JH, Hop WCJ. *Anismus: fact or fiction?* Dis Colon Rectum 1997;40:1342-7.
36. Miller R, Duthie GS, Bartolo DC, Roe AM, Locke-Edmunds J, McC.Mortensen NJ. *Anismus in patients with normal and slow transit constipation.* Br J Surg 1991;78:690-2.
37. Fink RL, Roberts LJ, Scott M. *The role of manometry, electromyography and radiology in the assessment of intractable constipation.* Aust N Z J Surg 1991;61:959-64.
38. Jorge JM, Wexner SD, Ger GC, Salanga VD, Nogueras JJ, Jagelman DG. *Cinedefecography and electromyography in the diagnosis of nonrelaxing puborectalis syndrome.* Dis Colon Rectum 1993;36:668-76.
39. Lubowski DZ, King DW, Finlay IG. *Electromyography of the pubococcygeus muscles in patients with obstructed defaecation.* Int J Colorectal Dis 1992;7:184-7.
40. Dahl J, Lindquist BL, Tysk C, Leissner P, Philipson L, Järnerot G. *Behavioral medicine treatment in chronic constipation with paradoxical anal sphincter contraction.* Dis

Colon Rectum 1991;34:769-76.

CHAPTER 5

The impact of anismus on the clinical outcome of rectocele repair

JH van Dam[1], WR Schouten[1], AZ Ginai[2], WM Huisman[3], and WCJ Hop[4].
From the Departments of [1]General Surgery, [2]Radiology, [3]Gynecology and [4]Epidemiology and Biostatistics. University Hospital Dijkzigt, Rotterdam, The Netherlands.

Adapted from: "The impact of anismus on the clinical outcome of rectocele repair". Published in The Internal Journal of Colorectal Disease 1996;11:238-242.

ABSTRACT

There are doubts as to whether rectocele repair (RR) is beneficial for patients with concomitant anismus. The aim of this prospective study was to evaluate the effect of anismus on the clinical outcome of RR. In 85 out of 89 patients who underwent RR evacuation proctography (EP) was performed. Electromyography (EMG) of the pelvic floor and balloon expulsion test (BET) were carried out in 75 and 49 patients respectively. On EP, measuring the central anorectal angle (CARA) and the posterior anorectal angle (PARA), signs of anismus were found in 34 and 29 percent of the patients respectively. EMG and BET revealed anismus in 45 and 73 percent of the patients respectively. These results showed poor agreement. RR was successful in 63 (71%) out of 89 patients (follow up 12-92 months). No differences were found in clinical outcome in patients with and without signs of anismus. In conclusion, RR is beneficial for patients with obstructed defecation, and signs of anismus do not appear to be a contraindication for RR.

INTRODUCTION

Anismus, also known as non-relaxing puborectalis syndrome or spastic pelvic floor syndrome, is considered to be a major cause of obstructed defecation[1-4]. This phenomenon is characterized by contraction of the pelvic floor during attempted defecation. Evacuation proctography (EP), electromyography (EMG) of the pelvic floor, and balloon expulsion-tests (BET) are most commonly used to diagnose anismus, though in general, EMG is regarded as "the golden standard"[5]. Since anismus is a functional disorder, therapy consists of biofeedback training of the pelvic floor[6,7].

Rectoceles can also give rise to defecatory difficulties. It has been reported that rectocele repair is beneficial for 50 to 70 percent of the patients with obstructed defecation[8-17]. Despite this successful outcome several authors still debate the importance of rectoceles in causing obstructed defecation and even suggest that anismus is a causative factor in the formation of a rectocele[18]. A controversial category of patients with obstructed defecation therefore, are those patients, with a rectocele and concomitant anismus. It is stated that rectocele repair in these patients can not be successful, since the underlying cause for obstructed defecation persists[18].

Because precise data on this issue are lacking, we performed a prospective study in 89 consecutive patients. The prevalence of anismus in patients with a symptomatic rectocele was evaluated using EP, EMG and BET, and the impact of this phenomenon on the outcome of rectocele repair was investigated.

PATIENTS AND METHODS

Between January 1988 and July 1996, 240 women with constipation were analyzed. In the patients with a rectocele of more than 3 centimeter on evacuation proctography, the rectocele was considered as the principal cause of symptoms and these patients (89 women, median age at presentation 55 years, range 35-81 years) were enrolled in the study. The median age at onset of obstructed defecation was 46 years (range 15-77 years), and the median duration of symptoms was 5 years (range 1-40). The symptoms at the time of presentation are listed in Table 1. Of these women, all but one had had one or more vaginal deliveries. In 53 women previous hysterectomy had been performed, and in 40 patients the evacuation difficulties were reported to have started shortly after hysterectomy. Twenty-five patients had had previous transvaginal prolapse repair (9 anterior, 4 posterior and 12 combined repairs). Two patients had undergone a transrectal rectocele repair earlier. The minimal duration of follow-up after rectocele repair was 12 months (median 52, range 12-92 months).

Evacuation proctography

In 85 patients evacuation proctography (EP) was performed as described by Ginai[19]. With the patient in left lateral position, thickened barium sulfate was injected into the rectum, under fluoroscopic control. The vaginal wall was coated utilizing a contrast-soaked tampon, which was removed before starting EP. The commode was fixed onto the fluoroscopy table and prior to the examination the table was brought upright with the patient in the sitting position. A video recording was obtained in all patients. Spot films were also taken at rest, during defecation and at the end of straining efforts. The anorectal angle was measured in two ways. The posterior anorectal angle (PARA) was defined as the angle between the axis of the anal canal and the tangential line drawn along the posterior wall of the distal part of the rectum. The central anorectal angle (CARA) was represented by the angle between the central axis of the anal canal and the central axis of the distal part of the rectum. Both angles were measured

at rest and at the end of maximal straining effort. Anismus was defined as a decrease or insufficient increase (<5%) of the anorectal angle despite an adequate straining effort, represented by sufficient perineal descent.

Electromyography

EMG of the pelvic floor was introduced in a later phase of the study and performed in 75 patients. With the patient lying on her left side, a conventional concentric bipolar needle electrode was introduced in the mid-line behind the anal verge and directed slightly anteriorly. A standard EMG apparatus (Nicolet Viking) was used to amplify and display the recordings, which were made with the patient at rest and while straining. The measurements were repeated three times in the same sitting. Electromyographic evidence of anismus was considered as a lack of decrease of activity during a maximal straining effort.

Balloon expulsion test

In the last 49 patients BET was performed. With the patient lying on her left side, a lubricated latex balloon attached to a latex catheter was inserted into the rectal ampulla. The balloon was inflated with air until an urge to defecate was experienced. The patient was asked to strain and expel the balloon. If the efforts to expel the balloon were not successful, this maneuver was repeated up to three times. Failure to expel the balloon was considered as a criterion for anismus.

Surgical technique

Preoperative bowel preparation consisted of the use of the laxative Klean-prep® (Helsinn Birex Pharmaceuticals Ltd Dublin, Ireland) the day before operation. At induction and five days postoperatively, cefuroxim and metronidazol were administered parenterally. First, a posterior colporrhaphy was performed by the gynecologist. A transverse incision was made at the junction of skin and vaginal mucosa. A mucosal flap was dissected from the underlying tissue. When the highest point of dissection was reached, the fascia of the rectovaginal septum was identified by lateral preparation. The edges of the rectovaginal septum were approximated with interrupted Vicryl 0 sutures. The left and right part of the puborectal muscle were approximated with Vicryl 1 sutures. The number of these sutures

was determined by measuring the opening of the vaginal outlet. Introduction of two fingers had to be possible without applying pressure. If necessary, one or more sutures were removed. Reconstruction of the perineal body, if necessary, was performed by placing interrupted Vicryl 3-0 sutures including the lower margins of the bulbocavernosus and the transverse perinei muscles, thus supporting the levator hiatus. The procedure was ended by closing the vaginal mucosa with a running Vicryl 3-0 suture, which was continued over the perineum as a subcuticular stitch. Then the patient was placed in prone jack-knife position. An anal retractor was inserted to expose the anterior half of the circumference of the anal canal. A transverse incision was made at the dentate line. Two vertical incisions were made at either end and extended proximally for a distance of about 7 cm. A mucosal flap was lifted from the underlying internal sphincter and excised. Interrupted transverse sutures of Vicryl 2-0 were placed to plicate the anterior rectal wall and caudally the internal anal sphincter. Finally the mucosal defect was closed with interrupted Vicryl 3-0 sutures.

Postoperative evaluation

Following rectocele repair, the patients were seen on a regular basis. In the first two years the clinical outcome was evaluated by the surgeon and the gynecologist every six months. At end evaluation (median duration 52 months, range 12-92 months) the clinical outcome was evaluated by an independent observer. This final evaluation of the functional outcome was based on the five most common symptoms at time of presentation (Table 1). Each symptom equaled one point. The outcome was considered 'excellent' or 'good' when the score was 0 or 1 respectively. The outcome was considered 'poor' when the total score was 2 or more. Using this scoring-system, 70 patients (82%) had a total score of 4 or 5 preoperatively. Evacuation proctography was performed six months after operation.

Statistical analysis

Fisher's exact test was used to compare the differences in percentages of outcome of surgical treatment in patients according to the signs of anismus using the different tests. $P< 0.05$ (two sided) was considered statistically significant. The agreement between the various tests was assessed using Kappa statistics (20). A Kappa of one indicates perfect agreement and a Kappa of zero no agreement. Values above 0.6 are usually taken to indicate good agreement.

Table 1

Symptoms at time of presentation of 89 patients who subsequently underwent rectocele repair. The five most frequent symptoms (in italics) were used for the scoring system to evaluate the clinical outcome of rectocele repair.

Symptoms	No.pts	%
Excessive straining	86	97
Manual assistance	76	85
vaginal digitation	23	26
anal digitation	30	35
perineal support	23	26
Incomplete evacuation	82	92
Sense of fullness	77	87
*Constipation**	56	63
Abdominal pain	55	62
Pelvic pressure	36	18
Bloody discharge	16	18
Mucous discharge	13	15
Soiling	3	3
Fecal incontinence	6	7

*constipation was defined by a defecation frequency of less than three times per week

RESULTS

Symptomatic improvement

At end evaluation a successful outcome was observed in 63 of the 89 patients (71%). There was no correlation between the size of the rectocele and results of surgery (p=0.48). The most frequent complication in the postoperative period was an urinary tract infection (16 patients). In five patients an indwelling catheter had to be placed because of urinary retention. Four patients developed a wound abscess, in all these patients the abscess drained spontaneously. In three patients a perianal fistula had to be excised. The outcome of rectocele repair was not influenced by these complications. In none of the patients a rectovaginal fistula developed. In the first postoperative year, vaginal tightness and pain during sexual intercourse occurred in 17 out of 57 sexually active patients. Three patients experienced

incontinence for gas or liquids, six patients presented with incontinence for solid stool, requiring an anterior anal repair.

Evacuation proctography

Measuring PARA and CARA in 85 subjects, anismus was diagnosed in 22 patients (29%) and 29 patients (34%) respectively. The outcome of rectocele repair in patients with radiological signs of anismus did not differ from that in patients without such signs as shown in Table 2. After rectocele repair EP showed no persistent or recurrent rectoceles.

Table 2

The influence of anismus (A), defined by radiological criteria, on the clinical outcome of rectocele repair in 85 patients. CARA represents the Central AnoRectal Angle and PARA the Posterior AnoRectal Angle.

	No. pts. A+	Success rate A+	No. pts. A-	Success rate A-	*P**
CARA	29	59%	56	75%	0.19
PARA	25	64%	60	72%	0.66

(A+, Signs of anismus; A-, no signs of anismus; *P**, significance of difference (A+ vs A-)

Electromyography

EMG of the pelvic floor revealed anismus in 34 out of 75 patients (45%). As shown in Table 3, the clinical outcome was not significantly different from patients in whom the puborectalis muscle showed relaxation during straining.

Table 3

The influence of anismus, defined by EMG criteria, on the clinical outcome of rectocele repair in 75 patients.

