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# **Original Research Article**

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# Comparative study between open (milligan morgan) haemorrhoidectomy and stapled haemorrhoidectomy

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# **ABSTRACT**

**Background:** Haemorrhoids are one of the commonest afflictions of mankind from times immemorial. It is said that 40 percent of population have symptoms due to haemorrhoids at some time of their lives, a price possibly man has had to pay following the evolution of his erect posture. Conventional haemorrhoidectomy is a commonly performed operation for haemorrhoids, it has good results but is a painful procedure resulting in a hospital stay for variable days and time off work for two to six weeks. Stapled haemorrhoidectomy has come up as a new and promising procedure causing minimal post-operative pain, early discharge and quick return to work.

**Methods:** In all 50 patients were included in the study - 25 underwent open and 25 underwent stapled haemorrhoidectomy. Computerised analysis of the data was done with the help of software computer programme MS Excel and Statistical 1984-1999. Significance levels were determined by using averages, standard deviation, unpaired student t test, Mann Whitney U test (for non-parametric skewed distribution) and Fischer exact test. If p value < 0.01 or < 0.001, the difference is highly significant. If p value < 0.05, the difference is significant

**Results:** the stapled procedure for haemorrhoids is superior to Milligan Morgan haemorrhoidectomy in terms of post-operative pain, operative time and return to normal activities. It is straightforward and easy to learn. Early functional and symptomatic outcomes have been satisfactory and appear to be similar or better than those achieved using conventional technique. However, long term follow up with respect to these factors is necessary.

**Conclusions:** Stappled haemorrhoidectomy is superior to open haemorrhoidectomy in terms of less intraoperative blood loss,less time for surgery,less pain in postoperative period, less stay in hospital,less post operative complications and early return to work.

Keywords: Comparative study, Open and stappled haemorrhoidectomy

#### INTRODUCTION

Haemorrhoids are one of the commonest afflictions of mankind from times immemorial. It is said that 40 percent of population have symptoms due to haemorrhoids at some time of their lives, a price possibly man has had to pay following the evolution of his erect posture. Terrel, in his words expressed it as "Man is a victim of a capricious creator, there is no doubt that man was intended to walk on all limbs, and having perhaps frustrated his creator's plan by walking on two has

created a few problems. Haemorrhoids is one of them. The assumption of an erect posture was a prodigious accomplishment and man pays for his arrogance by the pain and humility that go with haemorrhoids." Morgagni too attributed the upright posture of man as the causative factor of haemorrhoids.<sup>3</sup>

By common consent the terms 'haemorrhoids' and 'piles' are used quite interchangeably, but etymologically the words have entirely different meanings. The term "haemorrhoid" is derived from the Greek adjective

"haimorrhoides", meaning bleeding (haima = blood, rhoos = flowing), and emphasizes the most prominent symptom in the majority of cases. It was first used by Hippocrates in his treatise but it cannot be accurately applied to all the conditions diagnosed as haemorrhoids, for a number of them do not at any time give rise to bleeding. The word Pile is derived from "pila", a ball.<sup>4</sup> This term was first used by Ardene J and can be aptly used for all forms of haemorrhoids or piles, for literally every such condition does produce a swelling of some kind, even though it may not show externally.<sup>5</sup>

Vascular cushions within the anal canal do not differ anatomically in normal individuals from those in symptomatic patients. It is therefore probably illogical to talk about the incidence of vascular cushions since they are ubiquitous. Both sexes, all races and all ages have anal cushions. If the cushions are omnipresent then it is only the existence of symptoms that merits classification as a disease. Hundred percent of population has haemorrhoids but only fifty percent are symptomatic.<sup>6</sup>

The treatment of haemorrhoids dates back to antiquity for the two chief symptoms of bleeding and protrusion. The methods of treatment date back to the Babylonian era, Hippocrates described the treatment by corrosives, which must have been extremely painful in the "pre-anaesthetic era.7 This has been mentioned in "Sushruta Samhita" of the ancient Indian medicine. At present a wide variety of treatment is available for haemorrhoidal disease, ranging from conservative to radical surgical treatments including advice on diet and bowel habits, non-surgical methods of mucosal fixation and widening of the anus and surgical excision of the internal anal vascular cushions and the external vascular channels. The choice of method depends on the severity and type of the symptoms, the degree of prolapsed, the expertise of the operator and the availability of equipments and facilities.

