Manometric and electromyographic studies on patients with rectal prolapse

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The manometric and electromyographic studies conducted on patients with rectal prolapse Indicates anal sphincter function. Resting and strain anal canal pressures and the myoelectrics! activities of the anal canal sphincters of the control group and patients with rectal prolapse were measured before and after operation. Pre-and postoperative results were compared statistically with the control group. The mean resting and contraction pressures in patients with prolapse were found to be lower than the control group ($p<0.05$). Similar results were observed after the surgical procedure ($p<0.05$).

In all patients myoelectrical activities normally continued; however, amplitude was low in incontinent patients. Also, myoelectrical anomalies, likely caused by pudental neuropathy, were noted. [Turk J Med Res 1993; 11(3): 126-130]

Key Words: Rectal prolapse, Anorectal manometry, Anal sphincter electromyography

Efforts have been made to explain the etiology of rectal prolapse by using theories based on anatomic findings. Manometric and myoelectrical studies are rare in such patients (1,2,3). The objective of this study is to evaluate manometrically, electromyographically and clinically the sphincter function in patients with rectal prolapse.

MATERIALS AND METHODS

10 patients with rectal prolapse and 10 healthy persons as the control group were evaluated (Table 1).

Proctologic examination of anorectum was made digitally and the use of a sigmoidoscope. The subjects in the control group had not undergone any surgery in their anal region and they were fully continent. Previously none of the patients was subjected to rectal surgery. Prolapse periods changed between 2 to 10 years. Two of the patients were incontinent. No bowel preparation was made prior to tests; but the patients were told to releive their rectums if they felt a need for it. Manometric and electromyographic procedures were applied at left lateral position with hips at 90 degree flexion.

DISA-2000 Urodinamy, device operating with on open liguid perfusion system, was used in anal manometry tests. The catheter with double lumen and a diameter of 4mm was alligned with anus and reset at this point. It was perfused with water at a rate of 0.4ml/m. The catether was lubricated and inserted into rectum without hurting the patients. The system was adjusted to a withdrawing rate of 1mm per second. In the mean time pressure curve was recorded at the same speed on milimetric paper.

Patients were told to be at ease, act normal and not to contract their anus. This process was repeated three times, the average of the values obtained were taken. The highest recorded resting pressure was taken as the maximum resting pressure (MRP) (Table 2).

The contraction pressure indicated the voluntary sphincter pressure at the area where the highest resting pressure was measured. In addition, to measurement of the anal canal resting pressures; patients were told to contract only their anus arid the process was repeated three times and the maximal voluntary contraction pressure (MVC) of anal canal was measured. Averages there of were taken and recorded (Table 2).

Myoelectric activity of anal sphincter was determined by using a DISA 1500 EMG device. Patients were placed on the examination bed at left lateral position. At room temperature, myoelectrical activities of the muscle group forming the anal canal were recorded in resting strain and contraction periods by this device. For this purpose a lubricated plug electrode was inserted into anus. Muscle activities at

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Table 1. Age, sex and continence distribution of control and patient group with surgery for rectal prolapse

	CONTROLS			PATIENTS		
Item No	Age	Sex	Continence	Age	Sex	Continence
1.	20	M	+	20	M	+
2.	21	M		22	M	+
3.	20	M	*'	21	M	+
4.	21	M	+	22	M	+
5.	20	M	+	20	M	+
6.	21	M	+	19	M	+
7.	20	M	+	20	M	+
8.	21	M	+	48	F	+
9.	22	M	+	54	F	–
10.	20	M		20	M	
Average	20.6±0.69			26.6±12.97		

Table 2. Maximal resting pressure (MRP) and maximal voluntary contraction pressures (MVC) before and after operation for rectal relapse

	CONTROLS		PATIENTS			
Item			MRP		MVC	
No	MRP	MVC	Pre-Op	Post-Op	Pre-Op	Post-Op
1.	94	124	75	82	108	112
2.	70	164	78	104	146	162
3.	81	140	70	82	112	110
4.	82	108	60	74	116	112
5.	88	116	68	78	110	114
6.	96	138	80	92	120	124
7.	78	110	62	86	106	108
8.	85	121	76	84	118	112
9.	90	120	16	38	43	62
10.	80	114	38	60	79	91
Average cm/H20	84.4+7.4	125.5+16.3	62.3+19.34	78.0+17.1	105.8±26.0	110.7±23.65

the state of resting, strain and contraction were recorded while the electrode was in anus. This process was repeated three times on each patient.