	No. pts. A+	Success rate A+	No. pts. A-	Success rate A-	*P**
EMG	34	71%	41	76%	0.82

(*P;* Significance of difference (A+ vs A-): A+; signs of anismus: A-; no signs of anismus)

Balloon expulsion test

Thirty-six of the 49 patients in whom a BET was performed, were unable to expel a balloon (73%). This sign of anismus did not influence the results of rectocele repair (Table 4).

Table 4

The influence of anismus, defined by BET criteria, on the clinical outcome of rectocele repair in 49 patients. BET represents the Balloon Expulsion Tests

	No. pts. A+	Success rate A+	No. pts. A-	Success rate A-	*P**
BET	36	72%	13	77%	1.00

(*P**, Significance of difference (A+ vs A-): A+; signs of anismus: A-; no signs of anismus)

Except for CARA versus PARA, the different tests showed a poor agreement (Table 5). There were 48 patients in which all tests (EP, EMG, BET) had been performed. There was no significant relation between the outcome of operation and the number of tests positive for anismus (Table 6).

Table 5

Agreement between the various tests used to diagnose anismus.

Combination of tests	No. pts.#	Observed agreement	Kappa-value
CARA vs PARA	71	83%	0.61
CARA vs EMG	58	62%	0.23
PARA vs EMG	58	55%	0.09
CARA vs BET	34	41%	0.00
PARA vs BET	34	47%	0.09
EMG vs BET	35	60%	0.25

(#; Number of patients in whom both tests were performed)

Table 6

Table 6

Relationship between the number of tests positive for anismus and the outcome of rectocele repair in 48 patients. Using evacuation proctography (EP), anismus was diagnosed when there was a decrease or insufficient increase of the anorectal angle either using CARA and/or using PARA.

	Number of tests positive for anismus			
	0	1	2	3
No. pts.	5	12	12	5
No. pts. with success	2 (40%)	9 (75%)	7 (58%)	4 (80%)

(Significance: P=0.55)

DISCUSSION

Obstructed defecation is a common symptom in every day medical practice, particularly in elderly people. Since the publication of Redding in 1965, it has become obvious that a rectocele can give rise not only to gynecological symptoms, but also to obstructed defecation[21]. Most often the evacuation difficulties arise during the fourth or fifth decade of life, when progressive weakening of the supportive tissues occurs[22]. On radiological examination small rectoceles have been shown in 10-50 percent of healthy women with a normal defecation pattern[23-28]. Larger rectoceles are more likely to be associated with disordered defecation and these rectoceles are usually nominated as "symptomatic". The symptoms are probably caused by stool being trapped in the sacculation.

In patients with a symptomatic rectocele, anismus appears to be a frequent finding as has been reported by other authors[18,28-31]. The impact of anismus on rectocele repair however has not been evaluated by these authors and it has been suggested that anismus might be a causative factor in the formation of the rectocele[30]. Recently Johansson et. al. stated that rectocele repair in patients with anismus is not advocated because of the dissatisfying results[18]. However, prospective studies on this issue are lacking. Our study is the first one in which the influence of anismus on the clinical outcome of surgical treatment of symptomatic rectocele is evaluated. It shows that results of rectocele repair in patients with signs of anismus are similar to those obtained in patients without evidence of anismus. This finding is irrespective to the method of diagnosing anismus.

Recently, doubt has been raised upon the clinical significance of anismus[32]. EMG signs of anismus have been found not only in patients with obstructed defecation, but also in patients with colonic inertia, fecal incontinence and even in control subjects[29,31-37]. On evacuation proctography, the angle between the anal canal and the rectal ampulla depends on the tone of the puborectalis muscle. To define the anorectal angle, CARA, and PARA are used. During attempted defecation, flattening of the anorectal angle occurs, due to relaxation of the puborectalis muscle. Absence of this flattening on straining is considered to be an important radiological sign of anismus[3,38-40]. In control subjects, lack of increase in anorectal angle was observed in 5 to 50 percent[22,25-27,38,41-43]. Comparing data of EMG and EP techniques, in most studies a poor correlation is found [5,39,40,44,45]. This finding has been confirmed in our study. Preston and Lennard-Jones developed a balloon model for the investigation of obstructed defecation[2]. They observed that severely constipated patients were unable to expel a balloon. However, several studies have shown a poor correlation of BET with EMG, as has been confirmed in our study[4,42,43,45]. It has been stated that using EMG, BET and EP, the true incidence of anismus is overestimated, because these tests poorly represent the natural physiology of defecation[2,31,42]. It has been suggested that artificially false-positive results may ensue from the patient's fear of evacuating in front of other people, resulting in over-diagnosis of anismus[29,31,33]. Considering the lack of agreement between the different diagnostic tests and the prevalence of anismus in healthy subjects, the question rises if anismus is indeed a distinct pathologic entity or merely a coincidental finding with no clinical relevance.

We conclude that rectocele repair is beneficial for patients with obstructed defecation and anismus should not be considered a contraindication for surgical treatment of patients with symptomatic rectocele.

REFERENCES

1. Wasserman IF. *Puborectalis syndrome (rectal stenosis due to anorectal spasm).* Dis Colon Rectum 1964;7:87-98.
2. Preston DM, Lennard-Jones JE. *Anismus in chronic constipation.* Dig Dis Sciences 1985;30:413-8.
3. Kuijpers HC, Bleijenberg G.*The spastic pelvic floor syndrome. A cause of constipation.* Dis Colon Rectum 1985;28:669-72.
4. Fleshman JW, Dreznik Z, Cohen E, Fry RD, Kodner IJ. *Balloon expulsion test facilitates diagnosis of pelvic floor outlet obstruction due to nonrelaxing puborectalis muscle.* Dis Colon Rectum 1992;35:1019-25.
5. Miller R, Duthie GS, Bartolo DCC, Roe AM, Locke-Edmunds J, Mortensen NJ. *Anismus in patients with normal and slow transit constipation.* Br J Surg 1991;78:690-2.
6. Enck P. Biofeed*back training in disordered defecation. A critical review.* Dig Dis Sciences 1993;38:1953-60.
7. Papachrysostomou M, Smith AN. *Effects of biofeedback on obstructive defecation-reconditioning of the defecation reflex?* Gut 1994;35:252-6.
8. Pitchford CA. *Rectocele: a cause of anorectal pathologic changes in women.* Dis Colon Rectum 1967;10:464-467.
9. Sullivan ES, Leaverton GH, Hardwick CE. *Transrectal perineal repair: an adjunct to improved function after anorectal surgery.* Dis Colon Rectum 1968;11:106-14.
10. Capps WF. *Rectoplasty and perineoplasty for the symptomatic rectocele: a report of fifty cases.* Dis Colon Rectum 1975;18:237-44.
11. Khubchandani IT, Sheets JA, Stasik JJ, Hakki AR. *Endorectal repair of rectocele.* Dis Colon Rectum 1983;26:792-6.
12. Sehapayak S. *Transrectal repair of rectocele: an extended armamentarium of colorectal surgeons. A report of 355 cases.* Dis Colon Rectum 1985;28:422-33.
13. Block IR. *Transrectal repair of rectocele using obliterative sutures.* Dis Colon Rectum 1986;29:707-11.
14. Sarles JC, Arnaud A, Selezneff I, Olivier S. *Endo-rectal repair of rectocele.* Int J Colorect Dis 1989;4:167-71.

15. Arnold MW, Stewart WRC, Aguilar PS. *Rectocele repair. Four year experience.* Dis Colon Rectum 1990;33:684-7.

16. Janssen LWM, van Dijke CF. *Selection criteria for anterior rectal wall repair in symptomatic rectocele and anterior rectal wall prolapse.* Dis Colon Rectum 1994;37:1100-7.

17. Mellgren A, Anzen B, Nilsson BY, Johansson C, Dolk A, Gillgren P, Bremmer S, Holmstrom B. *Results of rectocele repair. A prospective study.* Dis Colon Rectum 1995;38:7-13.

18. Johansson C, Nilsson BY, Holmstrom B, Dolk A, Mellgren A. *Association between rectocele and paradoxical sphincter response.* Dis Colon Rectum 1992;35:503-9.

19. Ginai AZ. *Technical report: evacuation proctography (defecography) a new seat and method of examination.* Clin Rad 1990;42:214-6.

20. Altman DG. *Practical statistics for medical research.* Chapman & Hall. London 1991;403-5.

21. Redding MD. *The relaxed perineum and anorectal disease.* Dis Colon Rectum 1965;28:279-2.

22. Cali LR, Christensen MA, Blatchford GJ, Thorson AG. *Rectoceles.* Sem Colorec Surg 1992;3:132-7.

23. Shorvon PJ, McHugh S, Diamant NE, Somers S, Stevenson GW. *Defecography in normal volunteers: results and implications.* Gut 1989;30:1737-49.

24. Selvaggi F, Pesce G, Scotto di Carlo E, Maffetoni V, Canonico S. *Evaluation of normal subjects by defecographic technique.* Dis Colon Rectum 1990;33:698-702.

25. Goei R, van Engelshoven J, Schouten H, Baeten C, Stassen C. *Anorectal function: defecographic measurement in asymptomatic subjects.* Radiology 1989;173:137-41.

26. Forenames MG, Walled A, Careen B, Badman DH. *Evacuation proctography in normal volunteers.* Invest Rad 11991;26:581-5.

27. Trundle GK, Barroom CHI, Lennard-Jones JE. *Radiologic studies of rectal evacuation in adults with idiopathic constipation.* Dis Colon Rectum 1988;31: 190-7.

28. Johansson C, Nilsson BY, Mellgren A, Dolk A, Holmstrom B. *Paradoxical sphincter reaction and associated colorectal disorders.* Int J Colorect Dis 1992;7:89-94

29. Jones PN, Lubowski DZ, Swash M, Path MRC, Henry MM. *Is paradoxical contraction of puborectalis muscle of functional importance?* Dis Colon Rectum 1987;30:667-70.

30. Johansson C, Ihre T, Holmstrom B, Nordstrom E, Dolk A, Broden G. *A combined electromyographic and cineroradiologic investigation in patients with defecation disorders.* Dis Colon Rectum 1990;33: 1009-13.

31. Barnes PRH, Lennard-Jones JE. *Function of the striated anal sphincter during straining in control subjects and constipated patients with a radiologically normal rectum or idiopathic megacolon.* Int J Colorect Dis 1988;3:207-9.

32. Schouten WR, Briel JW, Auwerda JJA, van Dam JH, Gosselink MJ, Ginai AZ, Hop WCJ. *Anismus: fact or fiction?* Dis Colon Rectum 1997;40:1033-41.

33. Duthie GS, Bartolo DCC. *Anismus: the cause of constipation? Results of investigation and treatment.* World J Surg 1992;16:831-5.

34. Wexner SD, Marchetti F, Salanga VD. *Neurophysiologic assessment of the anal sphincters.* Dis Colon Rectum 1991;34:606-12.

35. Rutter KRP. *Electromyographic changes in certain pelvic floor abnormalities.* Proc Roy Soc Med 1974;67:53-6.

36. Pemberton FH. Rath DM, Ilstrup DM. *Evaluation and surgical treatment of severe chronic constipation.* Ann Surg 1991; 214:403-13.

37. Pezim ME, Pemberton JH, Levin KE, Litchy WJ, Phillips SF. *Parameters of anorectal and colonic motility in health and severe constipation.* Dis Colon Rectum 1993;36:484-91.

38. Barroom CHI, Trundle GK, Lennard-Jones JE. *Evacuation proctography: an investigation of rectal expulsion in 20 subjects without defecatory disturbance.* Gastrointest Radiol 1988;13:72-80.

39. Fink RL, Roberts LJ, Scott M. *The role of manometry, electromyography and radiology in the assessment of intractable constipation.* Aust N Z J Surg 1991;61:959-64.

40. Jorge JMN, Wexner SD, Ger GC, Salanga VD, Nogueras JJ, Jagelman DG. *Cinedefecography and electromyography in the diagnosis of nonrelaxing puborectalis syndrome. Dis Colon Rectum* 1993;36:668-76.

