

Comparative Study of Electrotherapy, Rubber Band Ligation, and Hemorrhoidectomy in the Treatment of Hemorrhoids – A Retrospective Study

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Abstract

Background: Treating the hemorrhoids is one of the most challenging in field of surgeries in which different approaches (methods) are used to treat hemorrhoids. Hence, three different methods were used and compared the manometric and clinical results.

Materials and Methods: A total of 96 patients having symptomatic Grade II or III internal hemorrhoids were considered in the study. All the patients were grouped into three groups. The Group A was treated with rubber band ligation (RBL); Group B was treated with electrotherapy; and Group C was treated with hemorrhoidectomy, and the manometric study of the each group was compared.

Results: Clinical manifestations were classified with percentage. The manometric values were compared in Grades II and III maximum squeezing pressure, mean squeezing pressure had there was statistically significant values ($P < 0.01$). Manometric changes in RBL, before ligation and after ligation, were compared, and all the values were highly significant ($P < 0.01$). The different manometric parameters were compared at electrotherapy before and after electrotherapy, and all the statistical values including volume of first sensation and maximum tolerate volume were also highly significant ($P < 0.01$).

Conclusion: It was concluded that electrotherapy was safe, effective, and simple method to treat Grades II and III uncomplicated internal hemorrhoids and had little post-operative pain and least changes in an rectal manometric value.

Key words: Mean raising pressure, Maximum squeezing pressure, Rubber band ligation, Volume of first sensation

INTRODUCTION

Hemorrhoids are the common clinical conditions. About half of the population has hemorrhoids by the age of 50 years. It is estimated that about 58% of the people above 40 years of age will have hemorrhoids globally.^[1,2] Moreover, hemorrhoids can occur at any age and both men and women are affected. In the 460 BC, Hippocrates wrote about rubber band ligation (RBL) procedure. They treated hemorrhoids by transfixing with needle and tying thick woolen

thread. Hemorrhoidectomy was also in practice in 25 BC–14 AD mentioned by Roman Physician Celsus and Galen in 131–201 AD. In the 4th and 5th centuries in India in Susruta Samhita book, surgeon was also following these surgical procedures and emphasized on wound cleanliness to avoid post-surgical complication because anorectal physiology changes with the development of hemorrhoids. Piles have been associated with abnormally raised and resting and squeezing pressure.^[3] Treatment modalities also can potentially change physiological parameters.

It is also reported that functional changes in prolapsed hemorrhoids were treated with prolapsed hemorrhoid methods.^[4] Hence, attempt was made to study the uncomplicated Grades II and III with RBL and direct electrotherapy so that, the patients would not have any post-surgical complications which often prove to be fatal and life threatening.

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MATERIALS AND METHODS

96 adult patients aged between 25 and 55 years suffering hemorrhoids, regularly visiting to the General Surgery Department, Great Eastern Medical College, Ragolu, Srikakulam, Andhra Pradesh, India, were studied.

Inclusion Criteria

Having symptoms of hemorrhoids such as bleeding per rectum, painful defecations, itching, and chronic constipation were selected for study.

Methods

Routine blood examination, random blood sugar and complete blood count, was done to rule out any chronic infection. CT and BT were also done to study the status flow. Hemorrhoids were graded into I, II and III, IV and treated with RBL, electrotherapy, and open hemorrhoidectomy, depending on the severity and grades. Anorectal manometry was performed from 1 to 10 days before surgery and repeated for months after treatment.

Exclusions Criteria

The patients having anorectal fistula and malignancy of anal canal HIV positive were excluded from the study.

Statistical Analysis

The clinical manifestation was classified with percentage comparison of manometric changes in Grades II and III hemorrhoids. RBL (before and after ligation), electrotherapy (before and after), and hemorrhoidectomy, post-operative condition in all their methods classified with percentage. The ratio of male and female was 2:1. The duration of study was about 3 years (2016–2019).

OBSERVATION AND RESULTS

Pre-operative clinical manifestation of the hemorrhoids patients was studied [Table 1]. 38 (39.5%) patients had protrusion, 20 (20.8%) had bleeding, 17 (17.7%) had pain, 12 (12.5%) had discharge, and 9 (9.37%) had pruritis.

