

Evaluation of Two Haemorrhoidectomy Techniques: Ferguson's Haemorrhoidectomy and Harmonic Scalpel Haemorrhoidectomy

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Abstract: Hemorrhoids are the most common anal disease and many modalities are available for its treatment. In our study, we compared Harmonic scalpel haemorrhoidectomy and Ferguson's haemorrhoidectomy. Study conducted on 50 patients with Grade III and Grade IV haemorrhoids. We observed harmonic scalpel procedure has less postoperative pain, less need for analgesic, less operative time and more patient satisfaction. Harmonic scalpel haemorrhoidectomy is safe and easy method for treating hemorrhoids.

Keywords: Hemorrhoids; Harmonic scalpel ; Ferguson's; Haemorrhoidectomy.

1. Introduction

Haemorrhoids are one of the commonest diseases¹. Haemorrhoids are cushions of submucosal tissue containing venules, arterioles, and, elastic and connective tissue that are located in the anal canal. The prevalence of symptomatic haemorrhoidal disease in the population aged >40 years is approximately 58%. as the patient present late. Although conservative treatment is often sufficient for early stages (Grade I and Grade II), however late stage disease (Grade III and Grade IV) usually need surgical treatment. The most common and effective approaches for conventional surgical treatment are **Milligan Morgan (open) and Ferguson's haemorrhoidectomy (FH, closed)**. However FH can cause complication which include pain, postoperative bleeding, urinary retention, anal stenosis and occasional anal incontinence. The introduction of harmonic scalpel (1998) has offered alternative technique of haemorrhoidectomy to that conventional surgery. The modified **electrosurgical harmonic scalpel** instrument is an alternative technique for haemorrhoidectomy that has been developed recently. Harmonic scalpel (HS) has simultaneously cuts and coagulates tissue by producing a vibration of 55.5 kHz. **The procedure When compared with conventional electrosurgical devices has got advantage that is of minimal lateral tissue injury**, as a result the postoperative, neuromuscular stimulation (pain) is less. To overcome above mentions disadvantages, new treatment method harmonic scalpel haemorrhoidectomy has been introduced by in 1993. Harmonic scalpel haemorrhoidectomy has less postoperative pain, less need of analgesia, less postoperative complications and higher patient satisfaction. .Therefore, we propose to compare the outcome of a new technique of Harmonic scalpel haemorrhoidectomy with Ferguson's haemorrhoidectomy.

2. Aims and Objectives

This study aims to compare various aspects in the management of grade III and grade IV haemorrhoids by conventional Ferguson's (closed) haemorrhoidectomy and a newer technique of Harmonic scalpel haemorrhoidectomy.

3. Material and Methods

This was a Randomized comparative study. Fifty patients undergoing Haemorrhoidectomy between June 2014 - May 2016 were enrolled in this study with 25 patients each in Harmonic scalpel(group A) and Ferguson's(group B) Haemorrhoidectomy group. This study was conducted in the Department of Surgery, Mahatma Gandhi Medical College and Hospital, Sitapura, Jaipur. A complete medical history was taken with emphasis on haemorrhoidal symptoms, previous treatment and concurrent anorectal conditions. Clinical and proctoscopic examination was carried out in all patients. Outcome measures included postoperative symptoms, time taken in procedure, post-operative pain, duration of stay, requirement of postoperative analgesia, and duration to resume work . All patients underwent follow up visits at 1st week, 2nd week, 3rd week, 4th weeks and then monthly up to 12 months. Patients with a) systemic illness b) associated mucosal prolapsed, c) patients with severe co-morbid systemic diseases such as diabetes mellitus, hypertension, chronic obstructive pulmonary disease, coronary artery disease, coagulation disorders, d) patients with associated anorectal conditions like abscess, anal fissures, anal fistulae, rectal ulcer and rectal prolapse, e) patients who did not give consent for participation in the study. f) anal incontinence, g) rectocele, h) patients with previous anal surgery were exclude from the study. The data entered in Microsoft office excel chart by simple statistics like percentages and proportions. Chi-square test, t-test and N-par were applied to know association between the two methods. P value <0.05 will be considered statistically significant. written informed consent has been obtained before the procedure.

