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ORIGINAL ARTICLE

COMPARATIVE STUDY BETWEEN OPEN VS CLOSED METHODS OF PARTIAL DIVISION OF PUBORECTALIS IN TREATING PATIENTS WITH ANISMUS

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Aim: *to revive the results of partial division of the puborectalis and to compare the efficacy of open and a newly designed closed method in treatment of anismus.*
Methods: *This prospective randomized study included 30 patients. They were 29 males and one female, with a mean age 42.30± 13.01 years. Diagnosis was made by clinical examination, barium enema, colonoscopy, colonic transit time, anorectal manometry, Balloon expulsion test, defecography, and EMG. Patients were randomized into: Group (I): included 15 patients who underwent Bilateral open division of the puborectalis and Group (II): included 15 patients who underwent Bilateral closed method. Follow up was conducted for about one year. Improvement was considered when patients returned to their normal habits.*
Results: *Both open and closed methods significantly reduced the preoperative constipation scores. There was 100% initial success. Long term success existed only in 66.6% and 53.3% in group (I) & (II) respectively with no significant difference between the two methods (χ2:0.556 - P: 0.456). Recurrence was observed in 5 and 7 patients following open and closed methods respectively. Minor degrees of incontinence were confronted in 13.3% in each group with no significant difference.*
Conclusion: *Bilateral partial division of puborectalis was found to be an effective method in treatment of anismus. Moreover, closed method seems to be simple and attractive.*

Keywords: *puborectalis syndrome, obstructed defecation, maladaptive constipation.*

INTRODUCTION

Anismus, paradoxical contraction or failure to relax the pelvic floor muscles during attempts to defecate, impedes the outflow of feces.[1] The pathophysiology of anismus is unknown and it is thought to be secondary to maladaptive learning.[2]

Most authors advocated the use of anorectal manometry, electromyography (EMG), balloon expulsion test and evacuation proctography for the diagnosis of anismus.[3]

Anismus, although simple to diagnose, has proved to be difficult to treat.[4] Biofeedback retraining, botulinum toxin (BTx-A) injection were used for treatment of anismus with conflicting results.[5] Moreover, several surgical techniques have been described for dividing the puborectalis muscle in patients with constipation due to paradoxical contraction. Certain authors reported good results after partial division of puborectalis muscle,[6,7] meanwhile, other reports were disappointing.[8-10] The disappointing results pushed several investigators to report that surgery appears to have no role in the therapeutic approach of anismus patients and it should be considered as a last resort for treating these patients.[4.11.12]

In this study, we tried to revive the results of partial division of puborectalis and to compare the efficacy of open and a newly designed closed method for partial division of the puborectalis muscle.

PATIENTS AND METHODS

This prospective randomized study included 30 patients with outlet obstruction due to anismus. They were referred to our Colorectal Surgery Unit, Mansoura University Hospital during the period from September 2003 to September 2005.

We used Mansoura questionnaire for constipation to record 10 items; 5 minor criteria and 5 major criteria. Minor criteria are:(1) dull rectal pain,(2) the need for enemas at least once a week,(3) the need for anal digitations at least once a week,(4) major straining in less than 25% of bowel action and(5) sensation of incomplete evacuation. Major criteria are:(1) major straining in more than 25% of bowel action(2) and/or the time of defecation,(3) less than 3 bowel actions per week,(4) sensation of anal obstruction upon defecation in over 25% of bowel actions and(5) habitual defecation difficulties even with soft or liquid stool. Constipation score gives one digit for each minor criterion and 2 digits for each major criterion. Accordingly, we stage constipation into Stage 0 (< 2), Stage A (2 – 4), Stage B,(5–7) Stage C,(8–10) Stage D (≥11).

All patients were diagnosed by clinical examination, barium enema, colonoscopy, colonic transit time, anorectal manometry, Balloon expulsion test, defecography, and electromyography (EMG) of the puborectalis muscle.