About 40% of the patients suffering from haemorrhoids require surgery. Conventional haemorrhoidectomy is a commonly performed operation for haemorrhoids, it has good results but is a painful procedure resulting in a hospital stay for variable days and time off work for two to six weeks. The patient also faces the complications of hemorrhage immediate, reactionary or secondary, urinary retention, and late complications like stenosis or incontinence.

While in search of an additional and quicker surgical technique to treat this common condition of haemorrhoids, stapler has been introduced for haemorrhoidectomy. Stapled haemorrhoidectomy has come up as a new and promising procedure causing minimal post-operative pain, early discharge and quick return to work. This method has been adopted and apated by surgeons across the world. However, it is more expensive than conventional open surgery because of the cost of the instrumentation involved.

#### **METHODS**

The study was conducted in the Department of General Surgery, Bhatia Hospital, Mumbai from February 01, 2009 to May 31, 2011, on patients admitted to Bhatia hospital.

In all 50 patients were included in the study - 25 underwent open and 25 underwent stapled haemorrhoidectomy. The patients underwent one of the two surgeries after taking an informed consent. The advantages and disadvantages of both the procedures were explained to the patients.

#### Inclusion criteria

All patients of

- Large grade II haemorrhoids
- Grade III haemorrhoids
- Grade IV haemorrhoids were included in the study.

# Exclusion criteria

- Patients with grade I haemorrhoids
- Any associated anal pathology like fistula, fissure.

#### Details recorded

Each case was studied on a particular plan as in proforma

- Particulars of the patients, which included name, age, sex and occupation/routine activities
- A detailed history regarding the nature and duration of presenting complaints, details of the previous treatment/s if any, family history and personal history
- General physical examination
- Systemic examination of CVS, Respiratory and abdominal regions
- Local examination: digital rectal examination and proctoscopic evaluation.

To assess the general condition of the patient Hb, TLC, DLC, urine routine, X-ray chest, blood urea, blood sugar and ECG was done. Following assessment the cases were allocated to one of the two treatment groups.

# Pre-operative work up

The patients with no other co-morbid conditions were admitted directly on the day before surgery. The patients were prepared with Dulcolax tablets on the night prior to surgery. The patient was kept nil per orally at least 6 hours before the scheduled time of surgery.

At the time of induction, injection augmentin 1.2 gm (amoxicillin and clavulinic acid combination) was

injected for prophylactic antibiotic coverage. During the surgery the following parameters were recorded.

- Operative time
- Approximate blood loss during surgery (from the number of gauze pieces soaked with blood).

# PPH set (PPH01) consists of

- 33 mm ethicon endosurgery circular stapler (HCS33)
- Circular anal dilator (CAD33)
- Purse-string suture anoscope (PSA33)
- Suture threader (ST100).

#### Operative procedure

All patients were operated in lithotomy position under spinal anaesthesia, in the operation theatre of Bhatia Hospital. Two patients required a short general; anaesthesia in view of incomplete effect of regional anaesthesia.

#### Open haemorrhoidectomy

The skin covered component of each of the main piles is seized with artery forceps and retracted outwards. This has the effect of causing the lower poles of the mucosalcovered component of the haemorrhoid to protrude to a varying extent depending on the size of haemorrhoidal tissues. The purple anal mucosal component of each pile is now grasped in another artery forceps and drawn downwards and outwards. This maneuver prolapses the pile well out of the anus and brings into view the pink rectal mucosa at its upper pole. The traction of the three haemorrhoids is maintained until pink rectal mucosa shows not only at the upper part of the piles but also on the mucosal folds running between the piles. This indicates that the piles have been drawn down to their maximum extent so that the ligatures can be applied at their upper poles rather than in the middle.