4. Result

Table 1: Age Group variation

Gr	N	Mean	Std. Deviation	Minimum	Maximum	P Value
Harmonic	25	45.40	13.385	30	87	0.224
Ferguson's	25	40.84	12.773	20	70	
Total	50	43.12	13.152	20	87	

Mean age was found to be between 41-45 years in both groups and p value was found non-significant.

Table 2: Distribution of the cases according to gender

	Harmonic (N=25)		Ferguson's (N=25)		Total (N=50)	
	No	%	No	%	No	%
Female	10	40	7	28	17	34
Male	15	60	18	72	33	66
Total	25	100	25	100	50	100

Chi-square = **0.802(b)** with 1 degree of freedom; **P = 0.370**

Table 2 shows Male –female distribution and incidence of hemorrhoids was found much higher among males in both groups with 60% and 72% in harmonic and Ferguson's group respectively.

Table 3: Distribution of the cases according to Symptoms

Symptoms	Harmonic (N=25)		Ferguson's (N=25)		Total (N=50)	
	No	%	No	%	No	%
Bleeding	25	100	25	100	50	100
Constipation	21	84	22	88	43	86
Prolapse	8	32	10	40	18	36
Pain	4	16	9	36	13	26

Table 3, shows that Bleeding is most common complain present in all cases and constipation is present in 86% of patients in both groups. Incidence of pain in both groups were between 26%.

Table 4: Distribution of the cases according to No. of Piles

No. of Piles	Harmonic (N=25)		Ferguson's (N=25)		Total (N=50)	
	No	%	No	%	No	%
1	1	4	0	0	1	2
2	3	12	3	12	6	12
3	21	84	22	88	43	86
Total	25	100	25	100	50	100

Chi-square = **1.023** with 2 degrees of freedom; **P = 0.600**

Table 4, displays that most cases in both group presented with 3 hemorrhoids with 84% in Harmonic and 88% in Ferguson's group.

Table 5 Distribution of the cases according to Position of piles

Degree	Harmonic (N=25)		Ferguson (N=25)		Total (N=50)		Chi Square (df)	P Value
	No	%	No	%	No	%		
3	24	96	23	92	47	94	.355 (1)	1.000
7	23	92	24	96	47	94	.355 (1)	1.000
11	23	92	25	100	28	96	2.083 (1)	0.490

According to Table 5. There was no significant difference found according to position of hemorrhoids.

Table 6: Distribution of the cases according to degree of piles

Degree	Harmonic (N=25)		Ferguson (N=25)		Total (N=50)		Chi Square (df)	P Value
	No	%	No	%	No	%		
Third	18	72	14	56	32	64	1.389 (1)	.377
Fourth	7	32	11	44	18	36	0.764 (1)	.561

Table 6 shows that most cases presented with third degree piles with 72% and 56% in Harmonic and Ferguson's group respectively.

Table 7: Distribution of the cases according to associated diseases

Procedure	Present (n/%)	Absent (n/%)	Chi-square (df)	P value
Harmonic	4/16	21/84	0.166 (1)	1.00
Ferguson's	3/12	22/88		

Chi-square = **0.166** with 1 degree of freedom; **P = 1.000NS**

Table 7 shows no significant association of haemorrhoids with any other disease with p value of 1.000.

