

## ORIGINAL ARTICLE

# TRANS-PERINEAL VS. TRANS-RECTAL REPAIR OF RECTOCELE IN OBSTRUCTED DEFECATION: A PROSPECTIVE RANDOMIZED TRIAL

By

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**Aim:** To evaluate functional outcome of transperineal (TP) versus transrectal (TR) repair of rectocele presented with obstructed defecation.

**Methods:** 48 multiparous females with obstructed defecation due to rectocele were randomly allocated into 3 groups: Group A (16 patients): TP repair with levatorplasty (LP). Group B (16): TP repair without LP. Group C (16): TR repair. The study included defecographic assessment, anal manometry (Maximum anal resting pressure (MARP), maximum reflex volume (MRV) and urge to defecate volume (UTDV) and functional score (0 -26). These were done preoperative and 6 months postoperative.

**Results:** Defecography showed significant reduction in size of rectocele in all groups. Constipation improved significantly in the groups of transperineal but not in transrectal repair. We had significant reduction in MARP, UTDV and MRV only in transperineal approach. Functional score was significantly improved in group A ( $P < 0.001$ ) and B ( $P < 0.001$ ) while the improvement was insignificant in group C. LP significantly improved the overall functional score in group A compared to group B and C ( $P = 0.032$ )

**Conclusions:** Rectocele repair improves anorectal function by improving the rectal urge sensitivity. TP repair of rectocele is superior to TR repair in both the structural and functional outcome. Levatorplasty improves functional outcome, but should be avoided in young sexually active females.

**Keywords:** Constipation, Anal manometry, Levatorplasty.

## INTRODUCTION

Rectocele, or herniation of the anterior rectal wall into the vagina, is a common condition, frequently asymptomatic and reported as an incidental finding on defaecography in up to 80 per cent of patients.<sup>(1)</sup> Vaginal birth is generally considered as the most important life event predisposing for rectocele, probably due to localized lacerations in the rectovaginal fascia, however it is likely that a combination of factors is necessary to coexist for rectocele to develop.<sup>(2)</sup>

Connective tissue changes, laxity of the pelvic floor musculature as a result of denervation and/or pudendal neuropathy have been incriminated in the etiology of rectocele.<sup>(3,4)</sup>

Rectocele is associated -in 30-70% of cases- with significant rectal emptying difficulties, straining at defecation, manually assisted defecation, the need for perineal and/or vaginal digitations as well as local symptoms such as vaginal bulging and pelvic heaviness.<sup>(5-7)</sup>

The extent to which symptoms can be attributed directly to the anatomical pathology represented by the rectocele remains uncertain, resulting in difficulty in the selection of patients for surgical repair.<sup>(8)</sup> Repair of the rectocele has been correlated with a successful functional outcome in 70–90 % of patients,<sup>(9,10)</sup> but has failed to resolve symptoms in others despite successful resolution of the structural abnormality.<sup>(5)</sup> The reason for this variability in outcome remains uncertain. Selection of patients for surgical intervention for symptomatic rectocele remains an area of debate.

Surgical repair has been recommended when the rectocele is greater than 2-3 cm in depth, if there is significant barium trapping on defecography, or if digital assistance of defecation is frequently necessary for satisfactory emptying.<sup>(11-14)</sup> However studies have shown no correlation between the size of a rectocele or the extent of barium trapping and the functional outcome of rectocele repair.<sup>(9,15,16)</sup> Once the decision for surgery has been made, rectoceles can be approached by a transvaginal, a transrectal, or a transperineal approach. All approaches may improve obstructive defecation symptoms.<sup>(17-19)</sup> Although surgery seems to correct the anatomical defect, many side-effects may occur such as constipation, fecal incontinence, incomplete bowel emptying or sexual dysfunction.<sup>(20,21)</sup>

The most effective surgical treatment of rectocele remains undecided. Transvaginal repair<sup>(22)</sup> may correct the vaginal defect in the majority of women, but it may contribute to bowel and sexual dysfunction.<sup>(23)</sup> Transrectal repair (TR) has been considered to address the anorectal component of rectoceles, however it has been associated with a decrease in sphincter pressures after surgery and de novo or deteriorating anal incontinence combined with an expected increase in demand of urogynecological care in the future. Another benefit of transrectal repair is the ability to address the coexistent a norectal pathology that is present in 80% of patients.<sup>(13,14,24)</sup>

There are only limited data regarding the use and outcome of transperineal surgery for rectoceles. Short-term results of this procedure show an improvement in evacuation and continence in 75% of patients.<sup>(18,19)</sup> The role of levatorplasty is debated between improving continence and increasing dyspareunia.<sup>(25,26)</sup>

There is no sufficient prospective data that compare the transrectal and transperineal repair of rectocel in treatment of rectocele and improving the obstructed defecation symptoms.