41. Bartolo DCC, Roe AM, Virjee J, Mortensen NJ, Locke-Edmunds JC. *An analysis of rectal morphology in obstructed defecation.* Int J Colorect Dis 1988;3:17-22.

42. Read NW, Timms JM, Barfield LJ. *Impairment of defecation in young women with severe constipation.* Gastroenterol 1986;90:53-60.

43. Roe AM, Bartolo DCC, Mortensen NJ. *Slow transit constipation. Comparison between patients with or without previous hysterectomy.* Dig Dis Sci 1988;33:1159-63.

44. Lubowski DZ, King DW, Finlay IG. *Electromyography of the pubococcygeus muscles in patients with obstructed defecation.* Int J Colorect Dis 1992;7: 184-7.

45. Dahl J, Lindquist BL, Tysk C, Leissner P, Philipson L, Jarnerot G. *Behavioural medicine treatment in chronic constipation with paradoxical anal sphincter contraction.* Dis Colon Rectum 1991;34:769-76.

CHAPTER 6

Analysis of patients with poor outcome of rectocele repair

JH van Dam[1], WCJ Hop[2] and WR Schouten[1].

From the Departments of [1]General Surgery and [2]Epidemiology and Biostatistics. University Hospital Dijkzigt, Rotterdam, The Netherlands.

Submitted to The Diseases of Colon & Rectum for publication

ABSTRACT

Aim of the present study was to analyze the prognostic value of clinical data and physiologic tests in patients undergoing rectocele repair for obstructed defecation. Between 1988 and 1996, 89 consecutive patients with obstructed defecation due to a rectocele were enrolled in the study. Median age at time of presentation was 55 (range, 35-81) years. All patients underwent a combined transvaginal/transanal rectocele repair. End-evaluation to assess long term results was carried out by an independent observer after a median duration of follow up of 52 (range: 12-92) months. The presence of the following five symptoms was evaluated: prolonged and unsuccessful straining at stool, feelings of incomplete evacuation, manual assistance during defecation, false urge to defecate, and a stool frequency of less than three times per week. When none or just one of these symptoms was present, outcome of rectocele repair was considered successful. The outcome was considered as a failure when two or more of these symptoms were recorded. Furthermore, all patients were asked to score the outcome of their operation as excellent, good, moderate or poor. Clinical data and the results of physiologic tests obtained in those patients with a poor outcome of surgery were compared with those obtained in patients with a successful outcome. Outcome of rectocele repair was found to be successful in 63 (71 percent) patients. Sixty-one patients considered outcome of surgery excellent or good (69 percent). Graded subjective outcomes between both groups showed significantly better grades in case of success. Duration of symptoms, age, parity, and previous hysterectomy had no influence on the final outcome of surgery. Defecographic parameters, such as size of the rectocele, barium-trapping in the rectocele, poor rectal evacuation or intussusception, had no prognostic value. Signs of anismus based on defecography, electromyography and balloon-expulsion studies, did not influence outcome of surgery. The presence of symptoms such as defecation frequency, manual assistance, severe straining, false urge to defecate or feelings of incomplete evacuation had no impact on the outcome. However, in patients without a daily urge to defecate, or with a stool frequency of less than once per week, results of rectocele repair were significantly worse than in patients with a daily urge to defecate. In 14 out of 26 patients with a poor outcome, colonic transit studies were performed. A delayed passage was observed throughout the entire colon in seven patients, in the left part of the colon and the rectosigmoid colon in four patients, and the rectosigmoid colon in one patient. In two patients, colonic transit was normal. We

conclude that combined transvaginal/transanal rectocele repair is beneficial for the majority of patients with obstructed defecation. In patients without a daily urge to defecate or a stool frequency of less than once per week, indicating colonic malfunctioning, the outcome of rectocele repair seems to be poor.

INTRODUCTION

Since 1965, when Redding focused attention on the rectal side of rectoceles, a series of studies have been conducted in order to evaluate the impact of rectocele repair on bowel habit in patients with obstructed defecation[1-19]. Several surgical techniques have been described and short-term outcome has been reported as being successful in 62 to 85 percent of the patients [2-19]. However, since inclusion and exclusion criteria vary, and most studies are based on retrospective data, comparisons are difficult to make between different techniques. Furthermore, the reported results of rectocele repair are difficult to compare since definition of success is unclear and mostly subjective. We performed this prospective study to evaluate the prognostic value of clinical data and physiologic tests in patients undergoing rectocele repair for obstructed defecation.

PATIENTS AND METHODS

Patients characteristics

Between 1988 and 1996, 89 consecutive women with obstructed defecation due to a rectocele with a depth of more than three centimeters were enrolled in the study. Obstructed defecation was diagnosed when three or more of the following symptoms were present: prolonged and unsuccessful straining at stool, feelings of incomplete evacuation, manual assistance during defecation, false urge to defecate, and a stool frequency of less than three times per week. Mean age at time of presentation was 55 (range 35-81) years. The median duration of symptoms was 5 (range 1-40) years.

Preoperative analysis

Before surgery, the medical history was obtained using a standardized questionnaire, with special reference to bowel habit. This included questions about stool frequency, use of laxatives, daily urge to defecate, false urge to defecate, feelings of incomplete defecation,

excessive straining, digital manipulation during defecation, soiling and fecal incontinence. Physical examination was performed by a specialized team including a colorectal surgeon and a gynecologist. Besides the presence of anorectal pathology, associated vaginal pathology was recorded.

In all patients defecography was performed as described by Ginai[20]. Special notice was made of size and degree of contrast evacuation of the rectocele during straining, the presence of enterocele, internal intussusception, radiological signs of anismus, perineal descent and the degree of rectal evacuation of contrast during straining as described previously[21]. Anorectal manometry was performed in all 89 patients to exclude the presence of Hirschprung's disease. To evaluate the presence of anismus, electromyography of the pelvic floor was performed in 75 patients, and balloon expulsion tests were performed in 49 patients as described previously[22].

Rectocele repair

In all 89 patients surgical correction of the rectocele was performed by a gynecologist and one colorectal surgeon. Preoperative bowel preparation was carried out using Klean-prep ™ (Helsinn Birex Pharmaceuticals Ltd., Dublin, Ireland) administered the day before operation. At induction of anesthesia and during five days after surgery, cefuroxim and metronidazol were administered parenterally. The combined procedure was started first with a posterior colporrhaphy, performed by the gynecological team, using interrupted Vicryl ™ (Ethicon, Somerville, NJ) sutures. After repositioning the patient in prone jackknife position, mucosal redundancy of the anterior rectal wall was removed transanally by the colorectal surgeon, followed by a transverse plication of the muscular layer of the rectal wall using interrupted Vicryl ™ sutures. Finally the mucosa was repaired with interrupted sutures.

Postoperative evaluation

Clinical outcome was evaluated by a colorectal surgeon and a gynecologist every three months in the first two years after surgery. End evaluation was performed by an independent observer after a median duration of follow up of 52 (range 12-92) months. Six months after surgery defecography was repeated.

At end evaluation we recorded the presence of the five most frequent symptoms mentioned at time of presentation: the need for excessive straining during defecation, the need for manual assistance during defecation in order to empty the bowel, feelings of incomplete evacuation after defecation, sense of rectal fullness and a stool frequency of less than three times per week. Outcome was considered successful when none or just one of these symptoms was recorded. When two or more symptoms were present outcome of surgery was considered as poor. Furthermore, all women were asked to grade outcome of their operation as excellent, good, moderate or poor

Clinical data and the outcome of physiological tests of patients with unsuccessful results of rectocele repair where further analyzed and compared with those of patients with successful outcome of surgery.

Statistical analysis

Comparison of graded outcomes or continuous variables between groups was done using Mann Whitney's test, P=0.05 was considered the limit of significance. Percentages were compared using Fisher's exact test.

RESULTS

As shown in Table 1, 61 patients considered outcome of their operation excellent or good (69 percent). Based on the presence of symptoms, outcome of surgery was found to be successful in 63 patients (71 percent), and in 26 patients outcome of surgery was considered as a failure. Comparison of graded outcomes between both groups showed significant better grades in case of success (P<0.001). Defecography six months after rectocele repair showed no persistent or recurrent rectoceles.

Age, duration of symptoms, previous hysterectomy, and parity had no significant influence on the outcome of rectocele repair. Comparison of symptoms noted before rectocele repair in the group of patients with a successful outcome and those patients with a failure of rectocele repair showed no significant differences except for the presence of a daily urge to defecate, and a stool frequency of less than once per week, which was recorded more frequently in the group of patients with a successful outcome (Table 2).

Table 1

Results of surgery at end evaluation in 89 patients with comparison of the subjective outcome and the objective outcome based on the presence of symptoms.

	Objective assessment of outcome of surgery		
	Success	Failure	
Subjective assessment of outcome of surgery			Total
Excellent	20	1	21
Good	38	2	40
Moderate	5	17	22
Poor	0	6	6
Total	63	26	89

Table 2

Symptoms before and after surgery recorded in 26 patients with poor outcome of surgery and 63 patients with good outcome of surgery.

Symptoms before surgery	*26 Patients with poor outcome of surgery (%)*	*63 Patients with good outcome of surgery (%)*
Excessive straining	26 (100)	60 (95)
Manual assistance	20 (77)	56 (89)
vaginal digitation	8 (31)	14 (22)
anal digitation	9 (35)	21 (33)
perineal support	3 (12)	20 (32)
Incomplete evacuation	25 (96)	57 (90)
Sense of rectal fullness	22 (85)	55 (87)
Constipation	19 (73)	37 (59)
Freq <3 per week	5 (19)	19 (30)
Freq < 1 per week	14 (54)	18 (29)*
Daily urge for defecation	11 (42)*	53 (84)**
Abdominal pain	19 (73)	36 (57)

(*: *P*-value 0.03; **: *P*-value = 0.001)

In both groups, the prevalence of anismus, diagnosed by electromyography, balloon expulsion tests or by defecography, was not significantly different (Table 3). Comparison of defecographic parameters, such as size of rectocele, barium trapping in the rectocele, rectal contrast evacuation or the presence of internal intussusception, recorded in both groups, showed no significant differences (all P>0.28).

Table 3

Prevalence of anismus before surgery in patients with poor outcome of surgery (26 patients), and in patients with good outcome of surgery (63 patients). Electromyographic (EMG) evidence of anismus was considered as a lack of decrease of activity during maximal straining effort. In balloon expulsion studies (BES), failure to expel the balloon was considered as a criterion for anismus. On defecography, anismus was diagnosed, when a decrease or insufficient increase (<5 percent) of the anorectal angle, measure along the central anorectal angle (CARA) or the posterior anorectal angle (PARA) was observed.

Test for anismus	Patients with poor outcome of surgery (%)	Patients with good outcome of surgery (%)
EMG	53	43
BET	90	69
CARA	45	30
PARA	36	27

In 14 out of the 26 patients with moderate or poor outcome of surgery, colonic transit time studies were performed as described by Hinton[23]. In the remaining 9 patients, no further analysis was performed because of several reasons: disseminated cancer (two patients), emigration (one patient), dementia (one patient), and refusal (five patients). In three patients, no further analysis was performed since they considered outcome of surgery excellent or good, despite the presence of two or more symptoms, as is shown in Table 1. Colonic transit studies showed in seven patients a delayed passage of radioopaque markers throughout the entire colon, in four patients transit was delayed in the left part and the rectosigmoid colon. In one patient transit was normal except in the rectosigmoid colon. In two patients transit was completely normal.

DISCUSSION

In 1968 Sullivan *et al* propagated the transanal approach for patients with obstructed defecation due to a rectocele. Since then several studies have been published on the effect of transanal rectocele repair on bowel habit[2-14]. However, these studies are mostly based on retrospective data and comparisons are difficult to make since indications for surgery and exclusion criteria vary. In most studies large prolapsed rectoceles, 'mid' or 'high' rectoceles, and rectoceles associated with enteroceles are excluded and referred to gynecologists[2-7]. In recent years, several studies have been conducted to evaluate the impact of posterior colporrhaphy on bowel habit in patients with rectocele and obstructed defecation[15,24]. The clinical outcome of this posterior colporrhaphy is comparable with that after transanal rectocele repair, however, persistent and/or recurrent rectoceles after posterior colporrhaphy are observed in 20 to 24 percent of the patients. Recently, new techniques have been described, such as reinforcement of the rectovaginal septum using a dermis transplant or using a Marlex mesh[17,18]. Results of all these different techniques are comparable, with success rates varying between 62 and 85 percent.

