

**SHORT TERM OUTCOME OF DOPPLER GUIDED HEMORRHOIDAL ARTERY LIGATION AND RECTO-ANAL REPAIR IN COMPARISON WITH CONVENTIONAL OPEN HEMORRHOIDECTOMY AS A TREATMENT METHOD FOR PROLAPSED HEMORRHOIDS.****Sadq Ghaleb Kadem**

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**Abstract**

Conventional hemorrhoidectomy is the most common surgical procedure used to treat hemorrhoids, but it is associated with significant side effects and complications. Doppler-guided hemorrhoidal artery ligation and recto-anal repair is a new minimally invasive treatment option to avoid the complications of conventional hemorrhoidectomy.

This study aimed to evaluate the short term outcome of doppler-guided hemorrhoidal artery ligation and recto-anal repair in comparison with conventional open hemorrhoidectomy as a method for treating patients with prolapsed hemorrhoids.

This study was conducted at Al-Shiffa General Hospital in Basrah, Iraq, during the period from January 2015 to December 2016. One hundred patients with symptomatic hemorrhoids who are candidates for surgery were included in the study and were divided into two equal groups; the first group operated upon with conventional open hemorrhoidectomy and the second group operated upon with doppler guided hemorrhoidal artery ligation and recto anal repair technique which utilizes a special doppler ultrasound proctoscope to identify and ligate the hemorrhoidal arteries and to gather up and lift back into position. Both groups were similar in patients characteristics, all operations have been done under general or spinal anesthesia and in lithotomy position by the same surgeon. During intra and postoperative periods of follow-up, the outcome and the complications of both procedures were analyzed statistically and compared.

Doppler guided hemorrhoidal artery ligation and recto-anal repair technique significantly reduce postoperative pain and according to the Visual Analogue Scale; the majority of patients (64%) in doppler guided hemorrhoidal artery ligation and recto anal repair group have no pain at the night of the surgery while 82% of patients in conventional open hemorrhoidectomy group complained of moderate pain. It also significantly reduce the mean duration to return to normal daily activity to  $5.44 \pm 2.02$  days in comparison to  $15.40 \pm 4.18$  days for conventional open hemorrhoidectomy ( $p < 0.001$ ). The overall complications after conventional open hemorrhoidectomy were high; 14(28%) patients in comparison to 8(16%) patients after doppler guided hemorrhoidal artery ligation and recto-anal repair technique with significant statistical difference ( $p$  value  $< 0.001$ ).

In conclusion, the doppler guided hemorrhoidal artery ligation and recto-anal repair technique is a valid alternative treatment for hemorrhoids in stages II, III and IV and its main benefits are to evolve with a little postoperative pain and to enable fast return of the patient to daily activities with low rate of postoperative complications.

**Introduction**

Hemorrhoids are defined as mucosal cushions and are considered as a part of normal anatomy of human anal canal<sup>1</sup>. The normal anal canal contains three main cushions, classically located at left lateral, right anterior, and right

posterior position, they are composed of sinusoids, connective tissue and smooth muscle and known as the hemorrhoidal plexus<sup>2,3</sup>. Hemorrhoidal cushions play important role in continence mechanism of the anal canal. When the intra-

abdominal pressure increase, hemorrhoidal cushions increase in bulging helping to maintain anal closure<sup>4</sup>. It is believed that downwards sliding of hemorrhoidal cushions with excessive increase in venous pressure will result in the symptoms of hemorrhoid like pruritus, mucous discharge, bleeding and prolapse<sup>5,6</sup>.

According to Goligher's classification; internal hemorrhoids classified into four grades based on the degree of prolapse<sup>7</sup>: Grade I: No prolapse, just prominent blood vessels. Grade II: Prolapse on defecation, but spontaneous reduction. Grade III: Prolapse on defecation requiring manual reduction. Grade IV: Prolapse with inability to be manually reduced. Surgery is reserved for high grade hemorrhoids<sup>8</sup>.

The morbidity rate after conventional hemorrhoidectomy is between 10 and 15%<sup>9</sup>. It is associated with significant side effects and complications; in addition to excessive post-operative pain, symptoms of incontinence and anal stenosis have been described in considerable numbers<sup>10-13</sup>.

Doppler-guided hemorrhoidal artery ligation (DGHAL) has been first described by Morinaga in 1995 as a new minimally invasive treatment option to avoid the complications of conventional hemorrhoidectomy<sup>14</sup>. The principle of this technique was to use a specially designed doppler ultrasound probe to identify and ligate the hemorrhoidal arteries leading to reduction in the blood flow to the hemorrhoidal cushions and then fibrosis and shrinking of the hemorrhoids within 6-8 weeks<sup>15</sup>.