Table 8: Distribution of the cases according to duration of surgery

Procedure	N	Mean	SD	P value
Harmonic	25	24.0000	7.71902	.000
Ferguson's	25	36.7200	8.55628	

Table no. 8, shows The mean and standard deviation of duration of surgery in minute in Harmonic scalpel haemorrhoidectomy was 24.00 ± 7.71902 . The mean and standard deviation of duration of surgery in Ferguson haemorrhoidectomy was 36.7200 ± 8.55628 . On applying t test, p value comes out to be 0.000. Thus significantly higher duration of surgery is required in Ferguson haemorrhoidectomy in comparison to harmonic scalpel haemorrhoidectomy.

Table 9: Distribution of the cases according to need of analgesia at 24 hrs

Procedure	n	Mean (mg)	SD	P Value
Harmonic	25	135.00	30.619	.000
Ferguson's	25	228.00	26.339	

Table no. 9, shows the mean and standard deviation of need of analgesia at 24 hrs in mg in Harmonic scalpel haemorrhoidectomy was 135 ± 30.619 . The mean and standard deviation of need of analgesia at 24 hrs in mg in Ferguson haemorrhoidectomy was 228 ± 26.339 . On applying t test, p value comes out to be 0.000. Thus significantly higher dose of analgesia at 24 hrs is required in Ferguson haemorrhoidectomy in comparison to harmonic scalpel haemorrhoidectomy.

Table 10: Distribution of the cases according to need of analgesia at 7th day

Procedure	n	Mean	SD	P Value
Harmonic	25	42.00	23.629	.000
Ferguson's	25	94.00	21.985	

Table no. 10, shows The mean and standard deviation of need of analgesia at 7 day in mg in Harmonic scalpel haemorrhoidectomy was 42.00 ± 23.629 . The mean and standard deviation of need of analgesia at 7 day in mg in Ferguson haemorrhoidectomy was 94.00 ± 21.985 . On applying t test, p value comes out to be 0.000. Thus significantly higher dose of analgesia at 24 hrs is required in Ferguson haemorrhoidectomy in comparison to harmonic scalpel haemorrhoidectomy.

Table 11: Distribution of the cases according to need of analgesia at 28th day

Procedure	N	Mean	SD	P Value
Harmonic	25	.000	.000	.000
Ferguson's	25	20.000	25.000	

Table no. 11, shows The mean and standard deviation of need of analgesia at 28 day in mg in Harmonic scalpel haemorrhoidectomy was 00 ± 00.000 . The mean and standard deviation of need of analgesia at 28th day in mg in Ferguson haemorrhoidectomy was 20.00 ± 25.000 . On applying t test, p value comes out to be 0.000. Thus significantly higher dose of analgesia at 28th day is required in Ferguson haemorrhoidectomy in comparison to harmonic scalpel haemorrhoidectomy.

Table 12: Distribution of the cases according to hospital stay

Procedure	N	Mean	SD	P Value
Harmonic	25	4.40	4.12	.437
Ferguson's	25	1.323	1.201	

Table no. 12, shows The mean and standard deviation of hospital stay in Harmonic scalpel haemorrhoidectomy was 4.40 ± 1.323 . The mean and standard deviation of hospital stay in Ferguson haemorrhoidectomy was 4.12 ± 1.201 . On applying t test, p value comes out to be 0.437. Thus there is no statistically significant difference in both the groups in duration of hospital stay.

Table 13: Distribution of the cases according to time to return normal activity

Procedure	n	Mean	SD	P Value
Harmonic	25	7.68	1.435	.343
Ferguson's	25	7.32	1.215	

Table no. 13, shows The mean and standard deviation of time to start of normal activity in Harmonic scalpel haemorrhoidectomy was 7.68 ± 1.435 . The mean and standard deviation of time to start of normal activity in Ferguson haemorrhoidectomy was 7.32 ± 1.215 . On applying t test, p value comes out to be 0.343. Thus there is no statistically significant difference in both the groups in time to start of normal activity.