Comparative study values in Grades II and III have hemorrhoid patients (48 patients in each group) [Table 2].

- In maximum squeezing pressure (MXSP) study, mean value in Grade II was 104.1 (Standard deviation [SD]±0.24) and 121.7 (SD±0.93) in Grade III *t*-test value was 181.9, and *P* value was higher significant mean value in grade.
- In mean raising pressure (MRP) study, mean value in Grade II was 36.2 (SD±0.56) and 55.7 (SD±0.44) in Grade III *t*-test value was 365.9 and *P* value was (*P* < 0.01).
- In mean squeezing pressure (MSP) study, mean value in Grade II was 74.17 (SD± 0.26) and 98.08

Table 1: A clinical manifestations of the patients (n=96)

Clinical manifestations	n (%)
Protrusion	38 (39.5)
Bleeding	20 (20.8)
Pain	17 (17.7)
Discharge	12 (12.5)
Pruritis	9 (9.37)

Table 2: Comparison of manometric values in Grades II and III hemorrhoids patients n=48

Type of manometric	Values	Grade II	Grade III
MXSP (mmHg)	Mean value	104.1	121.7
	SD	0.24	0.93
	"t" test	181.9	
	DF	94	
MRP (mmHg)	"P"-value	<i>P</i> <0.01	
	SD	36.2	55.7
		0.56	0.44
MSP (mmHg)	"t"-value=365.9, DF=94, <i>P</i> <0.01		
	SD	74.17	98.08
		0.26	0.24
		<i>t</i> "-value=182.8, DF=94, <i>P</i> <0.01	

MXSP: Maximum squeezing pressure, MRP: Mean raising pressure, MSP: Mean squeezing pressure

(SD± 0.24) in Grade III; *t*-test value was 182.08 and *P* value was higher significant (*P* < 0.01).

Study of manometric changes in RBL [Table 3].

- In MXSP study, mean value before ligation was 80.1 (SD±0.1) and after ligation was 83.5 (SD± 0.02) and *t*-test value was 27.9 (*P* < 0.01)
- In MXSP study, mean value before ligation was 119.1 (SD±0.26) and after ligation was 116.1 (SD± 0.26) and *t*-test value was 55.7 (*P* < 0.01)
- In MRP study, mean value before ligation was 53.4 (SD±0.03) and after ligation was 49.2 (SD± 0.20) and *t*-test value was 66.2 (*P* < 0.01)
- In MSP study, mean value before ligation was 101.3 (SD± 0.22) and after ligation was 121.3 (SD± 0.27) and *t*-test value was 300.9 (*P* < 0.01)
- In volume of first sensation (VFS) study, mean value before ligation was 31.2 (SD± 0.22) and after ligation was 32.3 (SD± 0.32) and *t*-test value was 14.2 (*P* < 0.01)
- In maximum tolerate volume (MXTV) study, mean value before ligation was 104 (SD± 0.24), and *t*-test value was 322.3 and *P* value was higher significant (*P* < 0.01).

Study of different values before and after electrotherapy [Table 4].

- In MXRP, mean value before electrotherapy was 80.4 (SD± 0.28) and after electrotherapy was 77.3 (SD± 0.46) and *t*-test value was 34.9 and *P* value was higher significant (*P* < 0.01)

Table 3: Manometric changes in rubber band ligation n=48

Type of man metric	Values	Before ligation (32)	After ligation (32)
MXRP (mmHg)	Mean value	80.1	83.5
	SD	0.19	0.02
	"t"-value=27.9, DF=31, P<0.01		
MXSP (mmHg)	Mean value	119.1	116.1
	SD	0.26	0.20
	"t"-value=55.7, DF=31, P<0.01		
MRP (mmHg)	Mean value	53.4	49.2
	SD	0.34	0.20
	"t"-value=66.2, DF=31, P<0.01		
MSP (mmHg)	Mean value	101.3	121.3
	SD	0.22	0.27
	"t" value=300.9, DF=31, P<0.01		
VFS (CC)	Mean value	31.2	32.3
	SD	0.22	0.32
	"t"-value=14.2, DF=31, P<0.01		
MXTV (mmHg)	Mean value	104.3	122.2
	SD	0.24	0.21
	"t"-value=322.3, DF=31, P<0.01		