In recent years attempts have been made to define selection criteria for surgery in patients with obstructed defecation due to a rectocele in order to improve the outcome. Symptoms such as the need for vaginal manipulation and rectal digitization in order to empty the rectal ampulla are often recommended as a selection criterion[7,11,18]. In the present study, these two symptoms had no prognostic value, an observation also made by others[24]. All other clinical symptoms were also of no influence. Only in patients without a daily urge to defecate, and/or a stool frequency of less than once per week, outcome of rectocele repair was found to be significantly worse than in patients who experienced a daily urge to defecate or a stool frequency of more than once per week.

Trying to identify defecographic parameters useful in the selection of patients, we could not demonstrate any correlation between defecographic findings and results of surgery, though some authors hesitate to operate on those patients in whom the rectocele has no contrast retention during attempted defecation[7,24]. It also has been stated that rectocele repair in patients with concomitant anismus is not advocated because of poor results of surgery in these women[25]. However, in a previous report we already showed no significant differences

in outcome of surgery in patients with or without evidence of anismus either based on defecography, electromyography or balloon expulsion tests[22].

Controversy exist with regard to the optimum therapeutic strategy in patients with both a symptomatic rectocele and colonic inertia. A delayed colonic transit has been observed frequently in patients with symptomatic rectocele[24,25]. It seems likely that in these patients obstructed defecation is not only due to the rectocele. Although improvement of rectal emptying after rectocele repair has been observed, it is unlikely that rectocele repair influences colonic functioning[26]. It has been demonstrated that patients with poor outcome after rectocele repair have longer mean transit times[12]. Furthermore, it also has been shown that patients with delayed colonic transit preoperatively, have a poorer outcome of surgery[24]. Despite these observations, some authors advocate repair in patients with symptomatic rectocele, irrespective of a diagnosis of concomitant colonic inertia[10,27]. Although results of surgery may be disappointing in patients with concomitant colonic inertia, they advocate to correct any anorectal evacuation disturbance, to improve results of future colonic surgery[10,27].

In this study we demonstrated that combined transvaginal/transanal rectocele repair is beneficial for the majority of patients with obstructed defecation. In defining selection criteria, defecography, electromyography and balloon-expulsion studies were not helpful. The importance of a taking a good medical history was shown. In patients without a daily urge to defecate and/or a stool frequency of less than once per week, indicating concomitant colonic dysfunctioning, it was found that results of surgery were significantly worse than in patients without these symptoms.

We suggest to perform colonic transit studies in all patients with obstructed defecation. In patients with signs of colonic inertia, one has to discuss the implications of rectocele repair with the patient, since outcome of surgery can be disappointing. However, in patients with disabling symptoms, rectocele repair may be necessary in order to improve results of future colonic surgery.

REFERENCES

1. Redding MD. *The relaxed perineum and anorectal disease.* Dis Colon Rectum 1965;8:279-82.
2. Sullivan ES, Leaverton GH, Hardwick CE. *Transrectal perineal repair: an adjunct to improved function after anorectal surgery.* Dis Colon Rectum 1968;11:106-14.
3. Capps WF Jr. *Rectoplasty and perineoplasty for the symptomatic rectocele: a report of fifty cases.* Dis Colon Rectum 1975;18:237-44.
4. Khubchandani IT, Sheets JA, Stasik JJ, Hakki AR. *Endorectal repair of rectocele.* Dis Colon Rectum 1983;26:792-6.
5. Sehapayak S. *Transrectal repair of rectocele: an extended armamentarium of colorectal surgeons. A report of 355 cases.* Dis Colon Rectum 1985;28:422-33.
6. Block IR. *Transrectal repair of rectocele using obliterative suture.* Dis Colon Rectum 1986;29:707-11.
7. Sarles JC, Arnaud A, Selezneff I, Olivier S. *Endo-rectal repair of rectocele.* Int J Colorect Dis 1989;4:167-71
8. Arnold MW, Stewart WR, Aguilar PS. *Rectocele repair: Four years experience.* Dis Colon Rectum 1990;33:684-7.
9. Janssen LWM, van Dijke CF. *Selection criteria for anterior rectal wall prolapse.* Dis Colon Rectum 1994;37:1100-7.
10. Infantino A, Masin A, Melega E, Dodi G, Lise M. *Does surgery resolve outlet obstruction from rectocele?* Int J Colorectal Dis 1995;10:97-100.
11. Murthy VK, Orkin BA, Smith LE, Glassman LM. *Excellent outcome using selective criteria for rectocele repair.* Dis Colon Rectum 1996;39:374-8.
12. Karlbom U, Graf W, Nilsson S, Pahlman L. *Does surgical repair of a rectocele improve rectal emptying?* Dis Colon Rectum 1996;39:1296-1302.
13. Khubchandani IT, Clancy JP 3rd, Rosen L, Riether RD, Stasik JJ Jr. *Endorectal repair of rectocele revisited.* Br J Surg 1997;84:89-91.
14. Yik-Hong H, Ang M, Nyam D, Tan M, Seow-Choen F. *Transanal approach to rectocele repair may compromise anal sphincter pressure.* Dis Colon Rectum 1998; 41:354-8.

15. Kahn MA, Stuart SL. *Posterior colporrhaphy: its effect on bowel and sexual function.* Br J Obstet Gynaecol 1997;104:82-6.

16. Kahn MA, Stanton SL. *Techniques of rectocele repair and their effects on bowel function.* Intern Urogynecol J 1998;9:37-47.

17. Øster S, Astrup A. *A new vaginal operation for recurrent and large rectocele using dermis transplants.* Acta Obstet Gynecol Scand 1981;60:493-5.

18. Watson SJ, Loder PB, Halligan S, Bartram CI, Kamm MA, Philips RKS. *Transperineal repair of symptomatic rectocele with Marlex mesh: a clinical, physiological and radiologic assessment of treatment.* J Am Coll Surg 1996;183:257-61.

19. Silvis R, Gooszen HG, Kahraman T, Groenendijk AG, Lock MT, Italiaander MV, Janssen LW. *Novel approach to combined defaecation and micturition disorders with rectovaginovesicopexy.* Br J Surg 1998;85:813-7.

20. Ginai AZ. *Technical report: evacuation proctography (defecography) a new seat and method of examination.* Clin Radiol 1990;42:214-6

21. van Dam JH, Ginai AZ, Gosselink MJ, Huisman WM, Bonjer HJ, Hop WCJ, Schouten WR. *The role of defecography in predicting the clinical outcome of rectocele repair.* Dis Colon Rectum 1997;40:201-7.

22. van Dam JH, Schouten WR, Ginai AZ, Huisman WM, Hop WCJ. *The impact of anismus on the clinical outcome of rectocele repair.* Int J Colorect Dis 1996;11:238-42.

23. Hinton JM, Lennard-Jones JE, Young AC. *A new method for studying gut transit time using radioopaque markers.* Gut 1969;10:842-7.

24. Mellgren A, Anzen B, Nilsson B, Johansson C, Dolk A, Gillgren P, Bremmer S, Holmström B. *Results of rectocele repair. A prospective study.* Dis Colon Rectum 1995;38:7-13.

25. Johansson C, Nilsson BY, Holmström B, Dolk A, Mellgren A. *Association between rectocele and paradoxical sphincter response.* Dis Colon Rectum 1992;35:503-9.

26. Karlbom U, Graf WG, Hilsson S, Påhlman L. *Does surgical repair of a rectocele improve rectal emptying?* Dis Colon Rectum 1996;39:1296-1302.

27. Pemberton JH, Rath DM, Ilstrup DM. *Evaluation and surgical treatment of severe constipation.* Ann Surg 1991;214:403-13.

CHAPTER 7

Results of combined transvaginal/transanal rectocele repair on vaginal symptoms: a prospective study

JH van Dam[1], ME Vierhout[2], WCJ Hop[3], AZ Ginai[4], MJ Gosselink[1], and WR Schouten[1].
From the Departments of [1]General Surgery, [2]Gynecology, [3]Epidemiology and Biostatistics and [4]Radiology. University Hospital Dijkzigt, Rotterdam, The Netherlands.

Submitted to The American Journal of Obstetrics and Gynecology for publication

ABSTRACT

Rectoceles are frequently observed in elderly women. It is generally accepted that rectoceles can give rise not only to feelings of vaginal prolapse but also to severe emptying disturbances of the rectum. To evaluate symptomatology in patients with a rectocele we performed a prospective study. Between January 1988 and July 1996, 89 consecutive patients (median age 55, (range 35-81) years) with obstructed defecation and a rectocele measuring 3 cm or more on defecography, were enrolled in the study. Preoperative evaluation consisted of a standardized questionnaire, physical examination and defecography. Besides obstructed defecation, 36 patients mentioned feelings of vaginal prolapse. In these 36 patients additional gynecological pathology was confirmed during physical examination. In all 89 patients, a combined transvaginal/transanal rectocele repair was performed. In 18 out of the 36 patients with coexistent gynecological pathology an additional procedure was performed (colpo-sacrosuspension in nine patients, obliteration of Douglas pouch in five patients, an anterior colporrhaphy in seven patients and a hysterectomy in six patients). In the other 18 patients with coexistent gynecological pathology, no additional surgical procedure was performed for several reasons. An independent observer qualified long-term results after a median duration of follow up of 52 (range 12-92) months. After combined rectocele repair the number of patients with obstructed defecation declined significantly, and in 71 percent of the patients, outcome of surgery was considered successful. In all 18 patients in whom an additional procedure was performed, feelings of vaginal prolapse disappeared. In all 18 patients in whom no additional procedure was performed, feelings of vaginal prolapse persisted after rectocele repair. Combined transvaginal/transanal rectocele repair is beneficial for the majority of patients with obstructed defecation. Feelings of vaginal prolapse can not be attributed to rectoceles and are suggestive for coexistent gynecological pathology

INTRODUCTION

Until recently, a rectocele was regarded as just being part of genital prolapse and considered to be a gynecological disorder. Rectocele repair was carried out traditionally by gynecologists, performing a posterior colporrhaphy, mostly combined with other vaginal

surgery for concomitant pathology. However, dyspareunia frequently occurs after posterior colporrhaphy[1-4].

Although it is generally accepted that rectoceles can give rise to feelings of vaginal prolapse, the precise incidence of rectoceles in patients with feelings of vaginal prolapse and a normal defecation pattern is not known since no prospective studies have been performed on this subject. Milani *et al* retrospectively analyzed the data of 191 women with feelings of vaginal prolapse, and they reported that only six women had a solitary rectocele, whereas all other patients had coexistent pathology such as cystocele, vaginal vault prolapse or uterus prolapse[4]. In contrast, Kahn observed a solitary rectocele in 36 percent of his patients with feelings of vaginal prolapse[5].

Since the publication of Redding, colorectal surgeons have gained interest in the possible impact of rectoceles on defecation and recent years several authors have reported on the clinical outcome after transvaginal, transanal or combined procedures in patients with rectoceles and obstructed defecation with good results of 62 to 82 percent improvement in function[6-17].

Although it is frequently assumed that rectoceles often are asymptomatic, it has been shown on defecography in control subjects that only the minority of the rectoceles are more than 3 cm in depth, and therefore only rectoceles of more than 3 cm are considered abnormal[18-22].

The purpose of this prospective study is to evaluate the impact of rectoceles on vaginal symptoms in patients with obstructed defecation.

PATIENTS AND METHODS

Between January 1988 and July 1996, 89 consecutive patients with obstructed defecation and a rectocele with a size of more than 3 cm on defecography were enrolled in the study (median age 55 years, range 35-81 years). Obstructed defecation was diagnosed when three or more of the following symptoms were present: prolonged and unsuccessful straining at stool, feelings of incomplete evacuation, manual assistance during defecation, false urge for defecation, and a defecation frequency of less than three times per week.