Inclusion criteria were:

- There must be an evidence of adequate propulsive forces during attempts to defecate (rectal pressure > 45 mm Hg).
- Incomplete, prolonged or difficult evacuation, with constant use of enemas, laxatives and digital evacuation, in spite of having a regular and sometimes daily urge to defecate.

Exclusion criteria were sphincteric defect, colonic inertia, previous pelvic surgery or pregnancy.

Anorectal manometry: Conventional manometry was performed using a standard low compliance water perfusion system and eight-channel catheter with pressure transducer connected to 5.5 mm manometric probe with spirally located ports at 0.5 cm interval. The protocol of performance was stationary pull through technique with recording the functional length of the anal canal (FL), mean resting pressure in the upper (MRU) and lower anal canal (MRL), mean squeeze pressure in the upper (MSU) and lower anal canal (MSL). Pressure during attempted defecation (PDAD), rectal sensation, desire volume and the maximum tolerable volume (MTV) were estimated. Recto anal inhibitory reflex (RAIR) was also evaluated to exclude Hirschsprung's disease. Pressures were recorded using a computerized recording device (SANDHILL Bioview programs, USA) which included menu-driven software to aid with data acquisition. Data were analyzed with the use of a complied software package that automatically produced numeric reports and graphs.

Anismus was diagnosed by impaired anal relaxation or paradoxical anal contraction during attempted defecation.(14)

Evacuation proctography: The rectum was filled with 120 ml of barium paste. The patient was then seated upright on a specially designed commode and asked to empty the rectum as rapidly and completely as possible. Plain x-rays were taken under fluoroscopic control with the patient at rest, with voluntary anal contraction and during defecation. Defecographic features of anismus were either insufficient increase or decrease of the anorectal angle during straining, a persistent puborectal notch or an incomplete opening of the anal canal (< 1 cm diameter) resulting in delayed or incomplete rectal emptying. Incomplete evacuation (≤ 2/3 of the enema) after 30 seconds is highly suggestive for anismus.(15)

Surface electromyography (EMG): Two surface electrodes were placed on the skin over the subcutaneous part of the external anal sphincter at 3 and 9 o'clock. A ground electrode was placed on the patient's left buttock. The patient was carefully instructed and then asked to squeeze and strain while electro-myographic activity was recorded. A lack of decrease or even increase of electrical activity during maximal straining effort for at least two or three occasions has long been considered a major finding of anismus.(16)

Balloon expulsion test: A rubber balloon was inserted into the rectum and inflated with 60 ml saline. The patient was asked to expel the balloon in the left lateral position or into a toilet. Failure to expel the balloon was considered a criterion for anismus.(17)

After careful explanation of the clinical condition and the options of treatment, our patients signed informed consents. Then patients were randomized into 2 groups with a simple sealed envelop method into:

Group I patients: Bilateral open partial division of puborectalis (OPDPR): It consisted of 15 male patients with a mean age 38.26 ± 8.01 years. All patients were subjected to open bilateral partial division of the puborectalis sling (OPDPR).

While patients under general anesthesia, and in the lithotomy position, a 2-3 cm incisions were made along the posterolateral aspects of the anus. Dissection through ischio-rectal fossa was conducted till reaching the puborectalis sling. Nearly the inner half of sling was divided on each side. After complete haemostasis, the skin was closed without a drain. Postoperative wound care and oral antibiotics (metronidazol and ciprofloxacin) were given till complete wound healing.

Group II patients: Bilateral closed partial division of puborectalis (CPDPR): It consisted of 15 patient, 14 males and one female with a mean age 46.33 ± 15.85 years. All patients were subjected to bilateral CPDPR. This technique was performed by using a special handle designed for this purpose. When a surgical blade number 12 is fitted to that handle, the resulting knife will have a blunt tip, a concave sharp cutting border and a convex blunt border (Fig. 1).