The aim of our study is to evaluate the results of

transperineal repair (TP) with or without levatorplasty (LP) and transrectal repair (TR) of rectocele considering the anatomic, physiological and functional outcomes specially symptoms of obstructed defecation.

## PATIENTS AND METHODS

The study population comprised 62 multiparous females with obstructed defecation due to rectocele. All of them had rectocele size more than 2 cm with one or more of the following symptoms (digital manipulation during defecation, sense of incomplete evacuation, excessive straining or sexual dyspareunia). Patient with recurrent rectocele, diabetes, previous anal surgery, systemic steroid treatment, connective tissue disease, slow-transit constipation, compromised anal sphincter function or abnormal thyroid function were excluded from the study.

A total number of 48 patients fulfilled the above criteria and agreed to randomization. The Ethics Committee of both Alexandria University and University of Mansoura approved the study protocol. All patients participating in the study gave written informed consent.

All patients were evaluated preoperatively by clinical interview and examination. Clinical interview included a detailed questionnaire, with special reference to defecation frequency, use of laxative, excessive straining, digital manipulation during defecation, sensation of incomplete evacuation, frequency of incontinence, stool consistency, dyspareunia and past history of pelvic or anorectal surgery. Rectocele was diagnosed and estimated by inspection and rectovaginal palpation. Overall functional score for each patient was estimated using Modified obstructed defecation syndrome patient questionnaire<sup>(27,28)</sup> Table 1.

All patients had defecography and anorectal manometry.

**Defecography:** The rectum was filled with 200 ml of a suspension of barium sulfate; the patient was positioned on a toilet seat with a radiolucent rim. Defecographic findings included rectocele size (between the deepest pouch of the rectocele and the anterior surface of the anal canal) and contrast evacuation of the rectocele (grade 0: no evacuation, grade 1,2,3,4: evacuation was poor, moderate, subtotal and total).<sup>(29)</sup> Perineal descent and anorectal angle were also evaluated.<sup>(30)</sup>

Anorectal manometry using perfusion catheter systems (Synectics, Stockholm, Sweden)<sup>(31)</sup> was done for all patients with the evaluation of maximum anal resting pressure

(MARP), maximum anal squeezing pressure (MSP), rectal sensitivity threshold volume (STV), urge to defecate volume (UTDV), maximum tolerable volume (MTV), anal inhibitory reflex threshold (RTV), maximum reflex volume (MRV) and functional anal canal length (cm).

Patients were randomly divided into three equal groups: Group A: transperineal repair with levatorplasty, Group B: transperineal repair alone and group C: transrectal repair.<sup>(26,32,33)</sup> The randomization was performed blindly by an independent nurse taking randomly a card from an envelope, which contained 16 cards for transperineal with levatorplasty (TPLP), 16 for transperineal (TP) and 16 for transrectal (TR) repair. All surgeons were experienced in all 3 repairs.

Patients were followed up after surgery every 2 months for 6 months. Functional results were evaluated after six months (by examiners blinded the type of operative treatment for each patient) by anal manometry, defecography and questionnaire reflecting the symptomatic results.

*Statistical analysis* was performed using nonparametric tests for comparisons. For qualitative data, chi-square or fisher's exact probability tests (two samples, unpaired) was used. To investigate the relationship between change in rectocele size dimension and symptoms or the type of surgery the Mann Whitney test was used. Two-sided values  $\leq 0.05$  were considered significant.

## RESULTS

Mean age of patients was  $48.4 \pm 12.6$  years (range 36 to 68 years) and number of vaginal deliveries ranged from 3-6 with a mean of 4.4 with no significant difference in between groups as regard age and number of vaginal deliveries ( $p= 0.11$  &  $0.25$  respectively).