Preoperative analysis

Medical history

All patients were evaluated preoperatively according to a standardized protocol. This included a detailed questionnaire, with special reference to past history of pelvic surgery, obstructed defecation, urinary symptoms, sexual function disturbances and feelings of vaginal prolapse. All but one woman had had one or more vaginal deliveries. The medical history of the patients revealed a hysterectomy in 53 patients, and a transvaginal prolapse repair in 25 patients (9 anterior, 4 posterior and 12 combined repairs). Two patients had undergone a transrectal rectocele repair earlier. Thirty-six patients mentioned besides obstructed defecation, feelings of vaginal prolapse.

Physical examination

A specialized team including one surgeon and one gynecologist performed physical examination. Both anorectal pathology and associated vaginal pathology were recorded. Besides the rectocele, additional gynecological pathology was confirmed at physical examination in 36 patients, as shown in Table 1.

Defecography

In order to visualize the rectocele and associated pathology, defecography was performed, as described by Ginai[23].

Surgical procedure

Rectocele repair was performed in all patients using a combined transvaginal/transanal approach. First the gynecologist performed a posterior colporrhaphy and subsequently, after repositioning the patient in prone jack-knife position, a transanal repair was performed by the surgeon as described before[24]. In 18 patients with coexistent gynecological pathology, additional procedures were performed as summarized in Table 2. In the remaining 18 patients with coexisting gynecological pathology, additional procedures were not performed for several reasons such as a wish for pregnancy or refusal of the patient.

Table 1

Gynecological pathology on physical examination in 36 patients with feelings of vaginal prolapse.

Physical examination	number of patients*
Enterocele**	9
Cystocele	15
Vaginal vault prolapse	13
Uterine prolapse	12

(*: 13 patients had a combination of pathology, **: the presence of an enterocele was confirmed by defecography)

Table 2

Additional procedures performed in 18 patients with concomitant gynecological pathology

Indication	procedure	number of patients
Vaginal vault prolapse	colpo-sacrosuspension	2
Vaginal vault prolapse & cystocele	colpo-sacrosuspension and anterior colporrhaphy	2
Vaginal vault prolapse & enterocele	colpo-sacrosuspension and obliteration of Douglas	5
Uterine prolapse	hysterectomy	4
Uterine prolapse & cystocele	hysterectomy and anterior colporrhaphy	2
Cystocele	anterior colporrhaphy	3

Postoperative evaluation

After rectocele repair all women were seen on a regular basis. In the first two years the surgeon and the gynecologist evaluated the clinical outcome every three months. At end evaluation (median duration 52 months, range 12-92 months) an independent observer evaluated the clinical outcome. Regarding bowel function, 'objective' assessment of success of rectocele repair was based on the presence of the five most common symptoms recorded before surgery (Table 3, in Italics).

Table 3

Symptoms of 89 patients at time of presentation and at end evaluation. The symptoms used for end evaluation are in Italics.

Symptoms	number of patients before surgery (%)	number of patients after surgery (%)
Excessive straining	**86 (97)**	**30 (34)****
Manual assistance	**76 (85)**	**11 (12)****
Vaginal digitation	23 (26)	0 (0)**
Anal digitation	30 (34)	2 (2)**
Perineal support	23 (26)	9 (10)**
Incomplete evacuation	**82 (92)**	**24 (27)****
Sense of rectal fullness	**77 (87)**	**19 (21)****
Constipation	**56 (63)**	**29 (33)****
Abdominal pain	55 (62)	26 (29)**
Soiling	3 (3)	5 (6)
Fecal incontinence	6 (7)	9 (10)
Vaginal prolapse	36 (40)	25 (28)*
Group 1	18	0 (0)$^{\#}$
Group 2	18	18 (20)$^{\#}$
Dyspareunia$^{@}$	16 (28)	25 (28)

(*: $P < 0.05$; **:$P<0.001$; $^{\#}$:significantly different from each other, $^{@}$:only 57 women were sexually active)

Outcome was considered excellent or good when none or just one of these five symptoms was present. Defecography was performed six months after surgery in order to confirm the absence of the rectocele. Symptom percentages before and after surgery were compared using Mc Nemar's test. Fisher's exact test was used to make between-group comparisons. Two-sided P values ≤ 0.05 were considered significant.

RESULTS

Symptoms at the time of presentation and at end evaluation are enlisted in Table 3. After rectocele repair the number of patients with obstructive defecation declined significantly. In 63 patients no or just one of the five symptoms was recorded and therefore the outcome of rectocele repair was considered successful in 71 percent of the patients. Defecography six months after surgery showed no persistent or recurrent rectoceles. Considering vaginal symptoms before and after rectocele repair, we noticed that in all 36 patients with feelings of vaginal prolapse before surgery, additional gynecological pathology was observed as shown in Table 1.

Since additional surgery was performed in 18 of these 36 patients (Table 2), we divided these patients into two groups. Group 1 consisted of 18 patients with feelings of vaginal prolapse *and* additional surgery, group 2 consisted of 18 patients with feelings of vaginal prolapse before surgery and *no* additional surgery. After surgery, feelings of vaginal prolapse, had disappeared in all patients of group 1. In group 2, the prevalence of vaginal prolapse remained unchanged after surgery.

Postoperatively, the onset of dyspareunia was directly related to rectocele repair in 17 out of 41 sexually active women without dyspareunia before surgery (41 percent), as shown in Table 4.

COMMENT

Considering the close anatomical relationship of pelvic structures, it is not surprising that in patients with disorders of anorectal function, vaginal symptoms often coexist. In this group of 89 patients with a rectocele and obstructed defecation, 36 patients presented with Table 4

Table 4

The presence of dyspareunia before and after rectocele repair in 57 sexually active patients.

	Number of patients **with** dyspareunia after surgery	Number of patients **without** dyspareunia after surgery	Total
Number of patients **with** dyspareunia before surgery	8	8	16
Number of patients **without** dyspareunia before surgery	17	24	41

additional gynecological pathology such as vaginal vault prolapse, cystocele, enterocele and/ or prolapse of the uterus. A high number of patients had undergone previous pelvic surgery, an observation also made by others[6,12-14]. The explanation for this frequent combination of pelvic floor abnormalities is their pathogenesis.

In the formation of rectoceles, several factors play an important role. Childbirth seems to be a major etiologic factor, resulting in general weakening of the pelvic floor, and injury to the rectovaginal septum and perineal structures[25]. The aging process is also a contributing factor in the pathogenesis of rectocele because it is associated with loss of estrogenic hormone levels resulting in reduced elasticity of the supporting tissues of the uterus and atrophy of the uterus. These processes may give rise to not only to the formation of a rectocele, but also to relaxation of the whole pelvic compartment resulting in cystocele, enterocele, and prolapse of the uterus[26].

It has been suggested that hysterectomy itself plays a role in the pathogenesis of rectoceles and other pelvic floor abnormalities, since previous hysterectomy is often mentioned by women with rectocele and obstructed defecation, an observation made by us[12-14]. However, prospective data on this issue are lacking.

In this study, dyspareunia was frequently observed after surgery. In most studies on rectocele repair, this complication is not mentioned at all[6-9]. It is obvious that one has to ask

specifically about this symptom since patients are often too embarrassed to mention it. Although it is generally assumed that dyspareunia is caused by the transvaginal procedure, Arnold *et. al.* reported a similar incidence of dyspareunia after either a transvaginal or a transanal rectocele repair (21 and 23 percent respectively)[12]. It has been shown in this study that in patients with a rectocele and feelings of vaginal prolapse, associated gynecological pathology is likely to be present.

CONCLUSIONS

In this study we observed excellent anatomical results of combined transvaginal/ transanal rectocele repair, since no recurrent or persistent rectoceles were observed postoperatively on defecography. Furthermore, our surgical technique is beneficial for the majority of patients with obstructed defecation. In all patients with concomitant feelings of vaginal prolapse, associated gynecological pathology was present.

Since feelings of vaginal prolapse persisted in patients where *no* additional surgery was performed, and disappeared in patients in whom additional surgery *was* performed, it is unlikely that rectoceles *per se* give rise to feelings of vaginal prolapse.

Considering the risk of dyspareunia after rectocele repair, we believe that it is not justified to repair rectoceles in patients with just feelings of vaginal prolapse.

REFERENCES

1 Jeffcoate TNA. *Posterior colpoperineorrhaphy.* Am J Obstet Gynecol 1959;77:490-502.

2 Francis WJA, Jeffcoate TNA. *Dyspareunia following vaginal operations.* J Obstet Gynaecol Br Comnwlth 1961;1-10.

3 Haase P, Skibsted L. *Influence of operations for stress incontincence and/or genital descensus on sexual life.* Acta Obstet Gynaecol Scand 1988;67:659-61.

4 Milani AL, Flu PK, Vierhout ME, Wallenburg HCS. *Results and complications of vaginal correction of vaginal and uterine prolapse.* Ned Tijdschr Geneesk 1993;137:250-5.

5 Kahn MA, Stanton SL. *Posterior colporrhaphy: its effect on bowel and sexual function.* Br J Obstet Gynaecol 1997;104:82-86.

6 Redding MD. *The relaxed perineum and anorectal disease.* Dis Colon Rectum 1965;8:279-82.

7 Sullivan ES, Leaverton G, Clifford E, Hardwick E. *Transrectal perineal repair: An adjunct to improved function after anorectal surgery.* Dis Colon Rectum 1968;11:106-4.

8 Capps WF. *Rectoplasty and perineoplasty for symptomatic rectocele: a report of fifty cases.* Dis Colon Rectum 1975;18:237-44.

9 Khubchandani IT, Sheets JA, Stasik JJ, Hakki AR. *Endorectal repair of rectocele.* Dis Colon Rectum 1983;26:792-6.

10 Sehapayak S. *Transrectal repair of rectocele: an extended armamentarium of colorectal surgeons: a report of 355 cases.* Dis Colon Rectum 1985;28:422-33.

11 Block IR. *Transrectal repair of rectocele using obliterative suture.* Dis Colon Rectum 1986;29:707-11.

12 Sarles JC, Arnaud A, Selezneff I, Olivier S. *Endo-rectal repair of rectocele.* Int J Colorectal Dis 1989;4:167-71.

13 Arnold MW, Stewart WR, Aguilar PS. *Rectocele repair. Four years experience.* Dis Colon Rectum 1990;33:684-7.

14 Mellgren A, Anzen B, Nilsson B, Johansson C, Dolk A, Gillgren P, Bremmer S, Holmström B. *Results of rectocele repair. A prospective study.* Dis Colon Rectum 1995;38:7-13.

15 Infantino A, Masin A, Melega E, Dodi G, Lise M. *Does surgery resolve outlet obstruction from rectocele?* Int J Colorectal Dis 1995;10:97-100.

16 Murthy VK, Orkin BA, Smith LE, Glassman LM. *Excellent outcome using selective criteria for rectocele repair.* Dis Colon Rectum 1996;39:374-8.

17 Khubchandani IT, Clancy JP 3rd, Rosen L, Riether RD, Stasik JJ Jr. *Endorectal repair of rectocele revisited.* Br J Surg 1997;84:89-91.

18 Turnbull GK, Bartram CI, Lennard-Jones JE. *Radiologic studies of rectal evacuation in adults with idiopathic constipation.* Dis Colon Rectum 1988;31:190-7.

19 Shorvon PJ, McHugh S, Diamant NE, Somers S, Stevenson GW. *Defecography in normal volunteers: results and implications.* Gut 1989;30:1737-49.

20 Selvaggi F, Pesce G, Scotto Di Carlo E, Maffettone V, Canonico S. *Evaluation of normal subjects by defecographic techniques.* Dis Colon Rectum 1990;33:698-702.