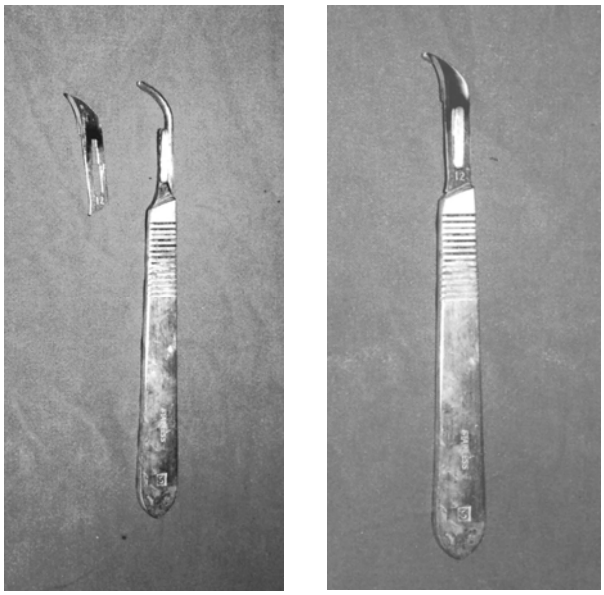

Fig 1 The special handle designed for closed partial division of puborectalis sling.

In the operating room, and while patients under general anesthesia, and in the lithotomy position, small skin stabs at 5, 7 o'clock through which the knife was introduced into the ischio-rectal fossa. With the index finger of the contra lateral hand in the anal canal, the tip of the knife was then directed to pick up the inner half of the puborectalis sling. By applying a downward and lateral traction on the knife, the sling was then cut. After feeling a complete cutting of the sling, the knife was then allowed to get out. Wounds were left open for drainage. Postoperative antibiotics (metronidazole and ciprofloxacin) were given for 2 days.

Follow up: Follow up was conduced weekly in the first month, then every 2 weeks in the second month and then, monthly for about one year. On each visit, patients were assessed subjectively by asking about straining, anorectal pain, and number of weekly bowel movements, incomplete evacuation and the need for anal digitations or enemas, as well as incontinence and objectively by PR examination to assess relaxation of the puborectalis muscle during straining.

For assessment of incontinence, we used Mansoura scoring system:

Stage (A) means incontinence to flatus, (B) incontinence to mucous, (C) incontinence to liquid stool and (D) incontinence to solid stool. Each grade takes digit 1 (once / week) or 2 (> once / week) or 3 (> once / day).

Clinical improvement or success was considered when patients returned to their normal habits experienced long time ago before the occurrence of the disease.

Anorectal manometry, balloon expulsion test, defecography and EMG studies were performed one month after the procedure to monitor any changes in paradoxical contraction.

Statistical analysis: Statistical analysis of the data was performed using SPSS version 11. Tests used were: the mean value (average) and standard deviation, Frequency (percentage), Student's t- test, and Chi-square test. P value was considered significant when it is ≤ 0.05.

RESULTS

From September 2003 to September 2005, a group of 30 patients complaining of anismus underwent bilateral PDPR. They were randomly divided into two groups. Group I included 15 male patients with a mean age 38.26 ± 8.01 years and mean disease duration 5.67 ± 4.66 years. Patients in group I underwent bilateral open PDPR. Group II included 15 patients (14 males and one female) with a mean age 46.33 ± 15.85 years and mean disease duration 4.53 ± 2.64 years. All patients in group II underwent bilateral closed PDPR. Slow transit constipation was recorded in 3 patients in group I and in 4 patients in group II.

Both bilateral open and closed PDPR significantly reduced the pre-operative constipation scores (Table 1). There was no significant difference in the efficacy of both methods either in the early or late postoperative results Table 2.

Both methods resulted in a significant reduction in MRU, MSU, FACL and MPDS. On the other hand, there were no significant changes in MRL, MSL, rectal sensation, desire for defecation or maximum tolerable volume Tables 3,4.