Constipation, manual assisted defecation and excessive straining during defecation were reported in 75% of patients. Incomplete evacuation was the prominent symptom in 79.2% of patients while dyspareunia was reported by 29 women (60.4%). Clinical preoperative data of patients in different groups are shown in Table 2

Regarding post operative results, 47 (98%) patients complied with the 6-month assessment request. One was

unavailable for follow-up for unrelated clinical reasons. The rates of symptom relief were calculated for those patients who had reported each symptom before the operation. Constipation and use of laxatives improved significantly in the groups of transperineal ( $p < 0.001$  in group A and  $p = 0.01$  in group B respectively) but not in transrectal repair (group: C;  $p = 0.12$ ). The % of constipation improvement was more in group A (from 68.75% to 12.5%). Same applies to symptoms of obstructed defecation, maximum improvement with levatorplasty (group: A;  $p = 0.002$ ) while transrectal approach didn't result in significant improvement (group: C;  $p = 0.12$ ). Urgency completely disappeared in group A; however the improvement was not significant in all groups. Sexual dysfunction didn't show improvement in transrectal approach, showed significant improvement in trans-perineal approach. The improvement with levatorplasty was not significant in young aged females; (females  $> 45$  ( $p = 0.031$ ), females  $< 45$  ( $p = 0.192$ ). Actually it was worsened in 12.5% of females  $< 45$  years. At 6 months the rates of symptom relief are shown in Table 2.

Defecographic size of rectocele decreased significantly after all types of repairs Table 3.

Functional score improved significantly in trans-perineal repair but not in trans-rectal repair Table 3. LP improved overall functional score in group A vs. B & C ( $p = 0.03$  and  $p < 0.01$  respectively)

Radiologically there was significant reduction in the defecographic size of rectocele in the group with improvement of symptoms in comparison to the group that has no significant improvement of symptoms. Significant improvement of rectal evacuation grade was noted in all groups. Tables 4, 5.

In Table 6 we demonstrate significant reduction in MARP, UTDV and MRV in transperineal approach with or without levatorplasty but not with transrectal repair.

Using multivariate analysis, factors correlated with symptom improvement in all groups included postoperative rectocele size ( $p < 0.001$ ), % of reduction in size ( $p = 0.069$ ), postoperative rectum evacuation grade ( $p < 0.001$ ), MARP ( $p = 0.23$ ), UTDV ( $p < 0.001$ ), MRV ( $p < 0.001$ ).

**Table 1. Modified obstructed defecation syndrome patient questionnaire.**

Question and response options	Score			
1- Medication to evacuate (enemas or suppositories)	0	1	2	3
2- Difficulties to evacuate	0	1	2	3
3- Digitation to evacuate	0	1	2	3
4- Return to toilet to evacuate	0	1	2	3
5- Feeling of incomplete evacuation	0	1	2	3
6- Straining to evacuate	0	1	2	3
7- Time needed to evacuate	0	1	2	3
8- Lifestyle alteration	0	1	2	3

Each point is scored according to frequency of the symptom (questions 1 to 6: never, less than once weekly, 1-6 times weekly, every day; question 7: less than 5 minutes, 6-10 minutes, 11-20 minutes, more than 20 minutes). The total score is in the range of 0 (best) to 24.

**Table 2. Pre and Postoperative symptoms.**

		All Patients (48)	Group A (TP and LP) (N= 16)	Group B (TP) (N= 16)	Group C (TR) ( N= 16)
Constipation	Preoperative	75%	68.75%	81.3%	75%
	Postoperative	33.3%	12.5%	37.5%	50%
	P-value	0.001	0.004	0.016	0.125
Incomplete evacuation	Preoperative	79.2%	81.25%	75%	81.25%
	Postoperative	35.4%	12.5%	37.5%	56.25%
	P-value	0.002	0.001	.031	0.89
Digitation	Preoperative	75%	75%	75%	75 %
	Postoperative	33.3%	12.5%	37.5%	50%
	P-value	0.001	0.002	0.031	0.125
Straining during defecation	Preoperative	75%	75%	75%	75%
	Postoperative	29.2%	12.5%	25%	50%
	P-value	0.003	0.002	0.008	0.125
Sexual Disorders	Preoperative	39.38%	37.5%	37.5%	43.75%
	Postoperative	31.25%	18.75%	31.25%	43.75%
	P-value	0.11	0.061	0.11	-

