

# Comparison of Electrotherapy, Rubber Band Ligation and Hemorrhoidectomy in the Treatment of Hemorrhoids: A Clinical and Manometric Study

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## ABSTRACT

### BACKGROUND

Treatment of hemorrhoid disease is one of the most challenging fields in general surgery in which different methods are used to treat this condition. In this study, we compared the manometric and clinical results of three treatment methods for hemorrhoids.

### METHODS

A total of 150 patients with symptomatic grades II or III internal hemorrhoids were randomly assigned to three groups. Group A underwent Ferguson hemorrhoidectomy, group B were treated with rubber band ligation (RBL) and group C were treated with direct current electrotherapy.

### RESULTS

Preoperatively, grade III hemorrhoids had significantly higher mean resting pressure and mean squeezing pressure in comparison to grade II hemorrhoids. After hemorrhoidectomy, patients in group A had a significant decrease in the maximum resting pressure (90.8 to 77.7 mmHg) and maximum squeezing pressure (130.6 to 114.8 mmHg) with a significant raise in the volume of the first sensation. However there was no significant change in manometric indexes after RBL and electrotherapy. Group A patients had more postoperative pain and itching compared to groups B and C.

### CONCLUSION

We conclude that electrotherapy is a safe, effective and simple method of treating grades II and III uncomplicated internal hemorrhoids. This procedure is associated with little postoperative pain and complications, and has the least changes in anorectal manometric characteristics. Therefore electrotherapy may be recommended as a treatment of choice for grades II and III uncomplicated internal hemorrhoids.

### KEYWORDS

Electrotherapy; Manometry; Rubber band ligation; Hemorrhoidectomy

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## INTRODUCTION

There is evidence that anorectal physiology changes with the development of hemorrhoids. Piles have been associated with abnormally raised anal resting and squeezing pressure.<sup>1-5</sup>

Treatment modalities also can potentially change physiological parameters.<sup>6,7</sup> Little is known about how these changes occur and when they develop.

Most recently, studies dealing with functional changes in prolapsing hemorrhoids have treated patients with the prolapsed hemorrhoids (PPH) method.<sup>8-11</sup> There is little information available on the physiological and clinical abnormalities which may develop in the anorectum of patients with grades II or III hemorrhoids that have undergone rubber band ligation or direct current electrotherapy.<sup>12-17</sup>

This study is a comparison of three methods of treating uncomplicated internal hemorrhoids in grades II and III: Ferguson hemorrhoidectomy,<sup>18</sup> rubber band ligation (RBL) and direct current electrotherapy.

## MATERIALS AND METHODS

From Jan 2004 to Oct 2005, 150 patients with symptomatic grades II and III hemorrhoidal disease were included. There were 73 (48.6%) men and 77 (51.4%) women who presented with fresh rectal bleeding, perianal pain and itching, mucus discharge or a prolapsing lump.

The diagnosis and grading was confirmed by history, physical exam and anoscopy. Exclusion criteria were: age over 50 or less than 25 years, history of previous procedures in the anorectal area, anal manometric pressures less than normal, presence of concomitant anorectal disease (including anal fissure) and diabetes mellitus.

All treatment modalities were discussed with patients and those asking for a specific procedure were excluded. Patients were randomly divided into groups A, B and C. Randomization was performed by block randomization and the five patients scheduled for operation in each day were treated by one modality. Group A underwent the Ferguson hemorrhoidectomy, group B underwent RBL and group

C underwent electrotherapy. Hemorrhoidectomy was done under general anesthesia in the lithotomy position. The hemorrhoids were excised in one or two main positions, the vascular pedicles were sutured and the mucosa was closed using 3/0 absorbable suture material with running sutures.

RBL was performed as per standard procedure.<sup>19</sup> Direct current electrotherapy was done under general anesthesia with the patient in the lithotomy position. During surgery, the speculum was inserted such that only one hemorrhoidal tag was exposed to the surgeon at each attempt. The speculum was then repositioned to treat the remaining tags.