While DGHAL appears to control pain, bleeding, pruritus and mucous discharge with success, control of the prolapse seems to be more difficult specially in patients suffering from grade III or IV. Persistent or recurrent prolapse has been described with rates of 14% in grade III disease and with rate of 59% in grade IV disease, for these patients, recto-anal

repair (RAR), a technique developed and described by Scheyer, resolve this problem by supplementing DGHAL with a further step, whereby the hemorrhoidal tissue is gathered up and lifted back into position. Based on this principle of tissue reduction, RAR is an alternative to surgical removal that is made possible by placing a multiple longitudinal running suture while using a specially designed proctoscope<sup>16,17</sup>.

The aim of this study is to evaluate the short term outcome of DGHAL-RAR technique in comparison with conventional open hemorrhoidectomy as a method of treating patients with prolapsed hemorrhoids.

### Patients and methods

This study was conducted in Al-Shiffa General Hospital in Basrah, Iraq during the period from January 2015 to December 2016. Following the approval of the local ethical committee, one hundred patients with symptomatic hemorrhoids who were candidates for surgery were included in this study. Patients were divided into two groups; first group include 50 patients underwent conventional open hemorrhoidectomy (COH) and second (DGH) group included 50 patients operated upon with DGHAL-RAR technique.

The selection of the procedure depends on the patients consent and the availability of the disposable doppler probe in our hospital for DGHAL-RAR technique. Both groups were similar in patients characteristics, all operations had been done under general or spinal anesthesia and in lithotomy position by the same surgeon.

Exclusion criteria includes; grade I hemorrhoid, previous anal surgery, thrombosed piles, hemorrhoid associated with fistula or fissure in ano, patients with history of inflammatory bowel disease and patients with postoperative follow-up less than eight weeks (expected period

for complete wound healing after conventional open hemorrhoidectomy and shrinkage and reduction of prolapsed hemorrhoid after DGHAL-RAR procedure).

Technique of conventional open hemorrhoidectomy: After anal dilatation, the hemorrhoid grasped with two artery forceps, a V-shape incision done on the skin component and extended proximal until the vascular pedicle of hemorrhoid which then transfixed with 2/0 vicryl suture before excision. All three main hemorrhoids (on 3 , 7 , 11 o'clock) had been dealt with same procedure described above and after complete hemostasis, external wound dressing done without packing inside the anal canal.

Technique of DGHAL-RAR: A specifically designed proctoscope with a side viewing doppler probe (AMI, Austria, Doppler wave frequency 8.2 MHz ) image1, was inserted into the anal canal after anal dilatation and lubrication

with ultrasound gel. Then the proctoscope was turned around slowly and the hemorrhoidal arteries were found with a doppler pulse sound. Next, the arteries were ligated with a 2/0 polyglactin braided suture attached to a 5/8 curved needle (AMI Austria), using a knot pusher. The figure-of-eight suture was made into a side hole of the probe. The site of ligation is 2-3 cm proximal to the dentate line. Then the sites of ligation are checked by doppler probe and if there were no pulse sound distal to the ligation, the ligation is considered successful. Typical vessels were at 1, 3, 5, 7, 9, and 11 o'clock. For management of prolapsed hemorrhoids, a further step is added; recto-anal repair (RAR) in which the hemorrhoidal tissue is gathered up and lifted back into position by placing 4-6 longitudinal running sutures with 5-7mm apart started proximal at the pedicle of hemorrhoid and ending about 5mm proximal to the dentate line.



**Image 1:** DGHAL-RAR unit from AMI Austria with the ultrasound doppler proctoscope and other accessories.

Following recovery from anesthesia, patients were transferred to the surgical ward for observation, all patients were given analgesia in form of Diclofenac injection (75mg IM) shortly after reaching the surgical ward, after that all patients were re-evaluated at the night tour and only patients with pain were given analgesia in form of Tramadol injection (50mg IM). The dressing were

removed at the night or at the next morning after surgery.

After discharge from hospital, the patients were given appointment for re-examination after 1 week, 4 weeks and then 8 weeks. During operative and postoperative periods of follow-up, the following data had been recorded in both groups; operation time in minutes (recorded from the beginning of anal

dilatation to the end of anal dressing), duration of hospital stay in hours, duration required to return to normal daily activity in days, persistence of preoperative symptoms of hemorrhoid and any other intraoperative and postoperative complications.

His study utilizes visual analogue scale (VAS) for postoperative pain assessment (0 to 10 scale); no pain = 0, mild pain = 1-3, moderate pain = 4-6 and severe pain = 7-10. The pain assessment have been done by the resident doctor during the night tour.