Average maximal resting pressure of the patients in the control group was found as 84.4±7.46cm H_2O. The preoperative maximal average resting pressure of the patients was found as 62.3±19.34cm and the difference between the two groups were found statically meaningful ($p<0.05$). According to these results; the mean maximum resting pressures were lower than those of the control group. As seen in Table-2, this value was still lower in our two patients with incontinent prolapse.

While the mean maximal strain pressures of the patients in the control group was 125.5±16.34cm H_2O. This value was found as 105.8±26.06cm H20 before the operation in patients with prolapse. The difference between the two groups were found statistically meaningful ($p>0.05$). As in the case of resting pressures, maximal straining pressures were lower in patients with prolapses as compared with the control group (Table 2).

While the mean maximal resting pressures of patients with prolapse before operation were 62.3±19.34, postoperative mean maximal resting pressures were 78.0±17.16 cm. H_2O so the difference between the two values were not found statistically significant ($p<0.05$). In other words the values of the resting pressures of patients with prolapse before and after operation were equal statistically. The mean preoperative maximal straining pressures of the patients with prolapse were 105.8±26.0, their postoperative mean maximal straining value were 110.7±23.65 cm. H_2O and the difference between the two group were found meaningless. Hence, the straining pressures of the patients with prolapse did not change after operation.

Ten patients were operated. 6 patients were subjected to posterior restopexy and 4 patients to posterior rectopexy + segmentary sigmoid resection, and the results were recorded. The selection of the operation mode was left to the surgeon and the methods of the operations were not compared. Same tests were applied to all patients in 2 months in average and the results were recorded. The difference between groups was analysed by Spearman sequence correlation test.

RESULTS

Digital examination revealed that sphincter toni were considerably low in incontinent patients (Table 1). There was no significant difference in other patients with prolapse. They had normal sphincter tonus same as the control group. The rectosigmoidoscopic examination of patients with prolapse did not indicate a prominant pathology different than the control group. Particularly rectal ulcers were looked for but could not be detected.

All members of the control group were males. Two of the patients with rectal prolapse were females. The average age in the control group was 20.6±0.69 and it was 26.6±12.97 in the patient group (Table 1). From the statistical point of view there was no significant age difference between the two groups ($p<0.05$).

While the resting pressure of the persons in the control group was 84.4±7.4 cm/hteO, the same pressure in the patient group was 62.3±19.34 before and 78.0±17.1 cm/H2o after surgery. Likewise, while the average maximal contraction pressure was 125.5±16.3 cm/FteO in the control group, the same pressure was in average 105.8±26.0 cm/H2o in patients with prolapse before and 110.7±23.65 after surgery (Table 2), (Figs. 1,2).

The maximal average resting pressure in the control group was 84.4±7.46 cm/H2o and the preoperative maximal average resting pressure in the patient group was 62.3±19.4 **CIT1**/H2O. The difference between the two groups was statistically significant ($p>0.05$).

Maximal average voluntary contraction pressure of the patients in the control group was 125.5±16.34 cm/H2o, and the preoperation average maximal voluntary contraction pressure of the patients with prolapse 105.8±26.0 cm/hteO. When statistically compared it can be seen that trie difference between the groups are significant ($p>0.05$).

Preoperation average maximal resting pressure was 62.3±19.34 cm/hteO in patients with prolapse, and the post-operative average maximal resting pressure was 78±17.16 cm/hteO. Statistically the difference between the two groups was insignificant ($p<0.05$). Similarly, pre-operative average maximal voluntary contraction pressure of the patients with prolapse was 105.8±26.06 cm/FteO. Post-operative average maximal contraction pressure of the same group was 110.7±23.65 cm/hteO. When statistically compared, the difference between the two groups was negligable ($p<0.05$), (Fig. 1,2).