The grounding pad was placed under the patient's dependent thigh. A single tip probe was inserted into the base of the hemorrhoid about 1 to 1.5 cm in the longitudinal axis of the tag and at a slight angle to the anal canal. Then, a 30mA direct current was applied for 2.5 to 3.5 minutes according to the size of the tags or stopping criteria.<sup>12, 14, 17</sup> A current was applied to all enlarged hemorrhoidal tags. The generator utilized provided a smooth direct current from 220 VAC.<sup>12</sup>

None of the three groups received enema or bowel preparations prior to surgery. All patients were re-evaluated at one week, two weeks and three months post-surgery. Research personnel blinded to the surgery technique asked patients about their symptom relief and possible complications, which included pain and incontinence.

Anorectal manometry was performed from one to ten days before surgery and repeated three months after treatment. Manometry was done with a fine fluid filled, open tipped, multilumen 4-channel system which perfused at a rate of 1 ml normal saline per minute, (Medtronic polygram 98, Denmark). Pressures were recorded by stationary pull-through at 1 cm intervals.<sup>20</sup>

The volume of the first sensation (VFS), the maximum tolerated volume (MxTV) and the rectoanal inhibitory reflex (RAIR) were recorded. The maximum resting pressure (MxRP), maximum squeezing pressure (MxSP), mean resting pressure (MRP) and mean squeezing pressure (MSP) were

also obtained. None of the patients received bowel prep before manometry. Pain was evaluated by a scoring system from 0 to 10. A score of 7 or greater was considered as severe pain; between 4 and 7, moderate pain; and less than 4, mild pain.

The study was approved by Shiraz University Ethics Committee and written informed consent was provided from each patient.

Statistical significance was assessed with two-tailed student's t-test for dependent and independent samples, as appropriate. Chi square, t- test and ANOVA were used for comparisons. Data was analyzed using SPSS statistical software package for Windows, version 16.0 (SPSS Inc., Chicago, IL, USA).

## RESULTS

There were 150 patients, 72 (48%) with grade II and 78 (52%) with grade III hemorrhoidal disease. The mean age of patients was  $41 \pm 7$  years. Patients were divided into group A ( $n=47$ , 31.4%), group B ( $n=51$ , 43%) and group C ( $n=52$ , 34.6%).

The mean ages of the patients were: group A  $40 \pm 2$  years; group B  $40 \pm 5$  years; and group C  $41 \pm 9$  years, which was statistically comparable. The male to female ratio was approximately 1:1.50.

The mean duration of symptoms was 119 days (range: 10-804). The most common symptom was prolapse in 80%, followed by bleeding in 79.8% and pain in 75.2%.

Regarding postoperative complications, hemorrhoidectomy was associated with a significantly higher incidence of itching compared to RBL or electrotherapy. Postoperative bleeding was identical between the three groups.

The most dramatic difference between postoperative clinical side effects among these three groups was pain. While most subjects who underwent hemorrhoidectomy suffered severe postoperative pain (mean=8), the dominant pain score in the RBL group was moderate (mean=5) and the majority of patients who underwent electrotherapy had only mild postoperative pain (mean=2) ( $p < 0.05$ ). There was no statistically significant difference in fecal continence following the three therapeutic modalities.

Both pre - and postoperatively, all patients showed a normal RAIR. There was a significant statistical difference in preoperative MRP and MSP between degree II and III hemorrhoids (Table 1).

**Table 1: Manometric differences between patients with grades II and III hemorrhoidal disease.**

Parameters	Grade II	Grade III	*p-value
MxSP (mmHg)	$106.0 \pm 35.0$	$124.0 \pm 36.0$	0.06
MRP (mmHg)	$38.0 \pm 6.0$	$57.0 \pm 7.2$	* $<0.05$
MSP (mmHg)	$76.0 \pm 11.7$	$101.0 \pm 15.1$	* $<0.05$

\*p-value was assessed with student's t test for dependent samples. Values are given as mean $\pm$ SD.

MRP, MSP, MxRP and MxSP remained unchanged after RBL and electrotherapy (Tables 2 and 3), whereas MxRP and MxSP declined significantly after hemorrhoidectomy (Table 4).