The operator then makes a V shaped incision in the anal and perianal skin. The limbs of the V cross the mucocutaneous junction but do not extend into the mucosa. The point of the V should lie 2.5-3 cm away from the anal verge. If the tip of the surgeon's left index finger is pressed firmly against the end of the scissor as the V shaped incision is being made, the lower edge of the internal sphincter is exposed so that it can be preserved while the venous plexus is dissected from it. Longitudinal strands of fascia and muscle may be seen entering the venous plexus from the region immediately internal to the inferior margin of the internal sphincter. These strands are termed the muscularis submucosae ani.

In the classic operation described by Milligan these are not divided and the only further dissection of the pile consists of making a slight nick in the mucosa above and below to narrow the mucosal pedicle before applying the ligature. However, it is preferred to free the haemorrhoidal venous plexus further by dissecting it off the internal sphincter for a distance of 1.5-2.0 cm. Care must be taken not to injure the internal sphincter throughout the dissection. The apex of the pedicle is then transfixed with a 0/0 or 1/0 chromic catgut suture on a round-bodied needle. The isolated haemorrhoid is then excised with scissors a few millimeters below the apical ligature, while the transfixation suture remains clamped and left long for further inspection at the end of the operation.

The procedure is repeated in exactly the same manner for each of these positions. It is essential that in making the skin incisions the surgeon ensures that there is an intact bridge of skin and mucosa between each excised haemorrhoid. The transfixation ligatures are then divided and the skin wounds are trimmed if they appear ragged, leaving three pear-shaped raw areas. Sometimes, in addition to the three primary haemorrhoids, there exist one or more accessory piles. These may, with care, be incorporated into the excision of one of the main piles. However, if there is any chance that a mucosal bridge is likely to be compromised, it is better either to leave the accessory pile and inject it with sclerosant agent at the end of the procedure, or preferably fill the mucosal bridge of its vascular elements by scissor dissection from either side leaving the anal mucosa intact.

# Stapled haemorrhoidectomy

The anal verge is held by three atraumatic forceps at the three points where the prolapse is smaller and the anoderm is slightly everted. Such a maneuver facilitates the introduction of the circular anal dilator (CAD 33) after lubrication with jelly. The introduction of the CAD 33 causes the reduction of the prolapse of the anoderm and parts of the anal mucous membrane. After removing the obturator, the prolapsed mucous membrane falls into the lumen of the CAD33. As it is transparent, the CAD33 allows visualization of the dentate line. The CAD 33 should be affixed to the perineal skin through the four windows of the CAD 33 with silk or linen stitches on a cutting needle. All remaining prolapsing tissues should be pushed back with atraumatic forceps through the windows of the CAD33.

The Purse string suture anoscope (PSA33) is now introduced through the CAD33. The suture is to be taken at least 4 cm above the dentate line, the distance to be increased in proportion to the degree of the prolapse. The purse string is initiated at 3'O clock position. By rotating the PSA33, it will be possible to complete a purse-string suture around the entire anal circumference. On completion of purse string both ends of the suture will be at 30'clock position.

The PSA in now introduced to visualize the 9 O'clock window and a second simple stitch with the same suture material is placed at 9 O' clock at the same level as the

purse string stitch. This is to ensure equal pull down of mucosa into the hollow stapler housing along its entire circumference.

# Details of purse-string suture

The PSA 33 will cover 270° of the circumference of the rectal wall and expose a 90° window to work on. The 90° window must first visualize the 3 O'clock position, which is the beginning point of the purse string suture. The purse string is taken with 1/0 or 2/0 Prolene, with half circle, 30mm needle. The purse string suture is started at the 3 O' clock position, moving in clockwise direction and including mucosa and sub-mucosa. There should be approximately 3 bites in each quadrant of the exposed mucosa.

The anoscope is rotated clockwise to expose subsequent quadrants. The haemorrhoidal circular stapler (HCS 33) is opened to its maximum position. Its head is lubricated, introduced and positioned proximal to the purse string. The purse string is then tightened with a single throw. With the help of the suture threader (ST 100) both ends of the purse string suture are pulled through the 3-0 clock hole of the HC33. The suture threads at 9 O' clock are pulled through the 9 0' clock hole. A simple throw on the two sets of threads or clamping the two sets of threads to an artery forceps allows moderate traction on the purse string. This simple manoeuver draws the prolapsed mucous membrane into the casing of the HCS33. This technique, and the devices in the PPH procedural set (PPH01) ensure correct placement of the muco-mucous suture over the anaorectal ring, at least 2 cm from the dentate line.