VFS: Volume of first sensation, MXTV: Maximum tolerate volume

Table 4: Study of different values before and after electrotherapy n=48

Type of man metric	Values	Before electrotherapy (32)	After ligation electrotherapy (32)
MXRP (mmHg)	Mean value	80.4	77.3
	SD	0.28	0.46
	"t"-value=34.9, DF=31, P<0.01		
MXSP (mmHg)	Mean value	116.5	112.5
	SD	0.31	0.36
	"t"-value=80.4, DF=31, P<0.01		
MRP (mmHg)	Mean value	52.2	47.6
	SD	0.12	0.42
	"t" value=61.1, DF=31, P<0.01		
MSP (mmHg)	Mean value	95.4	90.1
	SD	0.30	0.21
	"t"-value=68.7, DF=31, P<0.01		
VFS (CC)	Mean value	31.1	29.2
	SD	0.23	0.26
	"t" value=32.4 DF=31, P<0.01		
MXTV (mmHg)	Mean value	118.1	121.3
	SD	0.06	0.23
	"t" value=86, DF=31, P<0.01		

- b. In MXSP, mean value before electrotherapy was 112.5 (SD± 0.31) and after electrotherapy was 116.5 (SD± 0.36), and t-test value was 80.4 and P value was higher significant (P < 0.01)
- c. In MRP, mean value before electrotherapy was 52.2 (SD± 0.12) and after electrotherapy was 47.6 (SD± 0.42), and t-test value was 61.1 and P value was higher significant (P < 0.01)
- d. In MSP, mean value before electrotherapy was 95.4 (SD± 0.30) and after electrotherapy was 90.1 (SD± 0.21), and t-test value was 68.7 and P value was higher significant (P < 0.01)
- e. In VFS, mean value before electrotherapy was 31.1 (SD± 0.23) and after electrotherapy was 29.2 (SD± 0.26), and t-test value was 32.4 and P value was higher significant (P < 0.01)
- f. In MXTV, mean value before electrotherapy was 118.1 (SD± 0.06) and after electrotherapy was 121.3 (SD± 0.23), and t-test value was 86. and P value was higher significant (P < 0.01).

DISCUSSION

In the present comparative study of electrotherapy, RBL and hemorrhoidectomy pre-operative clinical manifestations were considered. 38 (39.5) patients had protrusion, 20 (20.8%) had bleeding, 17 (17.7%) had pain, 12 (12.5%) had discharge, and 9 (9.37%) had

pruritis [Table 1]. In the comparative study, manometric values in Grades II and III hemorrhoids: (a) In MXSP study, mean value in Grade II was 104.1 (SD± 0.24) and in Grade III was 121.7 (SD± 0.93), and *t*-test value was 181.9 and *P* value was higher significant mean value in grade; (b) in MRP study, mean value in Grade II was 36.2 (SD± 0.56) and 55.7 (SD± 0.44) in Grade III, and *t*-test value was 365.9 and *P* value was (*P* < 0.01); and (c) in MSP study, mean value in Grade II was 74.17 (SD± 0.26) and 98.08 (SD± 0.24) in Grade III, and *t*-test value was 182.08 and *P* value was higher significant (*P* < 0.01).

In study of manometric charges in RBL – before and after ligation [Table 2].