21 Freimanis MG, Wald A, Caruana B, Bauman DH. *Evacuation proctography in normal volunteers.* Invest Rad 1991;26:581-5.

22 Bartram CI, Turnbull GK, Lennard-Jones JE. *Evacuation proctography; an investigation of rectal expulsion in 20 subjects without defecatory disturbance.* Gastrointest Radiol 1988;13:72-80.

23 Ginai AZ. *Technical report: evacuation proctography (defecography) a new seat and method of examination.* Clin Radiol 1990;42:214-6.

24 van Dam JH, Schouten WR, Ginai AZ, Huisman WM, and Hop WCJ. *The impact of anismus on the clinical outcome of rectocele repair.* Int J Colorectal Dis 1996;11:238-42.

25 Nichols DH. *Surgery for pelvic floor disorders.* Surg Clin North Am 1991;71:927-46.

26 Nichols DH, Genadry RR. *Pelvic relaxation of the posterior compartment.* Curr Opin Obstet Gynecol 1993;5:458-64.

CHAPTER 8

Fecal continence after rectocele repair, a prospective study

JH van Dam[1], WM Huisman[2], WCJ Hop[3], and WR Schouten[1].

From the Departments of [1]General Surgery, [2]Gynecology and [3]Epidemiology and Biostatistics. University Hospital Dijkzigt, Rotterdam, The Netherlands.

Submitted for publication to The International Journal of Colorectal Disease

ABSTRACT

In a consecutive series of 89 women (mean age 55, range 35-81 years) with obstructed defecation due to a rectocele with a depth of more than three centimeters, a combined transvaginal/transanal rectocele repair was performed. The impact of this procedure on anal sphincter pressure and continence status was evaluated prospectively. Before and after surgery (at three, six, twelve and twenty-four months) anorectal manometry was carried out. The following measurements were performed: maximal anal resting pressure (MARP), maximal anal squeeze pressure (MASP), and rectal sensory perception including first initial sensation, urge to defecate and maximum tolerable volumes (MTV). The outcome was successful in 71 percent of the patients with respect to their symptoms such as the need for straining at defecation, manual assistance, feelings of incomplete evacuation, sense of rectal fullness, constipation, abdominal pain and the use of laxatives. However, after rectocele repair, seven patients encountered a deterioration of fecal continence, whereas dyspareunia developed in 41 percent of the sexually active patients. Manometric studies revealed a significant decline in mean MARP and MASP of 18 and 16 percent respectively. In contrast to MASP, MARP gradually improved during the follow-up period. Distending volumes required for initial sensation and urge to defecate did not change after the procedure. Three and six months after rectocele repair the MTV's were significantly lower than the volumes recorded before and twenty-four months after surgery.

In patients who encountered impairment of continence after surgery, MARP and MASP were similar to those obtained in patients with normal continence after surgery.

In conclusion, transvaginal/transanal rectocele repair is beneficial for patients with obstructed defecation, however, care should be taken in sexually active patients, and patients at risk for developing fecal incontinence. Key words: Rectocele, outlet obstruction, manometry, fecal incopntinence

INTRODUCTION

In recent years it has become clear that rectocele repair is beneficial for patients with obstructed defecation[1-11]. However, long-term side effects of this procedure are not well documented. Besides dyspareunia, impairment of continence has been reported to occur in up to 38 percent of the patients[7]. During rectocele repair, anal stretching by a retractor may

result in damage of the anal sphincter complex. In order to investigate the long term side-effects of transvaginal/transanal repair on anal sphincter function, we performed a prospective study, including a continence status and anal pressures.

PATIENTS AND METHODS

Between January 1988 and July 1996, 89 consecutive patients with obstructed defecation and a rectocele with a depth of more than three centimeters enrolled in the study (median age 55 years, range 35-81 years). Obstructed defecation was diagnosed when three or more of the following symptoms were present: prolonged and unsuccessful straining at stool, feelings of incomplete evacuation, manual assistance during defecation, false urge to defecate, and a stool frequency of less than three times per week.

All patients were evaluated preoperatively according to a standardized protocol. This included a detailed questionnaire, with special reference to past history of pelvic surgery, obstructed defecation, urinary symptoms, sexual function disturbances and feelings of vaginal prolapse. A specialized team including a colorectal surgeon and a gynecologist performed the physical examination. After rectocele repair all women were seen on a regular basis. In the first two years, the surgeon and the gynecologist evaluated the clinical outcome every three months. At end evaluation (median duration 52 months, range 12-92 months) an independent observer evaluated clinical outcome. Regarding bowel function, 'objective' assessment of outcome was based on the presence of the five most common symptoms recorded before surgery (Table 1, in Italics). Outcome was considered excellent or good when none or just one of these five symptoms was present. Six months after surgery, defecography was repeated.

Anorectal manometry

Anorectal manometry was carried out using a microtransducer (Millar Company, Houston) with the patient in left lateral position. The following measurements were performed: maximal anal resting pressure (MARP) and maximal anal squeeze pressure (MASP). Rectal sensitivity to distension was measured, recording the volume of distension of the rectal balloon just required to be recognized by the patient, the volume at which an urge to defecate was present, and the maximum tolerable volume (MTV). All measurements were performed in triplicate.

Anorectal manometry was carried out before surgery, and three, six, twelve and twenty-four months after surgery.

Table 1

Symptoms of 89 patients at time of presentation and at end evaluation. Symptoms used for end evaluation are in Italics.

Symptoms	Number of patients Before surgery	Number of patients after surgery
Excessive straining	86	30**
Manual assistance	76	11**
vaginal digitation	23	0**
anal digitation	30	2**
perineal support	23	9**
Incomplete evacuation	82	24**
Sense of rectal fullness	77	19**
Constipation[#]	56	29**
Daily urge for defecation	64	67
Abdominal pain	55	26**
Use of laxatives	51	32*
Use of enemas	6	5
Perianal pain	6	1
Bloody discharge	16	8*
Mucous discharge	13	6
Soiling	3	5
Fecal incontinence	6	9
Vaginal prolapse	36	25*
Dyspareunia[†]	16	25

(*reduction: $p<0.05$; **: $p<0.001$; [#]: constipation was defined as a defecation frequency of less than three times per week: [†]: 57 women were sexually active)

Surgical procedure

A transvaginal/transanal rectocele repair was performed in all 89 patients under general anesthesia. First a posterior colporrhaphy was performed by the gynecologist, and

subsequently, after repositioning the patient in prone jack knife position, a transanal repair was performed by the surgeon, as described previously[12]. During this procedure, a Parks retractor was inserted for about twenty minutes. Additional gynecological surgery was performed in 18 patients because of cystocele, vaginal vault prolapse or uterine prolapse.

Statistical analysis

Longitudinal evaluations of manometric outcomes were done using repeated measurements analysis of variance[13]. Ninety-five percent confidence intervals were calculated. Initial sensation data were logarithmically transformed in this analysis to obtain approximately a normal distribution. The results of this parameter are therefore given as geometric means. Preoperatively, comparison of measurements in patients with and without impaired continence after surgery was done using the T-test. Percentages before and after surgery were compared using McNemar's test. P= 0.05 (two-sided) was considered the limit of significance.

RESULTS

Symptoms at time of presentation and at end evaluation are listed in Table 1. After rectocele repair the number of patients with obstructive defecation declined significantly. In 63 patients (71 percent) the outcome of rectocele repair was found to be successful. Defecography six months after surgery showed no persistent or recurrent rectoceles.

Of the 57 women who were sexually active, 41 patients had no pain during intercourse prior to surgery. At end evaluation, 17 of these 41 women (41 percent) encountered dyspareunia. Before surgery, three patients presented with incontinence for gas or liquids, whereas incontinence for solid stool was experienced by six patients as shown in Table 2. After rectocele repair, seven patients mentioned a deterioration in fecal continence.

Mean MARP significantly declined after combined transvaginal/transanal rectocele repair (Table 3). Although MARP, recorded two years after rectocele repair was higher than MARP recorded three, six and twelve months after surgery, it was still significantly lower than MARP recorded preoperatively. Regarding MASP, all values obtained postoperatively were significantly lower than those obtained prior to the procedure, and no significant differences between MASP's measured three, six, twelve and twenty-four months after surgery were found.

Table 3

Results of anorectal manometry before and 3, 6, 12 and 24 months after surgery. Data given are mean (95% C.I.).

	Before surgery	Months after surgery				*P*-value (Overall)
		3	6	12	24	
Mean resting pressure (mmHg)	76 (71-82)	60 (54-67)	62 (56-67)	59 (53-64)	68 (61-74)	<0.001
Maximum squeeze pressure (mmHg)	129 (120-137)	103 (91-116)	107 (97-117)	108 (97-118)	115 (102-129)	<0.001
Initial rectal sensation (ml)	81 (72-92)*	72 (60-87)*	81 (71-93)*	91 (79-105)*	91 (76-107)*	NS
Volume of urge for defecation (ml)	195 (177-213)	183 (156-211)	165 (143-188)	188 (166-211)	202 (173-230)	NS
Maximum tolerable volume (ml)	294 (274-313)	262 (232-292)	259 (235-284)	289 (265-313)	302 (270-334)	0.011

(*: geometric mean)

Table 2

Fecal continence before and after rectocele repair

After surgery	*Before surgery*			
	Continent	Incontinent for gas/liquids	Incontinent for solid stool	total
Continent	74	1	0	75
Incontinent for gas/liquids	4	1	0	5
Incontinence for solid stool	2	1	6	9
total	80	3	6	89

Mean volumes required for initial sensation and urge to defecate were not significantly different between the various time points. The MTV was significantly lower three and six months after surgery. The MTV twenty-four months after surgery was not significantly different from the MTV before surgery.

In patients with disturbed continence after surgery, MARP and MASP were not significantly different from MARP and MASP in patients without impaired continence after surgery.

DISCUSSION

The present study reveals that combined transvaginal/transanal rectocele repair provides a perfect anatomical restoration of the rectovaginal septum, since no recurrent or persistent rectoceles were observed after surgery. Furthermore, this procedure has been shown to be beneficial for the majority of patients with obstructed defecation. However, seven patients (8 percent) encountered a deterioration of fecal continence, whereas dyspareunia occurred in 41 percent of the sexually active patients.

Manometric studies showed a significant decrease of MARP and MASP after rectocele repair, though MARP was found to recover two years after the procedure. A likely explanation for the pressure drop after rectocele repair is the use of the Park's anal retractor during the transanal procedure[14]. Ho et al showed a significant decrease in MARP and MASP six months after transanal rectocele repair, although this had no clinical

implications[15]. Other authors have reported fecal incontinence after transanal procedures in up to 38 percent[7,16].

In recent years it has been become clear that vaginal delivery has a considerable impact on anal sphincter function[17,18]. Endo-anal ultrasound has shown sphincter defects in up to 41 percent of the women after vaginal delivery[18]. Besides childbirth, increasing age is also associated with deterioration of anal sphincter function[19]. In patients with rectocele, clinically occult sphincter defects may be present. Anal stretching during rectocele repair may lead to impaired continence. To avoid this complication, we need to identify those patients who are at risk for developing impaired continence after surgery. In this study it was shown that anorectal manometry was not helpful in selecting patients at risk for developing fecal incontinence, since MARP and MASP in these patients before surgery were not significantly different from the values obtained in patients that did not develop impaired continence. Occult sphincter defects can be detected with endo-anal ultrasound, however, data on the use of this technique in selecting those patients that will develop impaired continence after surgery are lacking.

In patients at risk for impairment of continence, alternate surgical techniques have to be considered. Use of other retractors, such as the Scott's retractor (Lone Star Medical Company, Houston), may be less damaging to the anal sphincters. It has been suggested that in patients with impaired continence, transvaginal rectocele repair might be preferable[15]. Although the impact of transvaginal rectocele repair on anal sphincter function has not been studied prospectively, incidences of fecal incontinence after transvaginal rectocele repair have been reported to occur in up to 36 percent of the patients[7]. Furthermore, dyspareunia is frequently observed after transvaginal rectocele repair[19-22]. In this study, the incidence of dyspareunia was 41 percent. Although it seems likely that this complication arises because of the transvaginal part of the repair, dyspareunia has been reported to occur after transanal rectocele repair in up to 21 percent[7].