**Table 2: Manometric changes after RBL.**

Parameters	Before RBL	After RBL	*p-value
MxRP (mmHg)	$81.0 \pm 18.2$	$85.0 \pm 26.4$	0.145
MxSP (mmHg)	$122.0 \pm 24.9$	$120.8 \pm 26.6$	0.861
MRP (mmHg)	$57.2 \pm 20.8$	$52.0 \pm 17.9$	0.138
MSP (mmHg)	$104.2 \pm 41.4$	$124.3 \pm 33.2$	0.054
VFS (cc)	$34.6 \pm 2.7$	$35.3 \pm 3.3$	0.75
MxTV (cc)	$107.4 \pm 19.5$	$124.1 \pm 23.5$	0.163

\*p-value was assessed with student's t test for dependent samples. Values are given as mean $\pm$ SD.

**Table 3: Manometric changes after electrotherapy.**

Parameters	Before electrotherapy	After electrotherapy	*p-value
MxRP (mmHg)	$83.0 \pm 19.1$	$79.0 \pm 18.8$	0.203
MxSP (mmHg)	$125.0 \pm 26.0$	$117.0 \pm 30.0$	0.754
MRP (mmHg)	$55.15 \pm 19.9$	$50.8 \pm 17.7$	0.23
MSP (mmHg)	$97.4 \pm 30.8$	$92.8 \pm 26.4$	0.3
VFS (cc)	$32.4 \pm 3.4$	$32.7 \pm 4.1$	0.8
MxTV (cc)	$120.9 \pm 13.8$	$123.4 \pm 15.3$	0.228

\*p-value was assessed with student's t test for dependent samples. Values are given as mean $\pm$ SD.

MRP and MSP remained unchanged, even in the hemorrhoidectomy group (Table 4). VFS significantly increased in the hemorrhoidectomy group when compared with the preoperative period (Table 4). VFS did not change significantly after RBL and electrotherapy (Tables 2 and 3).

**Table 4: Manometric changes after hemorrhoidectomy.**

Parameters	Before hemorrhoidectomy	After hemorrhoidectomy	*p-value
MxRP (mmHg)	90.8 ± 21.3	77.7 ± 19.9	*<0.05
MxSP (mmHg)	130.6 ± 34.3	114.8 ± 24.9	*<0.05
MRP (mmHg)	61.7 ± 22.0	49.3 ± 18.0	0.063
MSP (mmHg)	107.1 ± 50.2	123.7 ± 40.8	0.07
VFS (cc)	36.4 ± 3.0	40.5 ± 2.6	*0.04
MxTV (cc)	127.8 ± 17.6	127.8 ± 30.0	1

\*p-value was assessed with student's t test for dependent samples.  
Values are given as mean±SD.

## DISCUSSION

The aim of this study was to compare physiological changes after treatment of hemorrhoidal disease using three different methods. Raised anal pressures have been documented in patients with prolapsed hemorrhoids,<sup>2-5</sup> which are possibly due to vascular hypertension within the anal cushions.<sup>1,13,17</sup>

The morphological basis of this phenomenon can be the hypertrophied external sphincter, probably from hyperactivity in response to an irritated anal mass and from voluntary hyperactivity because of fear of mucous discharge originating from the pile.<sup>13,17</sup>

The present study supports these hypotheses since MxRP and MxSP decreased significantly following hemorrhoidectomy. Furthermore, patients having less pronounced hemorrhoids (grade II) had significantly lower MRP and MSP than patients having grade III hemorrhoids.

RBL and electrotherapy did not cause significant changes in anal pressures. Increased VFS which develops in parallel to the development of prolapsed hemorrhoids seems not to be reversible after hemorrhoidectomy.

On the contrary, it worsens after surgery which is possibly due to scar formation. Though the

differences in VFS were statistically significant, the patients did not report any problems. Hemorrhoidectomy, as expected, caused the most significant changes in anorectal physiology and for this reason has been discouraged for widespread first option use in the treatment of grades II and III hemorrhoids.<sup>11</sup>

RBL, despite the lack of significant effect on anorectal manometry seems to be inferior to the electrotherapy method due to the presence of rare, but major side effects and more pain associated with this modality.

Finally, we determined that electrotherapy is a good choice for the treatment of grades II and III internal hemorrhoids due to its high success rate, low cost, ease of procedure, lack of significant side effects, significantly less postoperative pain, and most importantly, minimal anorectal physiological change. Thus, we can recommend this procedure as one of the options of choice for treating internal hemorrhoids.

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