**Table 3. Defecographic rectocele size and functional score before and after repair.**

	Defecographic rectocele size		P Value	Functional score		P Value
	Preoperative (cm)	Postoperative (cm)		Preoperative (Mean ± SD)	6 m postoperative (Mean ± SD)	
All patients (48)	3.79 ± 819 (2.4-5.5)	1.23 ± 1.259 (0-4)	.001			
Group A	4.18 ± 770 (3-5.5)	0.937 ± 736 (0-2)	.001	17.3 ± 5.1	3.8 ± 1.7	< 0.001
Group B	3.8 ± 983 (2.4-5.4)	0.937 ± 750 (0-2)	.001	16.4 ± 6.3	7.7 ± 2.5	< 0.01
Group C	3.45 ± 536 (2.9-5)	2.08 ± 1.577 (0-4)	.002	16.9 ± 7.2	12.8 ± 8.9	0.142

**Table 4. Results of postoperative rectocele size in relation to improvement.**

	ODS significantly improved		ODS not significantly improved		P Value
	N	Postop. Rectocele size (Mean ± SD)	N	Postop. Rectocele size (Mean ± SD)	
All patients	30/48	0.423 ± 0.15	18/48	2.483 ± 0.761	0.001
Group A	13/16	0.23 ± 0.18	2/16	2	0.01
Group B	10/16	0.45 ± 0.37	6/16	1.75 ± 0.418	0.001
Group C	7/17	0.742 ± 0.565	10/16	3.02 ± 0.518	0.001

**Table 5. Rectal evacuation before and after repair.**

	Preoperative				Postoperative				P Value
	Poor	Moderate	Subtotal	Complete	Poor	Moderate	Subtotal	Complete	
All	20.8%	37.5%	41.7%	0	18.8%	10.4%	8.3%	62.5%	0.001
Group A	25%	50%	25%	0	18.75%	0	0	81.25%	0.001
Group B	12.5%	37.5%	50%	0	6.2%	18.8%	12.5%	62.5%	0.005
Group C	25%	25%	50%	0	37.5%	12.5%	12.5%	37.5%	0.206

**Table 6. Anorectal manometric findings before and after rectocele repair.**

		Preoperative	Postoperative	P-value
		Mean ± SD	Mean ± SD	
All Patients. (48)	MARP (mmHg)	87.12 ±13	80.64 ±16.34	0.001
	UTDV (ml)	225.41 ±25.76	199.47 ±33.5	0.001
	MRV (ml)	225.83 ±27.52	194.02 ±33.2	0.001
Group A	MARP (mmHg)	85 ±13.75	66.4 ±14.59	0.002
	UTDV (ml)	228 ±25.19	176.66 ±23.11	0.001
	MRV (ml)	230.66 ±30.25	176.33 ±24.80	0.001
Group B	MARP (mmHg)	87.31 ±13.54	83.12 ±13.76	0.035
	UTDV (ml)	223 ±30.74	196.56 ±36.08	0.013
	MRV (ml)	220 ±30.73	176.87 ±22.72	0.002
Group C	MARP (mmHg)	88.82 ±12.31	90.88 ±10.64	0.249
	UTDV (ml)	224.41 ±22.69	222.35 ±23.59	0.35
	MRV (ml)	226 ±22.14	225.35 ±25.37	0.258

## DISCUSSION

Defecation is a complex neuromuscular process that requires the integration of neuromuscular activity of large bowel, rectum, anal canal and pelvic floor muscles, together with the absence of anatomical factors that inhibit this process.<sup>(22)</sup> Although in the last decade our understanding of normal defecation function and dysfunction has improved significantly, the determination of the underlying pathophysiology of obstructed defecation still needs more clarification. Actually many aspects of obstructed defecation are not yet clarified that condition our therapeutic options.

The surgical treatment of rectocele is one of the most debated topics in coloproctology. Various techniques and approaches have been proposed in the past, with successful outcomes varying from 60% to over 90%.<sup>(13,14,18,19,34)</sup> Even if there is agreement on the fact that clinical examination and defecography are sufficient for the diagnosis of rectocele, the selection criteria for surgery and the selection of the type of procedure are controversial, as there is no clear relationship between the correction of the anatomical defect and the improvement of symptoms. We can also see improvement of symptoms of obstructed defecation without complete disappearance of rectocele.