The instrument is then tightened adequately by clockwise rotation till the orange indicator reaches as close as possible to the distal end of the green firing zone. It is then fired. Keeping the HCS 33 in the closed position for 20 seconds before and after firing acts as a tamponade, which promote hemostasis. The stapler is opened completely by anticlockwise rotation of the dial till it comes out of the anus. Occasionally, this manoeuver can be hampered by the pinching of mucous membrane between the stapler head and the upper edge of the CAD33. In such cases, it is easier to extract the CAS33 and HCS33 simultaneously by cutting the stay sutures that affix the CAD33. After removal of the stapler, the anus should be packed with a gauze piece and light pressure should be applied at the anastomotic site. Finally the staple, line is examined using the PSA33, and additional stitches, if needed should be taken.

# **Precautions**

- The muscular wall should not be included in the purse string suture
- In female patients, before the stapler is fired, vaginal mucosa must be checked to ensure it is not tenting into the housing of the stapler

• Just before firing, the 4 cm mark should be in line with or inside the CAD. This will ensure placement of the suture line at least 4 cm above the dentate line.

# Post-operative care

- Injection augmentin 1.2gm i.v 8 hours after the first dose
- Injection diclofenac 75 mg i.m. SOS.

The patient was allowed fully orally after 6 hours of surgery. Then the patient was put on

- Tablet Augmentin 625 mg 1 bd x 3 days
- Tablet Voveran 50 mg SOS.

The patient was advised as follows

- Sitz bath (at least twice a day and after every motion)
- Liquid Cremaffin 3 tsf HS.

Postoperative period parameters

- Analgesics required (injectable/oral)
- Soakage of the pad with blood
- Any episode of moderate to severe bleeding per rectum
- Episode of urinary retention
- Visual analogue score at 24 hours
- Patient satisfaction.

Visual analogue score.75 the concept of Visual analogue score was explained to each patient in the pre-operative period with the maximum imaginable pain as 10 and least as 1. The patient was assessed for pain by VAS at 24 hours, 3 days, 7 days and 15 days post-op. The patients were discharged when there was no requirement for analgesia in the last 12 hours. Duration of hospital stay was recorded. The criteria of passage of first motion after surgery was not considered necessary for discharge. All the patients were discharged on the above mentioned advice and were encouraged to join work as soon as possible. They were called for follow up after 3 days, 7 days, 15 days.

On each follow up visit the patient was subjected to visual analogue pain score. On the second and subsequent visit, a gentle digital rectal examination and proctoscopic evaluation was done. Level of patient satisfaction was assessed against a score of 10. A note on the number of days to return back to work was made. After the initial visits the patients were advised to follow up every 3 monthly to look for

- Anal stenosis
- Recurrent haemorrhoids
- Anal skin tags or fibrosis
- Incontinence

#### • Level of satisfaction.

The patients who were unable to come for follow up (due to any reason) were inquired telephonically.

# Statistical tests

Computerised analysis of the data was done with the help of software computer programme MS Excel and Statistical 1984-1999. Significance levels were determined by using averages, standard deviation, unpaired student t test, Mann Whitney U test (for non-parametric skewed distribution) and Fischer exact test.

- If p value < 0.01 or < 0.001, the difference is highly significant
- If p value < 0.05, the difference is significant.

# **RESULTS**

A total of 50 patients were included in the study. Group A include those who underwent open haemorrhoidectomy (n1 = 25). Group B include those who underwent stapled haemorrhoidectomy (n2 = 25). Following observations were made:

- Patient's characteristics age and sex
- Operative time
- Intra operative blood loss
- Post-operative pain scores (at 12 hours, 24 hours, 3 days, 7 days and 15 days)
- Duration of hospital stay
- Number of days to return to work
- Complications.