The Statistical Package of (IBM.SPSS. Statistics Version 20) was used for data analysis. The results were directly

compared between the two groups using the two-tailed *t*-test for quantitative variables and related samples Mc Nemar test for qualitative variables. Statistical significance was consider at  $P < 0.05$ .

### Results

The preoperative patients characteristics are shown in Table I; The mean age in COH group is  $42.140 \pm 15.022$  and in DGH group was  $43.380 \pm 15.413$  with no significant statistical difference (P value = 0.587). In COH group, there was 45 (90%) males and 5 (10%) females and in DGH group they were 4 ( 8% ) females and 46 ( 92% ) males with no significant statistical difference (P value=1).

**Table I: Characteristics of patients participating in this study.**

Patient's characters	COH group (No. = 50)	DGH group ( No.= 50 )	P value
Mean age (y) $\pm$ SD	42.140 $\pm$ 15.022	43.380 $\pm$ 15.413	0.587 = NS
<b>Gender</b>			
Male	45 ( 90% )	46 ( 92% )	1.000 = NS
Female	5 ( 10% )	4 ( 8% )	1.000 = NS
Total	50 ( 100% )	50 ( 100% )	
<b>Diagnosis</b>			
<b>Symptoms and Signs:</b>			
Prolapse with bleeding	32 ( 64% )	34 ( 68% )	0.500 = NS
Prolapse alone	18 ( 36% )	16 ( 32% )	0.500 = NS
Total	50 ( 100% )	50 ( 100% )	
<b>Grade of hemorrhoid</b>			
Grade II	24 ( 48% )	25 ( 50% )	1.000 = NS
Grade III	14 ( 28% )	15 ( 30% )	1.000 = NS
Grade IV	12 ( 24% )	10 ( 20% )	0.500 = NS
Total	50 ( 100% )	50 ( 100% )	
<b>Type of Anesthesia</b>			
General Anesthesia (GA)	38 ( 76% )	35 ( 70% )	0.250 = NS
Spinal Anesthesia (SA)	12 ( 24% )	15 ( 30% )	0.250 = NS
Total	50 ( 100% )	50 ( 100% )	

The most common symptoms in both groups were; bleeding with prolapsed hemorrhoids followed by prolapsed hemorrhoids alone. In COH group, 32 (64%) and in DGH group, 34 (68%) patients had bleeding with prolapsed

hemorrhoid, while 18 (36%) patients in COH group and 16 (32%) patients in DGH group had prolapsed hemorrhoids alone with no significant statistical difference. The most common grade of hemorrhoid in both groups was grade II

followed by grade III and then grade IV. In COH group, 24 (48%) patients had grade II, 14 (28%) patients had grade III and 12 (24%) patients had grade IV while in DGH group, 25 (50%) patients had grade II, 15 (30%) patients had grade III and 10 (20%) patients had grade IV, with no significant statistical difference. The type of anesthesia did not show any significant difference.

The mean operative time was  $32.26 \pm 7.79$

min. in COH group and  $45.72 \pm 8.53$  min. in DGH group, which was statistically significant ( $P < 0.001$ ). The mean duration of hospital stay was  $25.80 \pm 9.69$  hrs. in COH group and  $24.92 \pm 5.74$  hrs. in DGH group which was statistically not significant. The mean duration to return to normal daily activity was significantly shorter ( $5.44 \pm 2.02$ ) days in DGH group and  $15.40 \pm 4.18$  days in COH group ( $p < 0.001$ ) (table II).

**Table II: Intraoperative and postoperative parameters.**

Outcome factors	COH (No.=50)	DGH (No.=50)	P value
Mean duration of surgery (min) $\pm$ SD	$32.26 \pm 7.79$	$45.72 \pm 8.53$	$< 0.001$
Mean duration of hospital stay (hrs) $\pm$ SD	$25.80 \pm 9.69$	$24.92 \pm 5.74$	$= 1.000$
Mean duration to return to normal activity (days) $\pm$ SD	$15.40 \pm 4.18$	$5.44 \pm 2.02$	$< 0.001$

According to the VAS, the majority of patients (64%) in DGH group were complained of no pain at the night of the

surgery while (82%) of patients in COH group complained of moderate pain (Table III).