Other therapeutic strategies, such as an anterior rectopexy, have to be evaluated in treating sexually active patients with symptomatic rectocele and patients at risk for impaired continence. In elderly patients with symptomatic rectocele and fecal incontinence, a colostomy can also be the treatment of choice.

In conclusion, combined transvaginal/transanal rectocele repair is beneficial for the majority of patients with obstructed defecation and shows excellent anatomical results. Care should be taken in those patients that are sexually active since a considerable number of patients develop dyspareunia. Since impairment of sphincter function is likely to occur after rectocele repair, we need to identify those patients that are at risk for impaired fecal continence. Anorectal manometry has proved to be useless in selecting patients. The value of endoanal ultrasound has to be evaluated.

REFERENCES

1. Sullivan ES, Leaverton G, Clifford E, Hardwick E. *Transrectal perineal repair: An adjunct to improved function after anorectal surgery.* Dis Colon Rectum 1968;11:106-4.
2. Capps WF. *Rectoplasty and perineoplasty for symptomatic rectocele: a report of fifty cases.* Dis Colon Rectum 1975;18:237-44.
3. Khubchandani IT, Sheets JA, Stasik JJ, Hakki AR. *Endorectal repair of rectocele.* Dis Colon Rectum 1983;26:792-6.
4. Sehapayak S. *Transrectal repair of rectocele: an extended armamentarium of colorectal surgeons: a report of 355 cases.* Dis Colon Rectum 1985;28:422-33.
5. Block IR. *Transrectal repair of rectocele using obliterative suture.* Dis Colon Rectum 1986;29:707-11.
6. Sarles JC, Arnaud A, Selezneff I, Olivier S. *Endo-rectal repair of rectocele.* Int J Colorectal Dis 1989;4:167-71.
7. Arnold MW, Stewart WR, Aguilar PS. *Rectocele repair. Four years experience.* Dis Colon Rectum 1990;33:684-7.
8. Mellgren A, Anzen B, Nilsson B, Johansson C, Dolk A, Gillgren P, Bremmer S, Holmström B. *Results of rectocele repair. A prospective study.* Dis Colon Rectum 1995;38:7-13.
9. Infantino A, Masin A, Melega E, Dodi G, Lise M. *Does surgery resolve outlet obstruction from rectocele?* Int J Colorectal Dis 1995;10:97-100.
10. Murthy VK, Orkin BA, Smith LE, Glassman LM. *Excellent outcome using selective criteria for rectocele repair.* Dis Colon Rectum 1996;39:374-8.
11. Khubchandani IT, Clancy JP 3rd, Rosen L, Riether RD, Stasik JJ Jr. *Endorectal repair of rectocele revisited.* Br J Surg 1997;84:89-91.
12. Van Dam JH, Schouten WR, Ginai AZ, Huisman WM, Hop WCJ. *The impact of anismus on the clinical outcome of rectocele repair.* Int J Colorect Dis 1996;11:238-42.
13. Schluchter MD. BMDP *Statistical software manual,* volume 2. Editors W.J. Dixon. Univ. of Calif press, Berkely, 1990;1207-1244
14. Van Tets WF, Kuijpers JH, Tran K, Mollen R, van Goor H. *Influence of Park's anal retractor on anal sphincter pressures.* Dis Colon Rectum 1997;40:1042-5.

15. Ho YH, Ang M, Nyam D, Tan M, Seow-Choen F. *Transanal approach of rectocele repair may compromise anal sphincter pressure.* Dis Colon Rectum 1998;41:354-8.

16. Keck JO, Schoetz DJ Jr, Roberts PL, Murray JJ, Coller JA, Veidenheimer MC. *Rectal mucosectomy in the treatment of giant villous tumours.* Dis Colon rectum 1995;38:7-13.

17. Rieger N, Schloithe A, Saccone G, Wattchow D. *The effect of a normal vaginal delivery on anal function.* Acta Obstet Gynecol Scand 1997;76:769-72.

18. Rieger N, Schloithe A, Saccone G, Wattchow D. *A prospective study of anal sphincter injury due to childbirth.* Scan J Gastroenterol 1998;33:950-5.

19. Ryhammer AM, Laurberg S, Sorensen FH. *Effects of age on anal function in normal women.* Int J Colorect Dis 1997;12:225-9.

20 Jeffcoate TNA. *Posterior colpoperineorrhaphy.* Am J Obstet Gynecol 1959;77:490-502.

21 Francis WJA, Jeffcoate TNA. *Dyspareunia following vaginal operations.* J Obstet Gynaecol Br Comnwlth 1961;68;1-10.

22 Haase P, Skibsted L. *Influence of operations for stress incontincence and/or genital descensus on sexual life.* Acta Obstet Gynaecol Scand 1988;67:659-61.

23 Milani AL, Flu PK, Vierhout ME, Wallenburg HCS. *Results and complications of vaginal correction of vaginal and uterine prolapse.* Ned Tijdschr Geneesk 1993;137:250-5.

CHAPTER 9

Summary and conclusions

Samenvatting en conclusies

SUMMARY AND CONCLUSIONS

Last decennia, new techniques for anorectal functional investigations have lead to a better understanding of the pathophysiology of constipation. It has become generally accepted that two main types of constipation can be distinguished: colonic inertia and obstructed defecation.

Controversy exists about the importance of rectoceles in causing obstructed defecation, and it is still not clear *if, when* and *how* surgery should be performed in women with rectoceles and obstructed defecation.

In order to answer these questions we studied prospectively a group of 89 women with a rectocele and obstructed defecation. In all patients a combined transvaginal/transanal rectocele repair was performed. Aims of this study were to investigate the causative role of rectoceles in obstructed defecation and other symptoms, and to evaluate long-term clinical outcome and side-effects of combined transvaginal/transanal rectocele repair in women with obstructed defecation. We also assessed the prognostic value of clinical and physiological parameters as well as the impact of concomitant anismus and colonic inertia on the outcome of rectocele repair.

Chapter 1 provides a general introduction to the thesis and the aims of the thesis are presented.

In chapter 2 anatomical aspects of the pelvic floor, the rectovaginal septum and the perineal body are described.

In chapter 3, the importance of pregnancy and vaginal delivery in the pathogenesis of rectoceles is discussed. Pregnancy and vaginal delivery can give rise to general relaxation of the pelvic floor, and injury to the pelvic floor, stretching and laceration of the rectovaginal septum, and injury to the perineum. Besides childbirth, the impact of aging, hormonal changes, and hysterectomy on pelvic structures is discussed. In the second part of this chapter, symptoms and clinical features of rectoceles are reviewed. Next, the role of physical examination and different imaging and physiological studies in diagnosing rectoceles are discussed. In the third part, different surgical procedures used in the treatment of rectoceles in woman with obstructed defecation are reviewed.

In chapter 4 the role of defecography in predicting the clinical outcome of rectocele repair is evaluated. Results of defecography performed in 85 patients are presented. Besides the rectocele, defecography revealed internal intussusception of the rectum in the majority of the women. Furthermore it was noticed that in almost 50 percent of the patients, a pathologic perineal descent was observed during simulated defecation. Contrast retention in the rectocele or in the rectum after defecation was frequently observed.
It was shown that various defecographic parameters such as size of the rectocele, internal intussusception, rectal evacuation, barium trapping in the rectocele, increased perineal descent, and radiologic signs of anismus are of no influence on the outcome of rectocele repair.

In chapter 5 the impact of anismus on the clinical outcome of rectocele repair is evaluated. To diagnose anismus, defecography, electromyography of the pelvic floor and balloon expulsion tests were performed in patients with rectocele and obstructed defecation preoperatively. Anismus was diagnosed in a considerable number of patients with symptomatic rectocele. It was demonstrated that the different tests, used to diagnose anismus, showed poor agreement. Rectocele repair was proven to be beneficial both for patients with signs of anismus, and for patients without signs of anismus.

In chapter 6 we analyzed the clinical data and results of physiological tests in patients with poor outcome of rectocele repair. The duration of symptoms, age, parity and previous hysterectomy had no influence on the final outcome of rectocele repair. The presence of symptoms such as defecation frequency, manual assistance, severe straining, false urge to defecate or feelings of incomplete evacuation had no predictive value. However, in patients without a daily urge to defecate, and/or a defecation frequency of less than once per week, results of surgery were significantly worse than in patients with a daily urge to defecate and/or a stool frequency of more than once per week. Again it was shown that defecographic parameters had no prognostic value, and that sign of anismus, either based on defecography, electromyography of the pelvic floor or on balloon expulsion tests were of no influence on the final outcome of rectocele repair. Colonic transit time studies performed in 14 of the 26 patients with poor results of surgery, revealed a delayed colonic transit in the majority of these patients.

In chapter 7 we evaluated the impact of rectocele repair on vaginal symptoms. Before rectocele

repair, 36 patients mentioned feelings of vaginal prolapse. In all these patients, physical examination revealed associated gynecological pathology. In 18 patients, additional gynecological surgery was performed. In these patients, feelings of vaginal prolapse disappeared after surgery, whereas in the patients in which no additional surgery was performed, feelings of vaginal prolapse persisted. Based on these observations it was concluded that in patients with obstructed defecation due to a rectocele, feelings of vaginal prolapse are suggestive for associated gynecological pathology. Furthermore, it was noticed that a considerable number of patients developed dyspareunia after rectocele repair. Of the 57 sexually active patients, 41 patients experienced no dyspareunia before surgery. Of these 41 patients, 17 patients mentioned dyspareunia at end-evaluation.

In chapter 8 we prospectively studied the effect of rectocele repair on anal sphincter pressures. Continence status was evaluated before and after surgery. Furthermore, anorectal manometry was performed before and three, six, twelve and twenty-four months after surgery. At end evaluation seven patients mentioned a deterioration of fecal continence. Manometric studies revealed a significant decline in maximal anal resting pressure and maximal anal squeeze pressure after surgery. However, maximal anal resting pressure partially recovered twenty-four months after surgery. In patients who encountered impairment of continence after surgery, maximal anal resting pressures and maximal anal squeeze pressures before surgery were similar to values obtained in patients with normal continence after surgery. Anorectal manometry is therefore not helpful in selecting those patients who will develop impairment of continence after rectocele repair.

In summary and in answer to the questions posed in chapter 1, the following conclusions can be drawn:

- Rectoceles are a major cause of obstructed defecation
- Rectoceles do not give rise to vaginal symptoms.
- Combined transvaginal/transanal rectocele repair is beneficial for patients with obstructed defecation.
- Dyspareunia and impairment of continence are important side effects of combined transvaginal/transanal rectocele repair.

- Rectocele repair is beneficial for women with concomitant anismus.
- Rectocele repair is not beneficial for women with concomitant colonic inertia.
- In order to improve results of surgery, colonic transit time studies are advocated to identify patients with colonic inertia.
- In predicting outcome of surgery, the absence of a daily urge for defecation, and a stool frequency of less than once per week were the only symptoms with prognostic value. Results of anorectal manometry, defecography, electromyography or balloon expulsion studies have no prognostic value.

SAMENVATTING EN CONCLUSIES

In de laatste decennia hebben nieuwe methoden van anorectaal functieonderzoek geleid tot een beter inzicht in de pathofysiologie van obstipatie. Het is nu algemeen geaccepteerd dat obstipatie kan worden onderverdeeld in twee hoofdvormen; "slow transit" obstipatie, wat ontstaat ten gevolge van een vertraagde werking van de dikke darm, en een bemoeilijkte stoelgang.

Er bestaat geen eenduidige mening over de rol van rectoceles bij het veroorzaken van een bemoeilijkte stoelgang en het is nog steeds niet duidelijk *of, wanneer* en *hoe* rectoceles geopereerd dienen te worden.

Om op deze vragen een antwoord te kunnen geven hebben wij een prospectief onderzoek verricht bij 89 vrouwen met een rectocele en een bemoeilijkte stoelgang. Bij alle vrouwen werd een gecombineerde transvaginale/transanale rectocele plastiek verricht.