Table 1: Comparison of age (years) among study group:

Age (years)	N	Mean	Std. deviation	Median	IQR	Min	Max	Unpaired T test	P value
Open haemorrhoidectomy	25	49.28	14.724	48.00	26.0 0	26	75	0.0764	0.939
Stapled haemorrhoidectomy	25	49.60	14.897	49.00	28.0 0	25	75	Difference is significant	not

P value is 0.939

Table 2: Distribution of study group as per sex.

True of analystica		Sex		Total
Type of operation		Male	Female	Total
On an haamamhaidaatamy	Count	20	5	25
Open haemorrhoidectomy	Percent	80%	20%	100%
Stanlad has manufacida atomy	Count	19	6	25
Stapled haemorrhoidectomy	Percent	76%	24%	100%
Total	Count	39	11	50
Total	Percent	78%	22%	100%

Table 3: Distribution of most common complaint.

Most common complaint	Frequency	Percent
Bleeding	39	78%
Prolapse	11	22%
Total	50	100%

Table 4: Distribution of associated condition among study groups.

Trme of enquetion		Associate	e symptoms				■ Total
Type of operation		DM ^	DM+HT ^	Hernia ^	HT ^	Nil	Total
On an haamamhaideatamy	Count	3	2	1	3	16	25
Open haemorrhoidectomy	Percent	12.0%	8.0%	4.0%	12.0%	64.0%	100.0%
Stapled	Count	3	3	2	2	15	25
haemorrhoidectomy	Percent	12.0%	12.0%	8.0%	8.0%	60.0%	100.0%
Total	Count	6	5	3	5	31	50
Total	Percent	12.0%	10.0%	6.0%	10.0%	62.0%	100.0%

Table 5: Distribution of grade of haemorrhoids among study group.

Type of enemation		Grade		Tatal
Type of operation		II	III	Total
Open haemorrhoidectomy	Count	5	20	25
	Percent	20.0%	80.0%	100.0%
Stapled haemorrhoidectomy	Count	6	19	25
	Percent	24.0%	76.0%	100.0%
Total	Count	11	39	50
	Percent	22.0%	78.0%	100.0%

Table 6: Comparison of blood loss (ml) during procedure among study group.

Blood loss (ml)	N	Mean	Std. deviation	Median	IQR	Min	Max	Mann- Whitney U	P value
Open haemorrhoidectomy	25	76.80	11.075	70.00	20.00	60	100	10.50	2.50E-09
Stapled haemorrhoidectomy	25	48.00	8.660	50.00	20.00	40	60	Difference is	significant

Normality Test (Shapiro-Wilk) failed (p< 0.05), thus Mann-Whitney U Test applied; This was calculated by estimating the number of gauze pieces soaked with blood and multiplying it by 10.

Table 7: Comparison of OT Time (min) for procedure among study group.

OT time (min)	N	Mean	Std. deviation	Median	IQR	Min	Max	Mann- Whitney U	P value
Open haemorrhoidectomy	25	49.80	6.371	50.00	10.00	40	60	84.50	7.64E-06
Stapled haemorrhoidectomy	25	36.60	8.981	35.00	15.00	25	55	Difference is	significant

Normality test (Shapiro-Wilk) failed (p< 0.05), thus Mann-Whitney U test applied.

Table 8: Comparison of total hospital day (Days) among study group.

Hospital stay (days)	N	Mean	Std. deviation	Median	IQR	Min	Max	Mann- Whitney U	P value
Open haemorrhoidectomy	25	2.40	0.816	2.00	1.00	1	4	89.50	3.70E-06
Stapled haemorrhoidectomy	25	1.28	0.542	1.00	0.50	1	3	Difference is s	significant

Normality test (Shapiro-Wilk) failed (p< 0.05), thus Mann-Whitney U test applied.

Table 9: Comparison of return to work days among study group.

Return to work (days)	N	Mean	Std. deviation	Median	IQR	Min	Max	Mann- Whitney U	P value
Open haemorrhoidectomy	25	8.20	1.291	8.00	2.00	7	11	5.00	1.50E-09
Stapled haemorrhoidectomy	25	3.16	1.214	3.00	2.00	2	7	Difference is	significant

Normality test (Shapiro-Wilk) failed (p<0.05), thus Mann-Whitney U test applied.

