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Comparison of electrotherapy of hemorrhoids and Ferguson hemorrhoidectomy in a randomized prospective study

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KEYWORDS

Electrotherapy;
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Abstract *Background:* Ferguson hemorrhoidectomy has been shown to be associated with significant amount of post-operative (post op) pain and complications. However, electrotherapy in which hemorrhoidal tissue is not excised might not be associated with severe complications.

Objective: Our aim was to compare the results of Ferguson hemorrhoidectomy with electrotherapy methods using 16 and 30 mA (milliamperes) direct current (DC).

Methods: Four hundred and eight patients with symptomatic hemorrhoids, grades 1, 2 and 3, were randomly assigned into 3 groups. Group A (136 patients) underwent Ferguson hemorrhoidectomy, group B₁ (136 patients) and group B₂ (136 patients) were subjected to electrotherapy using 16 and 30 mA, respectively. The groups were compared in terms of duration of procedures, duration of hospital stay, post op pain severity and post op complications including recurrence, infection and non-healing ulcers.

Results: All patients in group A had severe pain for 7–14 days of post op. However, in group B₁, 88(65%) patients had mild pain during the treatment and 1st post op day; 28(21%) of them could not tolerate the operation; 20(15%) of them had mild pain and 10(7.5%) of them had moderate pain up to day 7. In group B₂, 47(35%) of patients had severe pain for 6 h and 20(15%) of them experienced mild pain for 2–7 days post op. The one day hospital stay in group A and group B₂ were 82 and 97%, respectively, while patients in group B₁ were treated as out patients. Mean procedure time for one hemorrhoidectomy in group A was 23 min, in electrotherapy using 16 and 30 mA was 9.7 and 6.1 min, respectively. The overall success rate with the first application in group B₁ was 57% and in group B₂ was 93%.

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Conclusion: Electrotherapy method using 30 mA DC could significantly decrease post op pain, operation time and hospital stay. This method had good success rate and very low post op complications compared to Ferguson hemorrhoidectomy and using 16 mA method. Therefore, due to its effectiveness, less pain, rapidity and safeness, we recommend it.

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Introduction

Symptomatic hemorrhoids are treated either medically or mechanically.^{1–3} Medical therapy is commonly used for symptomatic hemorrhoids of grades 1 and 2, while mechanical therapy is used for grades 3 and 4 and grades 1 and 2 refractory to medical therapy. In mechanical treatment, the aim is to eliminate the hemorrhoids.^{4,5}

In Ferguson hemorrhoidectomy, one of the most used mechanical therapies, the whole bundle including the venous plexus and the overlying mucosa is excised.⁶ The procedure has been associated with severe post op pain and other severe complications such as post op bleeding, anal stricture and incontinence.^{7–9} To avoid such complications, other methods such as direct current (DC) utilization were suggested.¹⁰ However, the outcomes of DC utility were different due to the use of different apparatuses and amperages.^{10–12} With the use of 16 mA DC the mean number of hemorrhoid segment's retreatment was reported as 2.22, 2.24, 2.76 and 3.44 for grade 1, 2, 3 and 4, respectively. Additionally, each segment needed 8–12 min of DC application. The outcomes of the method, which did not widely adopt were not uniform, ranging from 68 to 80%.^{10–12}

In order to avoid complications of Ferguson procedure and low success rate of 16 mA DC utilization procedures, we designed the present study to investigate the utilization of 30 mA DC under general anesthesia.

Materials and methods

Patients and design

From February 1999 to September 2002, 408 patients with hemorrhoid grades 1, 2 and 3 who had not responded to medical therapy with symptoms of fresh rectal bleeding, itching or prolapsed were assigned randomly to 3 equal blocks. The patients all came from south of Iran and they were seen in colorectal clinic of Shiraz Medical University.

We excluded the patients who had other diseases of this site, like fissure, fistula and IBD. Systematic

block randomization was used according the patient's number. The block 1 (group A) included 136 patients (82 male and 54 female) and were treated by Ferguson hemorrhoidectomy method. Block 2 (group B₁) consisted of 136 patients (74 male and 62 female) whom were subjected to electrotherapy using 16 mA DC. Block 3 (group B₂) consisted of 136 patients (76 male and 60 female) in whom electrotherapy using 30 mA DC was utilized. All patients were asked about suffering on days 1, 7 and 14 after procedure. The severity of pain classified according to numerical score as mild (1–3), moderate (4–7) and severe (8–10).