Het doel van deze studie was niet alleen om de rol van rectoceles in de pathogenese van een bemoeilijkte stoelgang te onderzoeken, maar ook om de lange termijn resultaten en de bijwerkingen van de gecombineerde transvaginale/transanale rectocele plastiek te evalueren. De prognostische waarde van klinische gegevens en diverse fysiologische testen werd bepaald, en tevens werd bestudeerd of zowel anismus als "slow transit" obstipatie van invloed waren op het resultaat van operatieve behandeling van de rectocele bij vrouwen met een bemoeilijkte stoelgang.

Hoofdstuk 1 omschrijft de probleemstelling en de doelstellingen van dit onderzoek.

In hoofdstuk 2 wordt een overzicht gegeven van de anatomie van de bekkenbodem, het rectovaginale septum en het corpus perinei.

In hoofdstuk 3 wordt de invloed van zwangerschap en vaginale baring op het ontstaan van rectoceles uiteengezet. Naast overrekking en schade van de bekkenbodem, zijn uitrekking en beschadiging van het rectovaginale septum en letsel van het perineum belangrijke voorwaarden voor het ontstaan van rectoceles. Naast de baring, lijken het verouderingsproces, hormonale veranderingen en een uterus extirpatie eveneens een rol te spelen in de pathogenese van rectoceles.

In hoofdstuk 4 wordt uiteengezet of defaecografisch onderzoek van waarde is bij het voorspellen van het resultaat van operatief herstel van de rectocele. Defaecografisch onderzoek werd verricht bij 85 vrouwen die vervolgens geopereerd werden. Bij de meeste vrouwen werd naast een rectocele ook een inwendige verzakking van het rectum. Tevens bleek dat er tijdens persen vaak een abnormaal grote daling van de bekkenbodem aanwezig was. Vaak bleek dat er contrast achterbleef in de rectocele en in het rectum, na de gesimuleerde defaecatie. Geen van deze waarnemingen was van waarde bij het voorspellen van het resultaat van de operatie.

In hoofdstuk 5 wordt de invloed van anismus op het resultaat van rectocele herstel besproken. Voorafgaand aan de operatie, werden verschillende onderzoeken verricht om de diagnose anismus te stellen: defaecografie, electromyographisch onderzoek van de bekken bodem en een ballon expulsie test. Bij een aanzienlijk percentage van de onderzochte patiënten bleek sprake van anismus. Opvallend was dat er een slechte correlatie was tussen de uitkomsten van de verschillende onderzoeken. Tevens bleek dat de diagnose anismus van geen enkele invloed was op het resultaat van de operatieve behandeling.

In hoofdstuk 6 wordt de invloed van klinische factoren en verschillende fysiologische testen op het resultaat van de operatie besproken. Twee symptomen kwamen significant vaker voor bij vrouwen met een slecht operatieresultaat, te weten de afwezigheid van een dagelijkse aandrang voor ontlasting en een defaecatie frequentie van minder dan éénmaal per week. Opnieuw werd geconstateerd dat tekenen van anismus niet van invloed waren op het resultaat van operatief herstel van rectoceles, evenmin als additionele bevindingen bij defaecografisch onderzoek.

In hoofdstuk 7 wordt de geëvalueerd of operatief herstel van rectoceles vaginale verzakkings gevoelens doet verdwijnen. Deze gevoelens werden voorafgaande aan de operatie door 36 vrouwen gemeld. Uit de studie blijkt dat bij al deze 36 vrouwen, naast een rectocele, andere gynaecologische afwijkingen werden geconstateerd. Bij 18 patiënten vond om deze reden een aanvullende operatie plaats. Bij deze 18 patiënten waren de vaginale verzakkings gevoelens na de operatie verdwenen. Bij de overige 18 patiënten werd geen aanvullende operatie verricht en bij al deze 18 patiënten waren de vaginale verzakkings gevoelens onveranderd aanwezig na de operatie. Het bleek dat 17 van de 41 seksueel actieve vrouwen, die voor de operatie geen last hadden van dyspareunie, na de operatie dyspareunie kregen.

In hoofdstuk 8 wordt de invloed van de gecombineerde transvaginale/transanale rectocele op de faecale continentie besproken. Naast het afnemen van een goede anamnese pre- en postoperatief om de continentie status te bepalen, werd anorectale manometrie verricht voor en drie, zes, twaalf en vierentwintig maanden na de operatie. Bij de eindevaluatie bleek dat bij zeven patiënten duidelijk sprake was van een verminderde faecale continentie. Manometrisch onderzoek toonde een significante daling van de maximale rustdruk en maximale knijpkracht, alhoewel de maximale rustdruk zich deels herstelde twee jaar na de operatie. Bij patiënten met een duidelijk achteruitgang van de faecale continentie, bleek dat de preoperatief gemeten rustdruk en knijpkracht niet verschilden van de drukken bij patiënten zonder deze achteruitgang. Met behulp van anorectale manometrie kon niet voorspeld worden wie na de operatie last kreeg van verminderde continentie.

Samenvattend en als antwoord op de vragen gesteld in hoofstuk 1, kunnen de volgende conclusie worden getrokken:

- Rectoceles zijn een belangrijke oorzaak van een bemoeilijkte stoelgang.
- Rectoceles veroorzaken geen vaginale prolaps gevoelens
- De gecombineerde transvaginale/transanale rectocele plastiek is een goede operatie om vrouwen met een rectocele en een bemoeilijkte stoelgang te behandelen.
- Dyspareunie en achteruitgang in fecale continentie kunnen beschouwd worden als belangrijke bijwerkingen van de transvaginale/transanale rectocele plastiek
- Rectocele herstel bij vrouwen met tekenen van anismus is zinvol.
- Rectocele herstel bij vrouwen met "slow transit" obstipatie is weinig zinvol.
- Om het resultaat van operatief herstel van rectoceles te verbeteren is het te overwegen de colon passagetijd te bepalen.
- Afwezigheid van een dagelijkse aandrang voor defaecatie en een defaecatie-frequentie van minder dan één keer per week, beïnvloeden de uitkomst van rectocele herstel nadelig. Resultaten van defaecografisch onderzoek, electromyografisch onderzoek en ballon expulsie testen zijn niet van prognostische waarde.

DANKWOORD

Ten eerste wil ik mijn ouders te bedanken voor het vertrouwen dat zij altijd in mij hebben gehad en voor de mogelijkheden die zij mij hebben geboden me te ontwikkelen tot wat ik nu ben; lieve papa en mamma, jammer dat jullie er op 6 oktober niet bij zijn.

Bij de totstandkoming van dit proefschrift zijn een groot aantal mensen betrokken geweest.
Een aantal mensen die van cruciaal belang waren bij het 'rectocele project', wil ik bijzonder bedanken:
Mijn copromotor *Ruud Schouten.* Beste Ruud, dank voor de zeer intensieve begeleiding. Zonder jouw hulp zou dit proefschrift zeker nog niet, of waarschijnlijk nooit, tot stand zijn gekomen. Zeer veel tijd stak jij in dit klinische onderzoek. Niet alleen startte je samen met Mark Vierhout dit onderzoek op, ook opereerde je alle patiënten en deed je alle poliklinische controles. Tijdens het kritisch doorlezen van de artikelen en tenslotte van het proefschrift is er veel rode inkt gevloeid. Ruud, mijn dank is zeer groot.
De maatschap Gynaecologie van het Dijkzigt Ziekenhuis, met in het bijzonder *Mark Vierhout, Wouter Huisman, Kees ten Hoop*e en *Frans Huikeshoven.* Niet alleen beoordeelden zij de vrouwen op de polikliniek, ook waren zij zeer kritisch bij het stellen van de operatieindicaties tijdens de maandelijkse rectocele besprekingen. Alle patiënten werden door hen geopereerd en alle postoperatieve controles werden door hen met groot enthousiasme verricht. Allen zeer bedankt.
Abida Ginai. Abida, je nimmer aflatende enthousiasme werkte zeer stimulerend. Alle defecogrammen werden door jou verricht en beoordeeld op zeer kundige wijze. Abida, mijn dank is groot.
Wim Hop. Beste Wim, op jouw kantoor was het altijd even uitblazen. Ik was altijd weer verbaasd hoe jij uit een wirwar van gegevens orde wist te scheppen en het resultaat tot een hoger niveau wist te tillen. Wim, bedankt.

Veel dank ben ik verschuldigd aan mijn promotoren Kieje Bruining en Huug Tilanus; bedankt voor jullie vertrouwen en steun.

Bij het tot stand komen van het uiteindelijke boekje zijn een aantal mensen intensief betrokken

geweest. *Mark van Sambeek* verzorgde de lay-out van dit proefschrift. Mark, bedankt voor al je hulp. *Kees Jongsma, Atto Rottier, Manon Gosselink* en *Casper van Eijck* lazen het manuscript kritisch door, bedankt!
In dit manuscript heb ik gebruik mogen maken van niet alleen de "Blue Nude" op de omslag maar ook van een aantal fantastische illustraties, beide gemaakt door *Charo van Eijck-Aymerich.* Charo, bedankt.
Groot is en was de stimulerende werking die uitging van *Manon Gosselink* en *Casper van Eijck,* mijn beide paranimfen. Bedankt!

Tenslotte wil ik Eric en Sophie bedanken. Lieve Sophie, jouw bestaan maakt alles zinvol. Lieve Eric, bedankt voor je ongekende geduld en tolerantie, zonder jouw stimulans was het niet zover gekomen. Ik hou van je.

CURRICULUM VITAE

29 December 1961	Geboren te Gouda
1974-1980	Gymnasium-B, Christelijk Lyceum te Gouda
1980-1987	Studie Geneeskunde, Erasmus Unversiteit Rotterdam
1988	Arts-assistent chirurgie
	Academisch Ziekenhuis Dijkzigt, Rotterdam
	Hoofd: Prof. Dr J. Jeekel
1989-1992	Arts-assistent in opleiding chirurgie
	St. Clara Ziekenhuis, Rotterdam
	Opleider: Dr T. I. Yo
1992-1995	Arts-assistent in opleiding chirurgie
	Academisch Ziekenhuis Dijkzigt, Rotterdam
	Opleider: Prof. Dr H. A. Bruining
1995-1996	Junior staflid/fellow oncologische chirurgie
	Academisch Ziekenhuis Dijkzigt, Rotterdam
1997- heden	Maatschap chirurgie
	Havenziekenhuis, Rotterdam

PUBLICATIONS RELEVANT TOT THIS THESIS

van Dam JH, Ginai AZ, Gosselink MJ, Huisman WM, Bonjer HJ, Hop WCJ, Schouten WR. *The role of defecography in predicting the clinical outcome of rectocele repair.* Dis Colon Rectum 1997;40:201-7.

van Dam JH, Schouten WR, Ginai AZ, Huisman WM, Hop *WCJ.The impact of anismus on the clinical outcome of rectocele repair.* Int J Colorectal Dis 1996;11:238-42.

van Dam JH, Hop WCJ, Schouten WR. *Analysis of patients with poor outcome of rectocele repair.* Dis Colon Rectum (submitted).

van Dam JH, Huisman WM, Hop WCJ, Schouten WR. *Anal sphincter pressures after rectocele repair. A prospective study.* Int J Colorectal Dis (submitted)

van Dam JH, Vierhout ME, Hop WCJ, Ginai AZ, Gosselink MJ, Schouten WR. *Results of combined transvaginal/transanal rectocele repair on vaginal symptoms: a prospective study.* Am J Obstet Gynecol (submitted).

Schouten WR, Gosselink MJ, Briel JW, Auwerda JJA, van Dam JH, Hop WCJ. *Anismus: fact or fiction?* Dis Colon Rectum 1997;40:1033-41.

van Dam JH, Gosselink MJ, Drogendijk AC, Hop WCJ, Schouten WR. *Changes in bowel function after hysterectomy.* Dis Colon Rectum 1997;40:1342-7.

Gosselink MJ, van Dam JH, Huisman WM, Ginai AZ, Schouten WR. *Treatment of enterocele by obliteration of the pelvic entrance.* Dis Colon Rectum (accepted for publication).