**Table III : Postoperative pain assessment.**

Score Pain	COH, No. (%)	DGH, No. (%)	P value
No Pain	-	32 (64%)	$< 0.001$
Mild Pain	9 (18%)	16 (32%)	
Moderate Pain	41 (82%)	2 (4%)	
Severe Pain	-	-	
Total	50 (100%)	50 (100%)	

The result of early complications are shown in Table IV. The overall complications in COH group were high;

14(28%) patients in comparison to 8 (16%) patients in DGH group with significant difference ( $p$  value  $< 0.001$ ).

**Table IV: Complications.**

Complications	COH , No. (%)	DGH , No.(%)	P value
Postoperative bleeding	1 ( 2 )	1 ( 2 )	$< 0.001$
Perianal hematoma	2 ( 4 )	4 ( 8 )	
Posterior anal fissure	2 ( 4 )	3 ( 6 )	
Perianal abscess	6 ( 12 )	0 ( 0 )	
Perianal fistula	3 ( 6 )	0 ( 0 )	
Total	14 (28)	8 (16)	

There was only one patient with rebleeding in the DGH group, who was returned to the operation room, but no specific bleeding origin was found and bleeding was ceased conservatively. In the COH group, there was also a case of rebleeding that was controlled with ligature in the operating room. Four (8%) patients in DGH group developed perianal hematoma; three of them treated conservatively while one patient needed evacuation of hematoma under local anesthesia in comparison with 2 (4%) patients in COH group who developed perianal hematoma and were treated conservatively. Two (4%) patients in COH group developed acute posterior anal fissure and were treated conservatively in comparison to 3(6%) patients in DGH group who were also treated conservatively. Six (12%) and 3(6%) patients in COH group developed perianal abscess and low type perianal fistula respectively and all of them needed surgery under general anesthesia while none of these complications were reported in DGH group. There were no mortality reported in both groups.

At the end of the 8<sup>th</sup> week of the follow-up period, another evaluation of the efficacy of each technique in controlling of the preoperative symptoms; bleeding and prolapsed hemorrhoid, both techniques are effectively control these symptoms and no patient complains of bleeding or prolapsed hemorrhoid at the end of the follow-up period.

### Discussion

The best surgical choice to treat symptomatic hemorrhoid must consider the following: it should provide full remission of symptoms, be of simple technical execution and financially accessible, be well tolerated by the patients and progress with low rates of postoperative complications and recurrence<sup>18,19</sup>.

The great number of surgical procedures that are currently available to treat hemorrhoid show that until now none of the proposed techniques can gather all of these items. Nowadays, conventional hemorrhoidectomy is still the most used surgical choice around the world for the treatment of hemorrhoid and despite being effective to control symptoms and evolving with low recurrence rates, its main limitations are the severe postoperative pain and the necessary care during convalescence, and because of that the patient is away from daily activities for a considerable length of time<sup>18,19</sup>.

This study evaluate the short term outcome of the new minimally invasive procedure DGHAL-RAR in comparison with the conventional open hemorrhoidectomy in treatment of grade II, III and IV hemorrhoid.

The results of this study reported slight longer duration of operative time for DGHAL-RAR procedure  $45.72 \pm 8.53$  min. in comparison with  $32.26 \pm 7.79$  min. for COH. Published studies by Infantino et al and Ratto et al reported DGHAL-RAR operative time similar to the operative time for COH<sup>20,21</sup>. The difference of the results of this study from the above results may be due to early experience of the author with this new procedure in comparison with conventional hemorrhoidectomy.

Regarding the postoperative pain and duration of recovery and return to normal daily activity and duration of hospital stay; this study reported a significant less postoperative pain for DGHAL-RAR procedure, the majority of patients operated upon with DGHAL-RAR procedure (64%) complained no pain at the night of surgery while most patients operated upon with COH (82%) complained of moderate pain. On the other hand, patients operated with DGHAL-RAR procedure reported significant less duration to recovery and

return to normal daily activity ( $5.44 \pm 2.02$ ) days in comparison to ( $15.40 \pm 4.18$ ) days for COH procedure. There was no difference in the duration of hospital stay between the two procedures, these result are similar to the results published by Attila Bursics et al and Shabahang H et al<sup>22,23</sup>.

Regarding the postoperative complications; patients operated upon with DGHAL-RAR procedure reported significant less rate of over all postoperative complications (16%) in comparison to (28%) for COH, these

results are similar to the results of other published studies<sup>22,23</sup>.

At the end of the follow-up period, both techniques reported complete and effective control of preoperative bleeding and prolapse in all grades of hemorrhoid, this result was supported by the result of Faucheron et al<sup>24</sup>.

**Conclusion:** The DGHAL-RAR technique is an alternative treatment for hemorrhoids in stages II, III and IV and its main benefits are to evolve with little postoperative pain and to enable the fast return of the patient to his daily activities.

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