The aim of most of the present surgical procedures is at the treatment of the rectocele. Although various surgical techniques have been described for treatment of rectocele, yet, results are variable with different patterns of complications.

Indication for surgical repair has not been standardized. Generally, rectocele >3 cm in defecogram is defined as abnormal bulging and considered to be an indication for surgical repair if it is symptomatic. Sarles et al<sup>(27)</sup> advocated that retention of contrast medium in the rectocele could be used as a good indicator for selection of patients for different types of rectocele repair. The clinical implication of a coexistent finding of occult rectal prolapse together with rectocele is not clear.

We compared transrectal and transperineal with or without levatorplasty for rectocele presented by obstructed defecation in a prospective, randomized study. The patients comprised a selected group of multiparous women with rectocele and obstructed defecation. Compromised anal sphincter function and/or previous anal surgeries were exclusion criteria because the anal dilatation may further affect function and/or manometric findings. The preoperative demographics symptoms and manometric findings were similar between the groups, indicating that selection bias was avoided by randomization.

Improvement in the preoperative symptoms was reported in all groups with different grades of significance. The sense of incomplete evacuation, the need to digitally assist defecation and straining during defecation were statistically significantly reduced in transperineal repair groups but not in transrectal group after a follow-up of 6 months. This might be due to that complete evacuation of rectocele was significant only in the transperineal approaches.

The percentages of improvement are comparable to those reported by other authors used the same techniques.<sup>(14,18,19,24,35-37)</sup> In our study, there was significant relation between the size of postoperative remaining rectocele and degree of symptom improvement. This may reflect the fact that the mechanism of rectocele producing obstructed defecation is mechanical.

There was improvement in the overall sexual function in the transperineal repairs however with levatorplasty this was on the expense of dyspareunia that was worsened in 12.5% of sexually active females in group A and improved in 18.75% of cases in the same group with no cases of de novo dyspareunia. We found no change in dyspareunia after transanal approach, a result which is against Arnold et al who found a 20 percent incidence of dyspareunia after the same surgical approach.<sup>(10)</sup> We think that this difference came from caution to keep the width of vaginal introitus.

Lopez et al<sup>(8)</sup> reported a high incidence of dyspareunia (33% of sexually active females) after different techniques of rectocele repair. This might be avoided by maintaining the width of the vaginal introitus. Thus, care must be taken to maintain the width of the vaginal introitus by at least two of the surgeon's fingers during the approximation.<sup>(38)</sup> However, Cundiff and Fenner<sup>(39)</sup> believe that dyspareunia is dependent on the caliber of the vagina in addition to postoperative scarring and/or levator spasms. We think that the data about dyspareunia with levatorplasty should be discussed with patients that are sexually active before proceeding to surgery.

The physiologic changes after rectocele repair are not well understood. MARP, decreased significantly postoperatively in the current study only after transperineal repair, Ayabaca et al,<sup>(40)</sup> found no significant change after both transanal or transperineal repair. Ho et al<sup>(35)</sup> reported that significant impairment in both mean resting pressure after transanal repair. Similar results were reported by van Dam et al.<sup>(38)</sup> They think that transanal approach usually needs an anal dilator for which could cause sphincter damage; an observation was not noted in the current study. From the data of the current study, we think that reduction in UTDV is a sensible predictor for improvement after surgery. This concept is reinforced by the idea that continence during the daytime is more dependent on rectal sensation of urge than on the sphincter pressure. Thus on looking to the results and considering this view, we can find that transperineal with levator repair leads to a more significant reduction in UTDV, in comparison with other approaches a finding probably not popularized too much by other investigators. Another significant finding is that the MRV required to induce maximum anal relaxation is decreased after surgery and is more significantly decreased after transperineal with levator repair rather than transrectal repair. This may suggest that obstructed

defecation by a large rectal volume is positively influenced by the repair. This is supported by the finding that outlet - obstructed patients show a significant increase in stool frequency shortly after operation. This could be due to the combined significantly improved rectal sensation (UTDV) with a significantly lowered MRV.