There was also a significant difference between pre-

operative and post-operative diagnostic utilities findings in both groups.

In both methods, we observed an initial success in all patients. However the long term success existed only in 10 patients following open division (66.7%) and in 8 patients following closed division (53.3%). This difference between the 2 methods failed to produce a significant difference Table 5.

Recurrence of symptoms was observed in 5 and 7 patients (33.33% & 46.67%) following open and closed methods respectively. The cause of which was rectal intussusception in 4 & 5 patients (26.67% & 33.33%) and anismus in one & two patients (6.67% &13.33%) in both methods respectively. There was no significant difference of recurrence between the 2 methods. Wound complications were significantly higher in open than closed method. In open method, 10 patients (66.67%) developed wound disruption and infection that required daily dressings and antibiotics till complete wound healing was achieved, while, in closed method, only 2 patients (13.33%) developed mild ecchymosis that required no treatment.

On the other hand, in the open method, 2 patients (13.33%) developed incontinence for flatus, one was grade A1 (once /week) and the other was grade A2 (> once /week). Also, in the closed method, 2 patients (13.33%) developed incontinence, one was stage A2 (for flatus > once /week), and the other was stage B1 (mucous soiling once / week) according to Mansoura scoring system for anal incontinence. Again, there was no significant difference in incontinence between both methods.

On comparing the hospital stay, we found a significant shorter hospital stay following closed method than open method of division (p = 0.0001). Also there was a significant earlier return to work following closed division than open division (p = 0.0001) Table 5.

At the end of follow up, 10 patients (66.67%) were found satisfied by open PDPR as compared with 9 patients (60.0%) following closed PDPR. However, this difference did not produce any significant value (P=0.7) Table 5.

Table 1. Comparison between preoperative and postoperative constipation score in patients with open & closed PDPR.

	Constipation score			Student t test	
	Pre-op	Early post-op	Late post-op	Pre-op. vs. Early post-op	Pre-op vs. Late post-op
Open PDPR	11.40 ± 0.73	2.26 ± 1.62	6.13± 1.68	0.0001	0.0001
Closed PDPR	10.80 ± 1.01	2.60 ± 1.05	6.06± 1.70	0.0001	0.0001

P-value is considered significant when < 0.05.

Table 2. Comparison of postoperative Constipation score (early and late) between open and closed PDPR.

	PDPR (O)	PDPR (C)	Student t test	
			T	P
Constipation score (early)	2.60 ± 1.06	2.27 ± 1.62	0.666	0.51
Constipation score (late)	6.07 ± 1.71	6.13 ± 1.68	-0.108	0.92

PDPR (O): open partial division of puborectalis muscle, PDPR (C): closed partial division of puborectalis muscle, P-value is considered significant when < 0.05

Table 3. Comparison between preoperative and postoperative motility study parameters in open PDPR.

	Pre-operative	Post-operative	Student t test	
			T	P
MRU	82.66 ± 9.83	71.73 ± 7.95	3.34	.002
MSU	188.13 ± 44.94	149.13 ± 32.80	2.71	.011
MRL	79.86 ± 5.73	83.86 ± 6.02	-1.86	.073
MSL	172.33 ± 30.96	177.66 ± 32.35	-.46	.64
FAC length	3.92 ± 0.60	3.40 ± 0.51	2.76	0.01
Sensation	118.000 ± 40.390	112.666 ± 34.942	.38	.70
Desire	183.333 ± 60.316	171.333 ± 48.824	.59	.55
MTV	254.000 ± 76.232	228.666 ± 62.434	.99	.32
MPDS	112.466 ± 22.369	66.866 ± 8.983	7.32	0.0001

MRU: mean resting pressure in the upper anal canal, MSU: mean squeeze pressure in the upper anal canal, MRL: mean resting pressure in the lower anal canal, MSL: mean squeeze pressure in lower anal canal, FACL: functional anal canal length, MTV: maximum tolerable volume, MPDS: mean pressure during squeeze
P-value is considered significant when < 0.05.