Table 10: Comparison of VAS score (day 1) among study group.

VAS score (day 1)	N	Mean	Std. deviation	Median	IQR	Min	Max	Mann- Whitney U	P value
Open haemorrhoidectomy	25	7.12	0.781	7.00	1.50	6	8	28.00	2.10E-08
Stapled haemorrhoidectomy	25	3.92	1.470	4.00	2.00	2	7	Difference is	significant

Normality test (Shapiro-Wilk) failed (p< 0.05), thus Mann-Whitney U test applied.

Table 11: Comparison of VAS score (day 3) among study group.

VAS score (day 3)	N	Mean	Std. deviation	Median	IQR	Min	Max	Mann- Whitney U	P value
Open haemorrhoidectomy	25	4.04	0.735	4.00	1.50	3	5	0.00	3.50E-10
Stapled haemorrhoidectomy	25	0.32	0.557	0.00	1.00	0	2	Difference is	significant

Normality test (shapiro-wilk) failed (p<0.05), thus Mann-Whitney U test applied.

Table 12: Comparison of VAS score (day 7) among study group.

VAS score (day 7)	N	Mean	Std. deviation	Median	IQR	Min	Max	Mann- Whitney U	P value
Open haemorrhoidectomy	25	1.52	0.770	1.00	1.00	0	3	19.50	6.84E-10
Stapled haemorrhoidectomy	25	0.04	0.200	0.00	0.00	0	1	Difference is	significant

Normality test (Shapiro-Wilk) failed (p< 0.05), thus Mann-Whitney U test applied.

Table 13: Comparison of VAS score (day 15) among study group.

VAS score (day 15)	N	Mean	Std. deviation	Median	IQR	Min	Max	Mann- Whitney U	P value
Open haemorrhoidectomy	25	0.36	0.490	0.00	1.00	0	1	200.00	1.04E-03
Stapled haemorrhoidectomy	25	0.00	0.000	0.00	0.00	0	0	Difference is	significant

Normality test (Shapiro-Wilk) failed (p< 0.05), thus Mann-Whitney U test applied.

Table 14: Distribution of complications among study groups.

Type of operation		Complication	— Total			
		Anal tag	Bleeding	Retention	Nil	Total
Open haemorrhoidectomy	Count	3	1	5	16	25
	Percent	12.0%	4.0%	20.0%	64.0%	100.0%
Stapled haemorrhoidectomy	Count	0	1	3	21	25
	Percent	0.0%	4.0%	12.0%	84.0%	100.0%
Total	Count	3	2	8	37	50
	Percent	6.0%	4.0%	16.0%	74.0%	100.0%

#### **DISCUSSION**

Haemorrhoids is one of the most common benign anorectal surgical problems worldwide.1 Goligher et al reported that about 40% of haemorrhoid patients have to undergo haemorrhoidectomy at some time or the other. Rubber band ligation, injection sclerotherapy, infra-red photocoagulation and cryotherapy have been used with some success but all have been shown to be inferior to surgery in the management of third and fourth degree  $hae morrhoids. ^{10}\\$ The criticism directed haemorrhoidectomy relate to the pain in the postoperative period, to the necessity for the patient to be admitted in hospital for the operation, and to be absent from work for atleast 2 to 3 weeks afterwards with a perineal wound which requires dressing.<sup>11</sup>

Introduction of stapler for haemorrhoids has eliminated most of the above challenges. <sup>12</sup> It has also made the surgery for haemorrhoids more patient friendly. <sup>13</sup> Present study is a comparative evaluation between open (Milligan Morgan) haemorrhoidectomy and stapled haemorrhoidectomy; designed to determine whether stapled technique offers any definite advantage over open method.

In the present study patients were divided into two groups A and B i.e. those undergoing Milligan Morgan haemorrhoidectomy and stapled haemorrhoidectomy. A total of 50 patients were part of the study excluding those who had grade I haemorrhoids or any associated anal pathology like anal fissure. Patients were equally divided in the two groups.