- a. In MXSP study, mean value before ligation was 80.1 (SD± 0.1) and after ligation was 83.5 (SD± 0.02), and *t*-test value was 27.9 (*P* < 0.01)
- b. In MXSP study, mean value before ligation was 119.1(SD± 0.26) and after ligation was 116.1 (SD± 0.26), and *t*-test value was 55.7 (*P* < 0.01)
- c. In MRP study, mean value before ligation was 53.4 (SD± 0.03) and after ligation was 49.2 (SD± 0.20), and *t*-test value was 66.2 (*P*<0.01)
- d. In MSP study, mean value before ligation was 101.3 (SD± 0.22) and after ligation was 121.3 (SD± 0.27), and *t*-test value was 300.9 (*P*<0.01)
- e. In VFS study, mean value before ligation was 31.2 (SD± 0.22) and after ligation was 32.3 (SD± 0.32), and *t*-test value was 14.2 (*P*<0.01)
- f. In MXTV study, mean value before ligation was 104 (SD± 0.24); *t*-test value was 322.3 and *P* value was higher significant (*P* < 0.01).

In electrotherapy before and after electrotherapy [Table 3].

- a. In MXRP, mean value before electrotherapy was 80.4 (SD± 0.28) and after electrotherapy was 77.3 (SD± 0.46), and *t*-test value was 34.9 and *P* value was higher significant (*P* < 0.01)
- b. In MXSP, mean value before electrotherapy was 112.5 (SD± 0.31) and after electrotherapy was 116.5 (SD± 0.36), and *t*-test value was 80.4 and *P* value was higher significant (*P* < 0.01)
- c. In MRP, mean value before electrotherapy was 52.2 (SD± 0.12) and after electrotherapy was 47.6 (SD± 0.42), and *t*-test value was 61.1 and *P* value was higher significant (*P* < 0.01)
- d. In MSP, mean value before electrotherapy was 95.4 (SD± 0.30) and after electrotherapy was 90.1 (SD± 0.21), and *t*-test value was 68.7 and *P* value was higher significant (*P* < 0.01)
- e. In VFS, mean value before electrotherapy was 31.1 (SD± 0.23) and after electrotherapy was 29.2

(SD± 0.26), and *t*-test value was 32.4 and *P* value was higher significant (*P* < 0.01)

- f. In MXTV, mean value before electrotherapy was 118.1 (SD± 0.06) and after electrotherapy was 121.3 (SD± 0.23), and *t*-test value was 86. and *P* value was higher significant (*P* < 0.01) [Table 4]. These findings were more or less in agreement with previous studies.^[5-7]

In the present study, the physiological changes after the treatment hemorrhoids of different grades, the raised anal pressure were documented in all three methods before and after treatment because there is vascular hypertension in the vessels which forms anal cushion.^[8,9]

It was observed that maximum rising pressure (MXRP) MXSP decreasing significant after hemorrhoidectomy. Moreover, Grade II had significant lower MRP and MSP than Grade III hemorrhoids RBL, and electrotherapy did not cause any significant changes in anal pressure as compared to hemorrhoidectomy. Increased VFS was observed in prolapsed hemorrhoids elevated after hemorrhoidectomy. It could be due to scar formation after surgery. Among these three types of patients, hemorrhoidectomy caused most significant changes in physiology. Hence, hemorrhoidectomy must be avoided in uncomplicated Grades II and III hemorrhoids.^[10,11] Because there will be tonic contraction in the muscles of anal sphincter. It was confirmed that electrotherapy was safer, effective in Grades II and III than RBL and hemorrhoidectomy, because there were no physiological and clinical abnormalities observed in patients in electrotherapy method. Moreover, electrotherapy was low-cost, easy procedure with minimal side effects.

SUMMARY AND CONCLUSION

The present comparative study of electrotherapy, RBL, and hemorrhoidectomy will be useful for surgeon to decide the proper approach or method for different grades of hemorrhoids because surgeon has to be aware of post-surgical complications which may impair the tonic contraction of anal sphincter and anal cushion which are regulated by physiological parameters such as squeezing pressure, mean pressure tolerated volume, and rectoanal inhibitory reflex. This study proves that electrotherapy was ideal method for Grades II and III non-complicated hemorrhoids. However, this study warrants further hemodynamic biomechanical, pathophysiological, genetic, anthropological, nutritional study because occurrence of hemorrhoids is one of the disadvantages of erect posture.

This research paper was approved by the Ethical Committee of Great Eastern Medical College, Ragolu, Srikakulam, Andhra Pradesh, India.

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