Table 4. Comparison between preoperative and postoperative motility study parameters in closed PDPR.

	Pre-operative	Post-operative	Student t test	
			T	P
MRU	82.33 ± 8.54	72.26 ± 8.13	3.30	0.003
MSU	193.33 ± 43.49	152.46 ± 39.01	2.70	0.011
MRL	78.66 ± 4.63	81.93 ± 5.41	-1.77	0.087
MSL	179.40 ± 35.91	185.13 ± 37.22	-.42	0.67
FAC length	3.84 ± 0.52	3.36 ± 0.52	2.60	0.015
Sensation	93.3 ± 17.6	86.5 ± 15.3	1.14	0.26
Desire	166.00 ± 39.78	149.20 ± 34.28	1.23	0.226
MTV	244.00 ± 68.11	226.00 ± 60.92	0.76	.452
MPDS	113.13 ± 21.40	65.86 ± 7.26	8.10	0.0001

MRU: mean resting pressure in the upper anal canal, MSU: mean squeeze pressure in the upper anal canal, MRL: mean resting pressure in the lower anal canal, MSL: mean squeeze pressure in lower anal canal, FACL: functional anal canal length, MTV: maximum tolerable volume, MPDS: mean pressure during squeeze
P-value is considered significant when < 0.05.

Table 5. Comparison of hospital stay, return to work, long-term success & patient satisfaction between open and closed PDPR.

	Open	Closed	Chi-square test	
			X2	P
Hospital stay (hrs)	69.6 ± 17.1	10.2± 1.97	-13.4	0.0001
Return to work (days)	14.0 ± 3.53	1.27 ± 0.458	-13.9	0.0001
Long term success	10 (66.7 %)	8 (53.3 %)	0.556	0.456
Patient satisfaction	10 (66.7 %)	9 (60.0 %)	0.144	0.705

P-value is considered significant when < 0.05

DISCUSSION

There are two major mechanisms of constipation, either slow transit or outlet obstruction. Patients with slow transit constipation do not have an urge to defecate preceding bowel movement while patients with obstructed defecation have regular and even daily urges to defecate.[5]

In 1964, Wasserman advocated partial division of puborectalis muscle for treatment of this defecation disorder.[6] In 1969, Wallace and Madden, performed partial division of puborectalis in 33 patients complaining of constipation and reported a high success rate.[7] However, 3 subsequent studies revealed very disappointing results after division of the puborectalis muscle.[8-10] These disappointing results pushed several investigators to consider that surgery has no role in the therapeutic approach of anismus.[4,11,12]

Biofeedback therapy has yielded conflicting results, with success rates ranged from 31 and 89 percent.[14,18] Moreover, biofeedback is neither universally available nor uniformly successful.

BTx-A is a potent neurotoxin that causes paralysis of muscles by presynaptic inhibition of acetylcholine release.[19] However, because it wears off within three months, long-term results were only 50 percent and repeated injections were necessary to maintain the clinical improvement.[4,20]

Hence, this study came to revive the results of partial division of puborectalis muscle and to compare the results of partial division by using open and a newly designed closed method.

Our study showed marked male predominance (male: female = 29:1). This was in contrast to the others,[21,22] who especially described anismus in young or middle aged women. This difference could be explained by social factors in our community as female are always reluctant to seek medical advice.

In our series, bilateral OPDPR produced a significant decrease in constipation score 4 weeks following the operation and persisted till the end of one year follow up ($P < 0.001$). Complete clinical improvement was recorded in all patients (100%) 4 weeks following the operation.

However, the long term results, revealed improvement only in 10 patients (66.6%) with recurrence of symptoms in 5 patients (33.3%). Defecographic finding in recurred patients revealed that the cause of recurrence was rectal intussusception in 4 patients (26.67%) and anismus in one patient (6.67%).