Table 14: Distribution of the cases according to visual analogue scale at 24hrs

Procedure	n	Mean	SD	P Value
Harmonic	25	5.60	.816	.000
Ferguson's	25	8.08	.708	

Table no. 14, shows the mean and standard deviation of assessment of pain by visual analogue scale at 24 hrs in Harmonic scalpel haemorrhoidectomy was $5.60 \pm .816$. The mean and standard deviation of assessment of pain by visual analogue scale in Ferguson haemorrhoidectomy was $8.08 \pm .702$. On applying N-par test, p value comes out to be 0.000. Thus there is significantly higher pain in Ferguson's haemorrhoidectomy procedure as compare to harmonic scalpel haemorrhoidectomy procedure.

Table 15: Distribution of the cases according to visual analogue scale at 7th day

Procedure	n	Mean	SD	P Value
Harmonic	25	0.48	.872	.000
Ferguson's	25	4.16	1.281	

Table no. 15, shows the mean and standard deviation of assessment of pain by visual analogue scale at 7th day in Harmonic scalpel haemorrhoidectomy was $0.48 \pm .872$. The mean and standard deviation of assessment of pain by visual analogue scale at 7th day in Ferguson haemorrhoidectomy was 4.16 ± 1.281 . On applying N-par test, p value comes out to be 0.000. Thus there is significantly higher pain in Ferguson's haemorrhoidectomy procedure as compare to harmonic scalpel haemorrhoidectomy procedure.

Table 16: Distribution of the cases according to visual analogue scale at 28th day

Procedure	n	Mean	SD	P Value
Harmonic	25	.00	.000	.005
Ferguson's	25	.56	.917	

Table no. 16, shows The mean and standard deviation of assessment of pain by visual analogue scale at 28th day in Harmonic scalpel haemorrhoidectomy was $.00 \pm .000$. The mean and standard deviation of assessment of pain by visual analogue scale at 28th day in Ferguson haemorrhoidectomy was $0.56 \pm .917$. On applying N-par test, p value comes out to be 0.005. Thus there is significantly higher pain in Ferguson's haemorrhoidectomy procedure as compare to harmonic scalpel haemorrhoidectomy procedure.

Table 17: Distribution of the cases according to Postoperative complaint

Post Operative Complaint	Harmonic (N=25)		Ferguson's (N=25)		Total (N=50)		Chi Square Test
	No	%	No	%	No	%	P Value
Pain	4	16	9	36	13	26	0.196
Bleeding	2	8	3	12	5	10	1.000
Discharge	1	4	2	8	3	6	1.000

Table no. 17 shows Pain was main post-operative complaint in both groups with 16% in Harmonic hemorrhoidectomy and 36% in Ferguson's group. Incidence of bleeding were found equivalent in both groups but both complaints were statistically non significant. Discharge was present in very few no. of patients with <6% incidence. On applying chi square test, The data was not statistically significant

Table 18: Distribution of the cases according to Long term Follow up

	Harmonic (N=25)		Ferguson's (N=25)		Total (N=50)		Chi Square Test
	No	%	No	%	No	%	P Value
Retention of Urine	3	12	1	4	4	8	0.609
Constipation	1	4	3	12	4	8	0.609
Perianal Abscess	0	0	0	0	0	0	NA
Long Term Follow Up		0		0		0	
Recurrence	0	0	1	4	1	2	1.00
Stenosis	0	0	0	0	0	0	NA
Prolapse Incontinence	0	0	0	0	0	0	NA

Table no. 18 shows no significant post-operative complication in both groups and difference in both groups was also non-significant.