Procedures

Ferguson hemorrhoidectomy was performed under spinal or general anesthesia using standard surgical procedure. Care was taken not to excise more than 2 hemorrhoids in each session. Moreover, all wounds were sutured using 2-0 catgut.

Electrotherapy using 16 mA was preformed without anesthesia, whereas using 30 mA was done under spinal or general anesthesia. In these patients a changeable negatively-charged needle-like probe was inserted into the hemorrhoids for up to 1 cm.^{13,21}

The positively-charged plate was placed under patient's buttock. In group B₁ patients, the current was increased gradually from 0 to 16 mA over 1 min. The duration of electrotherapy was maintained for 10 min or until gas bubbles from needle penetration site were ceased.^{10,13} All patients except 2 of them tolerated the electrotherapy session. In patients undergoing electrotherapy using 30 mA DC (group B₂), the amperages were increased from 0 to 30 mA in seconds. The durations of electrotherapy for hemorrhoid grades 1–3 were 3.5, 4.5 and 6 min, respectively.^{13,21}

Post op care and evaluation

Patients subjected to hemorrhoidectomy or electrotherapy using 30 mA were prescribed analgesic (meperidin, 50 mg IV). All patients were advised to take oral metronidazol (500 mg, 3 times per day) for 5 days. Moreover, all patients in the study

were instructed to take diclofenac (25 mg 3 times per day) if they had pain. The patients were asked to return to clinic 1, 2 weeks and 2 months after interventions. On their return they were asked to report any symptoms such as, bleeding, spoilage, as well as severity and duration of pain. The severity of pain was described using numericals in which the patients were asked to define the pain they experienced by the scale of 1–10. For better analysis the scores 1–3 were taken as mild, scores 4–7 were taken as moderate and scores 7–10 were taken as severe pain. Two months after the intervention, patients were instructed to return to our clinic if any complications occurred for them, and if no complication, they were asked to come back for regular visits every 6 months up to 24 months.

Statistical analysis

All values are expressed as mean (\pm SD). Student's *t*-test, one way and two ways ANOVA, and Kolmogorov–Smirnov test were used for statistical analysis when appropriate. *P* values of less than 0.05 were considered significant.

Results

The mean number of hemorrhoids, distribution of hemorrhoid grades, duration of procedure, and one day hospital stay and recurrence rate among their groups are shown in Table 1.

There was no significant difference in the distribution of grades among the 3 groups ($P > 0.05$).

Eighteen percent of patients in group A and 2.9% of patients in group B₂ required 2 additional days of hospitalization.

Post op severe bleeding occurred in 2.9% of patients in group A requiring re-operation. No patients in group B₁ or B₂ developed such bleeding requiring surgical control.

The severity and percentage of pain were as follows (Table 2).

Day 1

All patients in group A and 35% of patients in group B₂ suffered severe pain in 1st 6 post operative hours. None of the patients in group B₁ had severe pain post operatively. Whereas in the rest of the 1st post operative day all of the patients in group A had severe pain, 48% of the patients in group B₂ did experience moderate pain, and 65% of the patients in group B₁ suffered mild pain in 1st post op day.

Day 7

All patients in group A had severe pain but with lower scales, while there was no patient reporting this level of pain in group B₁ or B₂. Whereas no patient experienced moderate pain in group A or B₂, only 7.5% of the patients in group B₁ reported pain of such level. Additionally, 15% of the patients in group B₁ and 15% in group B₂ experienced mild pain.

Day 14

The patients in group B₁ or B₂ did not have pain of any intensity. However, all patients in group A were still suffering from pain of varied severity. The patients suffering mild, moderate and severe pain were 24, 57 and 19%, respectively.

Eighty seven percent of the patients (43 out of 49) with recurrence in group B₁ responded favorably to the second or third electrotherapy with 16 mA, and the remaining 13% required hemorrhoidectomy. Fifty five percent (5 out of 9) of the patients with recurrence in group B₂ responded well to second application of electrotherapy using 30 mA, and the remaining patients required hemorrhoidectomy.

Prolonged non-healing ulcer (6%) and anal stricture (1.6%) developed in patients in group A. These complications were not observed in group B₁ or B₂.