The two groups of patients were matched with respect to age. Mean age in group A was 49.28±14.72 years and in group B was 49.60±14.89 years (table 1). There was no statistical difference in the mean age between the two groups. In the study conducted by Hetzer et al, the mean age was 44.8 years in open group and 50.4 years in stapled group with no statistical difference. <sup>14</sup> The mean age was 47 years and 48 years in the open and stapled groups respectively as evaluated by Ganio et al. <sup>18</sup> Ho and colleagues found the mean age of 46.3 years in open group and 44 years in stapled haemorrhoidectomy patients. <sup>15</sup>

The condition of haemorrhoids was more common in males as compared to females (Table 2). Hetzer et al reports that the sex distribution of male:female was 14:6 in open group and 15:5 in stapled group in his study. This has also been pointed out in other studies in the literature. 15-17

Third degree haemorrhoids are the commonest haemorrhoids requiring surgical treatment as reported in various studies. <sup>14,17-20</sup> In the present study 39 of 50 patients (78%) had grade III haemorrhoids (Table 5). However the condition of grade IV haemorrhoids was more common in the study by Shalaby et al. <sup>16</sup>

The most common complaint of the patients was bleeding (78%) (Table 3). In the study by Ortiz 89% of the patients presented with bleeding. However Shalaby reported bleeding as a complaint in 65% of patients. Ho et al documented bleeding in 80% of patients. 15-17

All the patients were operated under spinal anaesthesia after a routine pre-operative preparation. In the study by Gaino et al 46% of patients were operated under general anaesthesia, 34% under spinal and 20% under pudendal block. <sup>18</sup> Mehigan et al operated all the patients under general anaesthesia. <sup>19</sup> Pavlidis et al reported both types of surgeries under epidural anaesthesia only. <sup>20</sup> Hetzer et al operated 55% of patients under general anaesthesia and 45% under spinal anaesthesia. <sup>14</sup>

The intra-operative blood loss was significantly low in the stapled group as compared to the open group (mean  $76.80\pm11.07$  in group A and  $48.00\pm8.66$  in group B) (Table 6).

There was a significant difference in the operative time in the two techniques. In group A mean operative time was 49.80±6.37min as against 36.60±8.98 min in group B (Table 7). This point of shorter operative time (statistically significant) has been well confirmed by a number of studies. <sup>14,16,17,19,20</sup> However Ho et al found that the conventional haemorrhoidectomy required less time as compared to the stapled technique. <sup>15</sup> This is probably because the study by Ho et al was conducted between 1999-2000, when the stapled haemorrhoidectomy was still in its earlier stages. In the present study the patients (PAC fit) were admitted either on the morning of surgery or the night before surgery. Mehigan et al also followed similar protocols for admission. <sup>19</sup>

The calculation of the hospital stay was made from the day of the surgery and not from the day of admission thus excluding the duration in hospital for getting preanaesthetic fitness or managing other co-morbid conditions. e.g. diabetes and hypertention. 22% of the patients were diabetic while 20% were hypertensive. One patient in the stapled group was discharged after 3 days of surgery due to bleeding after surgery that presented as bleeding per rectum after 12 hours post-operatively. The duration of hospital stay was significantly less in group B (mean 1.28±0.54 days) as compared to group A (mean 2.40±0.81 days) (Table 8). The hospital stay was shorter in stapled group in the studies conducted by Rowsell et al, Pavlidis et al, Ganio et al and Shalaby et al. 15,16,18,20 However the duration of stay was similar in the two groups as reported by Mehigan et al, Hetzer et al and Ho et al. 14,15,19

All the patients were explained the visual analogue scale in the pre-operative period itself. Visual analogue scoring initiated at 12 hours post-operatively following the weaned out effect of spinal anaesthesia. Scores at 24 hours, day 3, day 7, day 15 was significantly low in group B as against group A (Table 10, 11, 12, 13). The

requirement of analgesics during the hospital stay as well as after discharge was less in group B. The pain scores compared between the two groups in various studies conclusively prove that the post-operative pain is much less after stapled haemorrhoidectomy than after open haemorrhoidectomy. All studies have been unanimous on this point. 11-19