5. Discussion

IlhanEce et al in 2014 compared outcomes of Ferguson's and Harmonic scalpel haemorrhoidectomy in 192 patients and found that The mean age of patients undergoing HS haemorrhoidectomy was 41 years (range 21–64 years) and for the Ferguson's haemorrhoidectomy group was 44 years (range 23–67 years). The male: female ratio was 9:5 in HS and 7:5 in Ferguson's haemorrhoidectomy groups. Another study done by HakanBulus et al in 2013 showed that The mean ages of patients who underwent HS and FEH were 34.1 ± 9.2 years and 33.7 ± 8.4 years, respectively. Sheikh et al (2013) found that mean age of patients with piles was 45.5. We also observed maximum number of patients between 41-50 age group. Total 27 patients out of 80 were falling in this age group. Sheikh et al also observed that 80% of patients included in study were males, which was statistically significant. The disease is more common in males as reported by SoderlandSignid (1962) – 2.3 : 1, Clark (1967) -4:1, William Killoyd (1973)- 13:1, Gopal Krishna (1977) – 1.8:1, E U Mgluid (1978) – 2:1. The low prevalence of haemorrhoids in female patients may be due to hesitancy in reporting to hospital for this problem. Our study shows mean age of patient presented with complaints of haemorrhoids was 43.12.

In our study, out of total 50 patients, 33 patients were male suggesting that haemorrhoids are more prevalent in male gender, similar finding as seen in literature except study done by HakanBulus et al in 2013 which showed that The mean ages of patients who underwent HS and FEH were 34.1 ± 9.2 years and 33.7 ± 8.4 years, respectively.⁸⁶

Loder PB (1994) conducted a study to find out risk factors and pathophysiology of haemorrhoids and found that straining during passage of hard stools increases anal tone and contributes to engorgement of anal cushions and leading to haemorrhoid formation. In our Study, All patients included in study presented with complaint of per rectal bleeding. This symptom was present in 100% of cases. There was another significant finding observed that constipation was present in (43 patients) 86% of cases suggesting that constipation plays significant role in pathophysiology of piles.

IlhanEce et al in 2014 compared outcomes of Ferguson's and Harmonic scalpel haemorrhoidectomy in 192 patients and found that the average operating time in the HS group was much lower as compared to Ferguson's group. Operating time in the HS and Ferguson's haemorrhoidectomy groups was 14.5 ± 3 min and 32 ± 3.2 min respectively ($p < 0.001$).⁸⁷ Another study done by HakanBulus et al in 2013 showed that The mean operating time of the HS and FEH groups was 16.8 ± 4.1 minutes and 25.5 ± 7.7 minutes, respectively ($p = 0.001$). In our study time duration of surgery was one of most significant finding observed in comparison of two techniques and results are consistent with other studies. We found that in Ferguson's group time taken in surgery was much greater, which was 36.7 min and in

Harmonic scalpel haemorrhoidectomy time duration was 24 min. Time taken in Harmonic scalpel haemorrhoidectomy is statistically significantly lower as compared to Ferguson's haemorrhoidectomy with p value of < 0.001 .

IlhanEce et al in 2014 also showed that the VAS pain scores on day 0, 1 and 7 in HS group were 3.1 ± 1.1 , 2.8 ± 0.8 and 1.1 ± 0.3 respectively and in the Ferguson's group were 6.3 ± 1.4 , 4.8 ± 1.6 and 1.5 ± 0.8 respectively ($p < 0.001$).⁸⁷ Another study done by S. Khan et al 2001 showed that there was no significant difference in pain measurements reported on Day 1 (5.8 ± 0.4 for electrocautery and 5.6 ± 0.6 for Harmonic Scalpel, $P < 0.82$). On postoperative Day 7, the difference in pain between groups approached significance, with pain reported as 3.7 ± 0.3 for electrocautery and 5.1 ± 0.7 for Harmonic Scalpel ($P < 0.06$). At six weeks, both groups were pain free. There was a significant decrease in pain between postoperative Day 1 and 7 in the electrocautery patients that was not seen in the Harmonic Scalpel® patients.⁸⁵ Study done by HakanBulus et al in 2013 showed that The total analgesic doses for the HS group were 790 ± 206 mg, 619 ± 234 mg, and 30 ± 99 mg, and for the FEH group were 1096 ± 194 mg, 1000 ± 259 mg, and 40 ± 0 mg for postoperative Day 1, Day 7, and Day 28, respectively.⁸⁶ In our study postoperative need for analgesia was also a most significant finding observed in comparison of both the techniques and results are compared with other studies. We found that analgesia needed at 24hrs, 7 day and 28 days are significantly lowered in harmonic scalpel haemorrhoidectomy group as compared to Ferguson's haemorrhoidectomy group with the p value < 0.001 .