Table 1 Demographic and clinical characteristics of the patients in the 3 groups

	Group A	Group B ₁	Group B ₂
Mean age (years)	45	43	42
Mean number of hemorrhoids	2.4	2.5	2.5
Grade of hemorrhoids			
Grade 1	16 (12%)	27 (20%)	20 (15%)
Grade 2	83 (61%)	83 (61%)	80 (59%)
Grade 3	37 (27%)	26 (19%)	36 (26%)
Duration of procedure for one hemorrhoid (min)	23 \pm 8	9.7 \pm 1.5	6.1 \pm 1.4
One day hospital stay (number and %)	111 (82%)	0 (0%)	133 (97%)
Two days hospital stay or more (% of patients)	(18%)	0	(2%)
Recurrence rate (up to 36 months follow up)	11 (8%)	49 (36%)	9 (7%)

Table 2 Frequency of pain severity at days 1, 7 and 14 after the procedures in groups A, B₁ and B₂

Groups of patients	Type of pain on day 1, number of patients (%)			Type of pain on day 7, number of patients (%)			Type of pain on day 14, number of patients (%)					
	No pain	Mild	Moderate	Severe	No pain	Mild	Moderate	Severe	No pain	Mild	Moderate	Severe
A	0	0	0	136 (100%)	0	0	0	136 (100%)	0	33 (24%)	78 (57%)	26 (19%)
B ₁	48 (35%)	88 (65%)	0	0	106 (77.5%)	20 (15%)	10 (7.5%)	0	136 (100)	0	0	0
B ₂	23 (17%)	0	65 (48%)	48 (35%)	116 (80%)	20 (15%)	0	0	136 (100)	0	0	0

Discussion

Hemorrhoids are being treated using a number of mechanical and conservative methods. The aim of all methods is to reduce the hemorrhoidal size to a physiologically acceptable level. The closed type excisional hemorrhoidectomy is one of the most commonly used mechanical methods which is reported to be satisfactory in terms of outcome.^{5,6} However, the method has the disadvantage of severe post-operative pain. Therefore, a simple, fast and less painful method seems to be essential.^{7,14-21}

Electrotherapy utilizing 16 mA DC which is a simple, effective and painless method has been used for many years.¹⁰ However, the method seems not to be cost-effective in terms of the time spent, since only one hemorrhoid cushion could be treated in each session, and even in some patients each segment may need more than 2 sessions of DC application.¹⁰⁻¹² These shortcomings have been attributed to the utilization of low DC amperage.¹⁰⁻¹²

In the present study, the DC amperage was increased to 30 mA, and the procedure was performed under general or spinal anesthesia. This method reduced the operation time and was associated with less pain (Tables 1 and 2). Moreover, the method did permit the treatment of all of the hemorrhoidal cushions in one session.

Compared to Ferguson hemorrhoidectomy, DC electrotherapy with 30 mA was associated with significantly more one day hospital stay (Table 1). Additionally, a significantly lower number of patients required more than one day hospital stay.

The distribution of grades of hemorrhoids was not statistically different among patients undergoing any of the 3 procedures. Therefore, the results of the present study are not affected by the severity of hemorrhoids.

DC Electrotherapy using 30 mA did cause more pain than using 16 mA on the first day after operation, where these 2 methods did not differ in terms of inflicting pain. However, the 2 methods were considerably superior to Ferguson hemorrhoidectomy ($P < 0.05$), in which all patients were suffering from severe pain on the 1st to 7th days after operation. Moreover, all patients in Ferguson hemorrhoidectomy were still suffering from varied levels of pain on the day 14 after operation. However, patients undergoing DC electrotherapy using 16 or 30 mA did not complain any sort of pain on the day 14 (Table 2). Considering the pain suffered by the patients it might be concluded that the DC electrotherapy utilizing 16 mA is superior to 30 mA but because of pain during insertion of the probe in

the hemorrhoid and initiation of current, 21% of patients in group B₁, who were treated without using anesthesia, could not tolerate the procedure. However, as it was discussed earlier, the use of 30 mA did allow the management of all of the hemorrhoidal cushion in one session and in a shorter time.

Of the 3 procedures only Ferguson hemorrhoidectomy was accompanied by post operative bleeding, the incidence of which was similar to that reported in the literature.⁴ The recurrence rates reported for Ferguson hemorrhoidectomy and DC electrotherapy using 16 mA were similar to those of previous reports.^{10,14} DC electrotherapy utilizing 30 mA was associated with a significantly lower recurrence rate than electrotherapy using 16 mA and to a similar level to Ferguson hemorrhoidectomy (Table 1).

Conclusion

The findings of the present study indicate that DC electrotherapy using 30 mA is better than utilization of 16 mA in terms of lower duration of procedure, number of hemorrhoidal cushions treated in one session, and the recurrence rate of hemorrhoid. Additionally, compared to Ferguson hemorrhoidectomy it significantly caused lower level of pain and incidence of post op bleeding, and lower duration of procedure and higher number of hemorrhoidal cushion treated in one session.

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