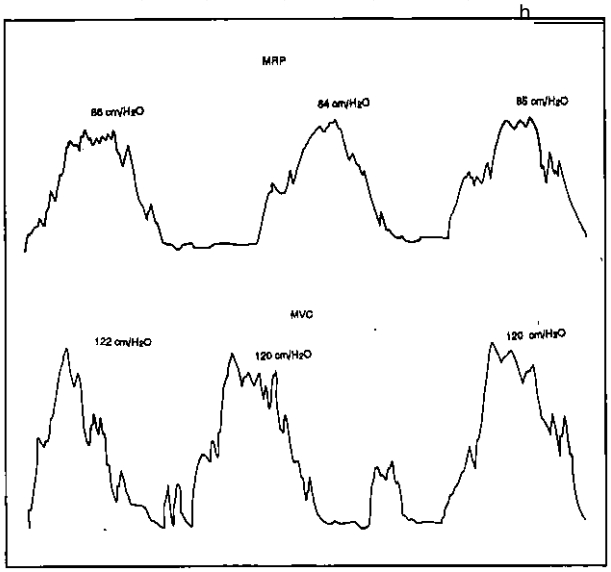

Figure 1. Maximal resting (MRP) and maximal voluntary contraction (MVC) of the anal sphincter of a patient in the control (healthy) group.

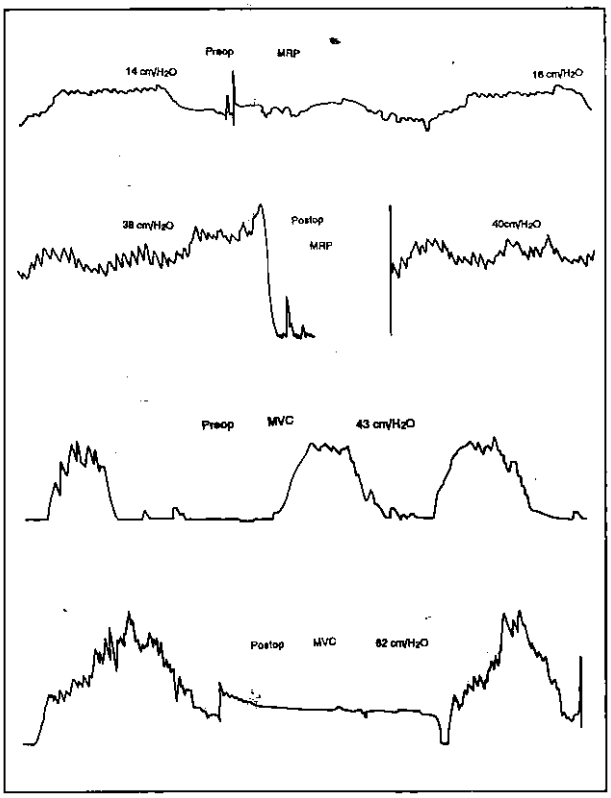

Figure 2. Pre and postoperative maximal resting and voluntary contraction of anal sphincter pressures of an incontinent patient.

The electromyographic of all the persons in the control group were normal and all of them showed a

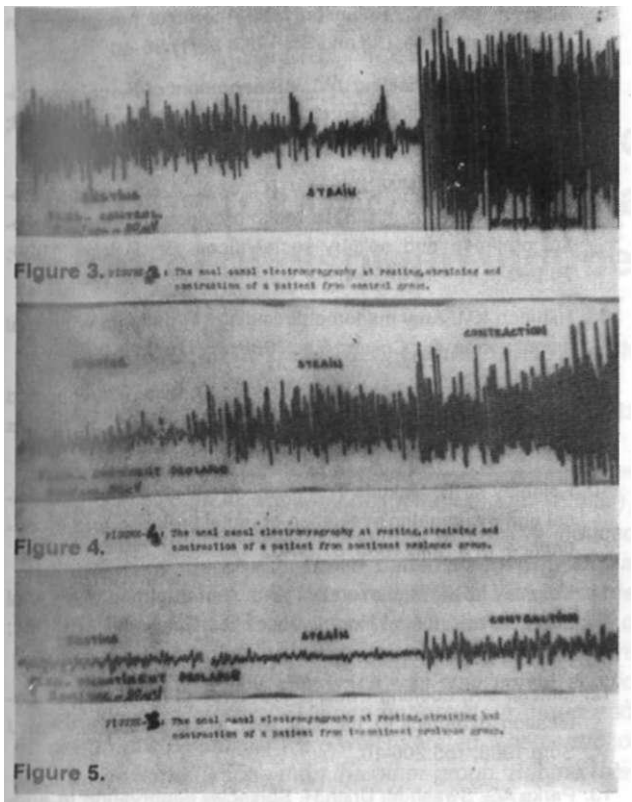

Figure 3.

Figure 4.

Figure 5.

Figure 3,4,5. The anal canal electromyography at the time of resting, straining and contraction in controls and continent and incontinent patients with rectal prolapse.

normal decrease in electromyographic activity at the time of defecation. The resting and contraction electromyographs of the continent patients with prolapse were also normal. Further, an abnormal electromyographic activity was observed in 6 patients during the strain (Figure 3,4,5).