The most common complication seen in the study was urinary retention. In group A, 5 of 25 patients had retention of urine while in group B, 3 of 25 patients had retention of urine (Table 14). Shalaby et al reported urinary retention in 14 of 100 patients (14%) in open group as compared to 7 of 100 (7%) in stapled group. Gani et al reports that retention developed in 5 of 50 patients (10%) after open haemorrhoidectomy where as in 3 of 50 patients (6%) after stapled haemorrhoidectomy. Smith et al has noted that urinary retention is the most common problem after haemorrhoidectomy, its degree related to the amount of surgery and the incisions required. The anal sphincter has the same nerve root as the bladder sphincter.

Haemorrhage or significant bleeding per rectum in the post-operative period was seen in 1 patient each in both the groups in the current study (Table 14). In the study by Ganio et al secondary haemorrhage occurred in 3 patients each in both groups (of 100 patients each). <sup>18</sup> 2 out of 100 patients (2%) in open group and 1 out of 100 patients (1%) in stapled group had significant bleeding as reported by Shalaby et al. <sup>18</sup>

Secondary haemorrhage was reported in only 1 of 28 patients in the conventional haemorrhoid ectomy group and none in stapled group in the study bt Ortiz et al.  $^{17}$ 

With regards to return to work / routine activities, there was a significant difference between the two groups. The range in group A was between 7 to 11 days with mean of  $8.20\pm1.29$  days. However in group B it ranged between 2 to 7 days with mean of  $3.16\pm1.21$  days (Table 9).

Most of the studies reported that the return to work or routine activities is much earlier after stapled haemorrhoidectomy in comparison to open group. However Ortiz et al reported that there was no statistical difference in the meantime to return to work. He said that social and cultural factors need to be taken into account in the assessment of return to work.

Of the 50 patients 32 are still in the follow up with the maximum follow up period of 12 months (1 year). In the follow up period none of the patients had anal stenosis. In the study by Shalaby et al anal stenosis was seen in 5 of 100 patients (5%) after open haemorrhoidectomy and 2 of 100 patients (2%) after stapled haemorrhoidectomy. There was no report of anal stenosis in the studies by Mehigan et al and Ganio et al. 18,19

There was no case of recurrence of haemorrhoids in this study. Shalaby et al reported recurrent prolapse in 1 of 95 patients in the maximum follow up of one year. However Ganio et al reported recurrence in 10 of 50 patients after the stapled procedure in the mean follow up of 16 months. 18

He performed telephonic follow up. Probably that may be the reason for a falsely high incidence of recurrence. 1 of 27 patients who underwent stapled haemorrhoidectomy had a residual thrombosed haemorrhoid as reported by Ortiz et al.<sup>17</sup> One patient each in both the groups had recurrence in the study by Hetzer.<sup>22</sup>

#### **CONCLUSION**

- Haemorrhoids are more common in males than in females
- Patients of haemorrhoids usually avoid surgery due to the fear of severe pain after haemorrhoidectomy
- To study the aetiology and pathogenesis a much larger group matched with controls is needed
- Intra-operative blood loss was significantly reduced in group B
- The time taken for surgery was significantly less in group B
- The duration of hospital stay was lower in group B as compared to group A
- The patients in group B experienced significantly less pain than the patients in group A even at two weeks post-operatively
- The post-operative complications (e.g. urinary retention, bleeding) were observed to be less in group B
- Return to work or routine activities was earlier in group B as compared to group A
- In the maximum follow up of 12 months, there was no complication due to the use of staplers for haemorrhoidectomy.
- Stapled haemorrhoidectomy has excellent patient acceptance and satisfaction.
- The cost of the stapling instrument which is not reusable is the only disadvantage against the spread of this method for the treatment of haemorrhoids in general population.
- However the economic gain achieved by reducing the number of days of hospital stay and early return to work following stapled haemorrhoidectomy is enourmous.
- With the promising results of new stapled technique, the age of painless haemorrhoidectomy is here to come and stay.
- Studies with longer follow up are required to prove the benefits of stapled haemorrhoidectomy and the absence of any long term complications.

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