In our study, we compared postoperative pain by visual analogue scale at 24hrs, 7 day and 28 day in both the groups. We found there is less pain in Harmonic group at 24hrs and 7 day as compared to Ferguson's group which was statistically significant with the p value < 0.001 and at 28 day there is no pain in Harmonic group patients as compare to Ferguson group (56 patients) this result is also statistically significant with the p value < 0.005 .

On long term follow up, we did not notice any significant complications in both groups. Recurrence was found only in 1 case of Ferguson's group.

Study done by HakanBulus et al in 2013 showed that the average postoperative stay in the HS group was 1.0 ± 0.1 days and in the FEH group was 1.2 ± 0.4 ($p = 0.001$). The time of return to normal activity was less for the HS groups than for the FEH groups (10.6 ± 2.1 days vs. 16.0 ± 6.3 days; $p = 0.001$).⁸⁶ In our study there is no statistically significant data found in length of hospital stay and time in return to normal activity. In our study, postoperative complaint of bleeding, discharge, constipation and retention of urine are 5%, 3%, 4% and 4% respectively, incidence of all these compared in both group and we found results were statistically insignificant.

In our study we tried to find out association of haemorrhoids with ant other co-existing disease among all haemorrhoids patients, but we did not find any relevant association. In our study only 7% of haemorrhoids patients having other disease and p value was 1.000, that was not significant. In this study,

32 patients were with third degree piles and 18 patients were with fourth degree piles and found statistically not significant.

6. Conclusion

Harmonic scalpel haemorrhoidectomy is a relatively new technique for the treatment of 3rd and 4th degree haemorrhoids. However, number of randomized clinical trial have been reported, despite their small size and limited follow up these trials all report the same essential findings. The Harmonic scalpel haemorrhoidectomy is easy and quit quick to perform. In addition it is less painful then the traditional Ferguson's haemorrhoidectomy. The Harmonic scalpel haemorrhoidectomy procedure have significant advantages over Ferguson's procedure in terms of early postoperative morbidity, less postoperative pain, short duration of hospital stay, early return to normal routine activity. Despite these differences patient satisfaction with respect to both the procedures is fairly equal.

In this study we have tried to compare the outcomes of Harmonic scalpel and Ferguson's haemorrhoidectomy. A randomized comparative study was conducted in 50 patients of both sexes, undergoing elective haemorrhoids surgery. The two groups were comparable with respect to baseline parameters including systolic blood pressure (SBP), diastolic blood pressure (DBP), mean arterial pressure (MAP), heart rate (HR) and SPO₂. We tried to study patient outcome in terms of intraoperative time, reduced consumption of analgesia, postoperative pain assessment by visual analogue scale, early and long term complications in both groups.

It is clearly apparent that both techniques are fairly effective and having no serious drawbacks in terms of long term patient outcome and satisfaction. Both procedures are easy to perform without requirement of any costlier instruments and operating room setup. Time duration of surgery was significantly less in Harmonic scalpel haemorrhoidectomy but 10-15 minutes more intraoperative time does not pose any significant morbidity to patient as both surgeries can be performed under spinal anaesthesia.

In conclusion we can say that the Harmonic scalpel haemorrhoidectomy safe, simple and effective modality in treatment of haemorrhoids. It is a minimally invasive faster technique associated with less intraoperative time, less postoperative pain which is assessed by pain scale (VAS), reduced consumption of analgesia. Furthermore, there are no significant long term complication. However, the procedure being relatively new, needs more clinical research for its long term outcome.

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