DISCUSSION

This was observe^ Inpatients. The resting pressure in Internal and external anal sphincters are low in the Patients with rectal prolapse. The mechanism of this effect is not known. These low pressures may be due to the insufficiency in the contraction of levators and Insufficiency in support of the pelvic base or it may be as a result of the weakness and elongation by strain °f the changes in sphincter functions. Weakness of Pelvic base may be seen more frequently after childbirth. This may explain the higher incidence of prolapse in women (5,8,9,10,11).

In a study made on 7 patients with rectal Prolapse in 1988, Metcalf et al. found the resting pressure, particularly the contraction pressure in incontinent group to be low (12). These findings coincide Wth the results obtained by Hiltunen, Keighley and *rks (4,6,8,9,10,13). Furthermore, Keighley disclosed *ne fact that the preoperative anal pressures are very valuable in determining the patients who are likely to remain incontinent after rectopexy (6,11).

During studies made on 45 patients with prolapse, Sun et al., found both basal and contraction pressures very low (7). In a retrospective study they made. In 1985, the effect of posterior rectopexy on fecal incontinence, Delamarre et al., found that the chances of gaining continence with rectopexy is 83%. They also asserted that the posterior rectopexy did not have any effect on anal pressures in continent group and it increased the anal pressures in incontinent group (14).

Operations on anorectal angle may correct the continence but in many cases it does not change the anorectal angle; it may increase the pressure or the length of anal canal, or it may thicken the pelvic base causing it to be more sensitive at intraabdominal pressure increase, as a result of which it may insure significant increases in external sphincter activities as a response to small increases in intraabdominal pressure (8,9,10,11).

During the studies of electromyography, the myoelectrical activities in resting of the control group and the group of patients with prolapse were normal. However; an abnormal increase in myoeletrical activities were observed in 6 patients with prolapse during straining postoperatively this increase was observed. In 1962, Porter, showed that most of the patients with rectal prolapse had neuromuscular deficit and the others suffered decrease in rectal sense. However; it is not clear whether these changes are primary or secondary. This researcher showed that, in some patients, puborectalis had long lasting inhibition and normal closing response did not exist after defacation. Rutter also observed that there was a paradoxal increase in puborectalis activity in some patients during defacation. And he asserted that as a result of this paradox, increase on overstrain would occur against an unflexible pelvic base, which might lead to prolapse. Recent views maintain that pelvic diaphragm stretches or displaces downwards because of such events at straining which may lead to weakness of the pelvic base as a result of neuropathy caused by the stretch on pudental nerve (3). Parks et al, believe this increased activity is due to pudental nerve injury (13).

In conclusion, while such operations as mucosal resection or colonic resection + rectopexy etc. are sufficient for patients with continent prolapse, such methods may not always be sufficient to correct both the prolapse and incontinence. For this reason advanced studies, particularly explaining physical and neurogenic factors are needed to solve the incontinency in these patients.

It may be necessary to consider incontinence as a separate entity. Therefore, the way to be followed in patients with incontinent prolapse should be treating prolapse first through abdominal interventions and then seeing the results of the operation and finally reexamining the incontinence, should it be in case it is

persisting, taking and action for its treatment (6,11,14,15).

Rektal prolapsuslu hastalarda manometrik ve elektromyografik çalışmalar

Rektal prolapsuslu hastalarda anal sfinkter fonksiyonlarını ölçmek için manometrik ve elektromyografik çalışmalar yapılmaktadır. Kontrol grubunda ve rektal prolapsuslu hasta grubunda ise ameliyat öncesi ve ameliyat sonrası anal kanal sfinkterlerinin myoelektrikal aktivitesi, istirahat ve sıkma anlarındaki anal kanal basınçları ölçüldü. Pre ve postoperatif sonuçlar birbiriyle ve her biri kontrol grubuyla istatistiki olarak karşılaştırıldı. Ortalama istirahat ve sıkma basınçlar, prolapsuslu hastalarda kontrol grubundan düşük bulundu ($p<0.05$). Benzer sonuçlar postoperatif işlemden sonra da gözlendi ($p<0.05$). Hastaların ve kontrol grubunun myoelektrikal aktiviteleri normaldi. Ancak inkontinen hastalarda amplitud düşük bulundu. Bu myoelektrikal düşüklük pudental sinir nöropatisi olarak değerlendirildi.

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