Postoperative complications following OPDPR was only in the form of wound infection and/or disruption in 10 patients (66.7%), incontinence in 2 patients (13.3%). Both patients were incontinent only to flatus with one had a grade A1 and the other grade A2 incontinence.

Our results go in accordance with Wasserman (1964)[6] who described surgical division of a part of puborectalis muscle in 3 patients and reported good results (success rate 100%). Our results are also similar to that of Wallace and Madden (1969),[7] who reported a large series of 33 constipated patients of different ages who underwent partial puborectalis muscle resection with apparently good results.

On the contrary, Barnes et al. (1985) reported a success rate (22.2%) and an incontinence rate (55.5%). They owed their high failure rate to either failure in sphincter division that might be related to disruption of anorectal anatomy by previous anorectal or pelvic surgery or incomplete division of puborectalis with persistence of functional outlet obstruction.[9]

In our series, we excluded any patient with previous pelvic or rectal surgery from the study and this may partially explain the difference in success rates between the 2 studies.

We applied a different technique and a different approach for PDPR. This approach allowed us to divide the inner half of the puborectalis muscle and its fibers attached to the rectal wall so that increasing the anorectal angle. This resulted in a lower incontinence rate in our series meanwhile others used much more division in order to improve the outcome, which resulted in a higher rate of incontinence.[9]

In patients with bilateral OPDPR, we have found a significant decrease in MRU, MSU, FCL and MPDS. Interestingly, we have observed an increase in the MRL and MSL but it did not reach a significant value. The sensation, desire and maximum tolerable volume decreased postoperatively but did not reach significant values.

Kamm et al. (1988),[10] reported that surgery led to a significant reduction in MSP whereas, the preoperative and postoperative MRP were not significantly changed. This partially goes with our results as we measured the upper and lower anal canal pressures and it was found that MRU had decreased significantly because we divided the inner half of the anorectal sling.

In our study, OPDPR produced significant changes in EMG, defecographic finding postoperatively ($P < 0.001$), balloon expulsion test and per rectal examination ($P < 0.001$). This may indicate that objective results goes with the subjective results and also may indicate the efficacy of this method in treating anismus.

On the other hand, bilateral CPDPR succeeded to produce a significant decrease in constipation scores in the early postoperative period and at the end of follow up ($P < 0.001$). The initial clinical improvement was observed in all patients (100% success). However, this initial improvement persisted only in 8 patients (53.3%) with recurrence of symptoms in 7 patients (46.67%) at the end of follow up. The cause of recurrence was rectal intussusception in 5 patients (33.33%) and recurrence of anismus in 2 patients (13.33%). Again these results were in accordance with certain authors,[6.7] and differed with others.[9,10] This difference is probably due to different patient selection and the technique of division.

On comparing the open and closed methods of PDPR, we have found that there were no significant differences in constipation scores in the early and late postoperative periods. This means that both methods are equally effective. However, the long term success of closed division seems to be slightly lower than open division (53.3% vs. 66.6%). This could be attributed to the fact that closed division needs experience and ascending learning curve.

CPDPR is a one-day procedure with a mean time of hospital stay equals to 10.2± 1.97 hours in comparison to 69.6 ± 17 hours after open division. This difference produced a significant statistical value ($p<0.001$).

In closed division, the mean time needed to return to work was 1.27 ± 0.46 days while it was 14 ± 3.5 days for the open division. This difference produced a significant value ($P < 0.001$).

In closed division, 9 /15 patients (60%) were satisfied one year after the procedure. Although complete clinical recovery was recorded only in 8 patients, one of the recurred patients decided that he was satisfied although he was still complaining. His constipation score decreased from stage D to stage C at the end of follow up.

Finally, we can conclude that bilateral PDPR is found to be an effective method in treating patients suffering from anismus. It has a relatively lower morbidity in contrast to its higher success rate. Moreover, the CPDPR seems to be an attractive procedure for treatment of anismus.

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