In most studies,<sup>(37,11,9,12)</sup> there is a group of patients who do not benefit from operation. In our study, there is only 13.3% did not improve after transperineal approach with levator ani repair which is less than the reports in published series. This satisfactory clinical data combined with improvement in anorectal manometry and defecographic findings after transperineal with levator repair could encourage us to perform this kind of surgery in management of rectocele. From our results it is noted that transrectal repair showed a worse outcome. This could be due to its dependence only on plicating the rectum up to 10 cm. on the contrary of transperineal with levator repair which gives a firm rectovaginal septum with better and accurate access to the apex of rectocele. Finally some authors thought that obstructed defecation with rectocele occurs due to rectal intussusception, mechanical due to rectocele or both. Actually all our patients were multiparous females with mean age 48 years. We think that in this group of patients, obstructed defecation symptoms were due to rectocele itself not rectal intussusception. Probably laxity of the pelvic muscles from multiply pregnancies and deliveries added to the defecation problem that's why it improved more with levatorplasty.

In Conclusions Rectocele repair improves anorectal function by improving the UTDV, MRV, reduction of rectocele size and improvement of rectal evacuation. TP repair of rectocele is superior to TR repair in both the structural and functional outcome. Levatorplasty improves functional outcome, however it should be avoided in young sexually active females.

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## REFERENCES

1. Maher, C. Baessler, K. Surgical management of posterior vaginal wall prolapse: an evidence-based literature review. *Int Urogynecol J Pelvic Floor Dysfunct.* 2006;17:84-8.
2. Harewood GC, Coulie B, Camilleri M. Descending perineum syndrome: audit of clinical and laboratory features and outcome of pelvic floor retraining. *Am J Gastroenterol.* 1999;94:126-30.
3. Zbar AP, Lienemann A, Fritsch H. Rectocele: pathogenesis and surgical management. *Int J Colorectal Dis.* 2003;18:369-84.

4. Kenton K, Shott S, Brubaker L. The anatomic and functional variability of rectoceles in women. *Int Urogynecol J Pelvic Floor Dysfunct.* 1999;10:96-9.
5. Sloots CE, Meulen AJ, Felt-Bersma RJ. Rectocele repair improves evacuation and prolapse complaints independent of anorectal function and colonic transit time. *Int J Colorectal Dis.* 2003;18:342-8.
6. Van Laarhoven CJ, Kamm MA, Bartram CI. Relationship between anatomic and symptomatic long-term results after rectocele repair for impaired defecation. *Dis Colon Rectum.* 1999;42:204-10; discussion 210-1.
7. Raz S, Nitti VW, Bregg KJ. Transvaginal repair of enterocele. *J Urol.* 1993;149:724-30.
8. Lopez A, Anzen B, Bremmer S. Durability of success after rectocele repair. *Int Urogynecol J Pelvic Floor Dysfunct.* 2001;12:97-103.
9. Roman H, Michot F. Long-term outcomes of transanal rectocele repair. *Dis Colon Rectum.* 2005;48:510-7.
10. Arnold MW, Stewart WR, Aguilar PS. Rectocele repair. Four years' experience. *Dis Colon Rectum.* 1990;33:684-7.
11. Lehur PA, Kahn X, Hamy A. [Surgical treatment of anterior rectoceles in women. The perineal-vaginal approach]. *Ann Chir.* 2000;125:782-6.
12. Fabiani P, Benizri E, Gugenheim J. [Surgical treatment of anterior rectoceles in women. The transanal approach]. *Ann Chir.* 2000;125:779-81.
13. Regadas FS, Regadas SM, Rodrigues LV. Transanal repair of rectocele and full rectal mucosectomy with one circular stapler: a novel surgical technique. *Tech Coloproctol.* 2005;9:63-6; discussion 66.
14. Tjandra JJ, Ooi BS, Tang CL. Transanal repair of rectocele corrects obstructed defecation if it is not associated with anismus. *Dis Colon Rectum.* 1999;42:1544-50.
15. Altman D, Mellgren A, Blomgren B. Clinical and histological safety assessment of rectocele repair using collagen mesh. *Acta Obstet Gynecol Scand.* 2004;83:995-1000.
16. Mimura T, Roy AJ, Storrie JB. Treatment of impaired defecation associated with rectocele by behavioral retraining (biofeedback). *Dis Colon Rectum.* 2000;43:1267-72.
17. Murthy VK, Orkin BA, Smith LE. Excellent outcome using selective criteria for rectocele repair. *Dis Colon Rectum.* 1996;39:374-8.
18. Lechaux JP, Lechaux D, Bataille P. [Transperineal repair of rectocele with prosthetic mesh. A prospective study]. *Ann Chir.* 2004;129:211-7.
19. Watson SJ, Loder PB, Halligan S. Transperineal repair of symptomatic rectocele with Marlex mesh: a clinical, physiological and radiologic assessment of treatment. *J Am Coll Surg.* 1996;183:257-61.
20. Mellgren A, Lopez A, Schultz I. Rectocele is associated with paradoxical anal sphincter reaction. *Int J Colorectal Dis.* 1998;13:13-6.
21. De Tayrac R, Picone O, Chauveaud-Lambling A. A 2-year anatomical and functional assessment of transvaginal rectocele repair using a polypropylene mesh. *Int Urogynecol J Pelvic Floor Dysfunct.* 2006;17:100-5.
22. Albo M, Dupont MC, Raz S. Transvaginal correction of pelvic prolapse. *J Endourol.* 1996;10:231-9.
23. Abramov Y, Gandhi S, Goldberg RP. Site-specific rectocele repair compared with standard posterior colporrhaphy. *Obstet Gynecol.* 2005;105:314-8.
24. Nieminen K, Hiltunen KM, Laitinen J. Transanal or vaginal approach to rectocele repair: a prospective, randomized pilot study. *Dis Colon Rectum.* 2004;47:1636-42.
25. Maeda K, Maruta M, Hanai T. Transvaginal anterior levatorplasty with posterior colporrhaphy for symptomatic rectocele. *Tech Coloproctol.* 2003;7:181-5.
26. Ommer A, Kohler A, Athanasiadis S. [Results of transperineal levator-plasty in treatment of symptomatic rectocele]. *Chirurg.* 1998;69:966-72.
27. Lehur PA, Stuto A, Fantoli M. Outcomes of stapled transanal rectal resection vs. biofeedback for the treatment of outlet obstruction associated with rectal intussusception and rectocele: a multicenter, randomized, controlled trial. *Dis Colon Rectum.* 2008;51:1611-8.
28. Amin AI, Hallbook O, Lee AJ. A 5-cm colonic J pouch colo-anal reconstruction following anterior resection for low rectal cancer results in acceptable evacuation and continence in the long term. *Colorectal Dis.* 2003;5:33-7.
29. Kelvin FM, Maglinte DD, Benson JT. Evacuation proctography (defecography): an aid to the investigation of pelvic floor disorders. *Obstet Gynecol.* 1994;83:307-14.
30. Van Dam JH, Ginai AZ, Gosselink MJ. Role of defecography in predicting clinical outcome of rectocele repair. *Dis Colon Rectum.* 1997;40:201-7.
31. Williams N, Barlow J, Hobson A. Manometric asymmetry in the anal canal in controls and patients with fecal incontinence. *Dis Colon Rectum.* 1995;38:1275-80.



32. Khubchandani IT, Clancy JP, 3rd, Rosen L, et al. Endorectal repair of rectocele revisited. *Br J Surg.* 1997;84:89-91.
33. Lehur PA, Bruley Des Varannes S, Moyon J. [Disabling rectocele: rectal plication by perineal approach. Apropos of 20 cases]. *Chirurgie.* 1992;118:516-20; discussion 521.
34. D'Avolio M, Ferrara A, Chimenti C. Transanal rectocele repair using EndoGIA: short-term results of a prospective study. *Tech Coloproctol.* 2005;9:108-14.
35. Ho YH, Ang M, Nyam D, et al. Transanal approach to rectocele repair may compromise anal sphincter pressures. *Dis Colon Rectum.* 1998;41:354-8.
36. O'Connor JJ. Transrectal repair of rectocele. *Dis Colon Rectum.* 1987;30:314.
37. Block IR. Transrectal repair of rectocele using obliterative suture. *Dis Colon Rectum.* 1986;29:707-11.
38. Dam J, Huisman, WM, Hop, WCJ, Schouten, WR. Fecal continence after rectocele repair: a prospective study. *Int J Colorectal Dis.* 2000;15:54-7.
39. Cundiff GW FD. Evaluation and treatment of women with rectocele: focus on associated defecatory and sexual dysfunction. *Obstet Gynecol.* 2005;104:1403-21.
40. Ayabaca SM, Zbar AP, Pescatori M. Anal continence after rectocele repair. *Dis Colon Rectum.* 2002;45:63-9.