SCREENING AND GRADING OF INTERNAL HEMORRHOIDS IN PATIENTS UNDERGOING FLEXIBLE COLONOSCOPY COMPARED TO STANDARD GOLIGHER'S GRADING

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ABSTRACT

Background: Hemorrhoid is a common anorectal lesion. Goligher's system classified the internal hemorrhoids into (4) grades, however, it did not provide any information about the severity of the disease. There is limited data about the role of the colonoscopy in the diagnosis and evaluate the severity of the internal hemorrhoids. **Objective:** The study to compare the difference between both colonoscopy and standard Goligher's grading in their relation to the symptoms and complications in the same patient and to prove which grading system is better for the diagnosis of internal hemorrhoids. **Patients and Methods:** This cross-sectional study was done in the elective gastrointestinal endoscopy unit, Internal Medicine Department, Faculty of Medicine, Zagazig University from March 2021 to Augustus 2021, and including 300 consecutive Egyptian patients who underwent a flexible colonoscopy were enrolled in this study for different reasons. **Results** A significant increase in the proportion of patients who had grade IV colonoscopy classification with an increase in the size and presents of RCS, also there is a significant increase in the proportion of patients who had RCS with increasing the size of internal hemorrhoids, **(P<0.05).** The chronic anemia, lower GI bleeding, are the most independent risk factors for the development of internal hemorrhoids in patients undergoing colonoscopy grading, **(P < 0.001)**. **Conclusions:** The use of retroflexed colonoscopy is accurate and effective in diagnosing and evaluating internal hemorrhoids. The colonoscopy grading is more accurate in describing the relationship between the degree of hemorrhoids and complaints than Goligher's grading.

Keywords: Goligher'sgrading, colonoscopy grading, internal hemorrhoids.

INTRODUCTION

Internal hemorrhoid is a common anorectal lesion in which are dilated veins present in the anal canal and become clinically detectable when the supporting connective tissue is damaged and lower gastrointestinal bleeding is the main clinical symptom. However, the symptoms of differ according to the type and location of internal hemorrhoids. [1] The diagnosis of internal hemorrhoids is made clinically through a careful digital examination and Anoscopy . [2] Internal hemorrhoids are classified clinically by Goligher's system into four grades that include: **G-I:** hemorrhoids with only bleeding, **G-II:** bleeding with a spontaneously reducible protrusion, **G-III:** bleeding with a protrusion that needs manual reduction, and **G-IV:** prolapsed hemorrhoids that cannot be reduced. [3]However, Goligher's system did not provide an endoscopic characterization of internal hemorrhoids, with a great difference between the intensity of symptoms and physical signs.[4] Like the grading used in esophageal varices, internal hemorrhoids can also be classified by a colonoscopy grading system using retroflexed colonoscopy. In the colonoscopy grading system the degree of distance (site) and size, and the presence of (RCS) are the categories in the evaluation of internal hemorrhoids. The range was classified in internal hemorrhoids according to their circumferential distribution into grade (zero) with no hemorrhoids, grade (I) with one-quarter of the circumference, grade (II) with half of the circumference, grade (III) with three-quarters of the circumference, and grade (IV) that involved all the circumference. The size was delineated by the size of the largest hemorrhoids which graded into grade zero with no hemorrhoids, grade one with less than 12 mm in diameter, and grade two with size 12 mm or more, (the diameter of the colonoscope was used as a reference, which is 12 mm)[4]. The prevalence of hemorrhoidal disease is less in underdeveloped countries and is not selective for sex or age. [2]

There is limited data about the incidence, gender, and age distribution of internal hemorrhoids in the Egyptian population especially those undergoing elective colonoscopy for different indications. In addition, there are scarce studies on which better grading system for the internal hemorrhoids.

The aim of the current study was to compare the difference between both colonoscopy and standard Goligher's grading in their relation to the symptoms and complications in the same patient and to prove which grading system is better for the diagnosis of internal hemorrhoids

PATIENTS AND METHODS

1-**Technical design:**

This Cross-sectional study was done in the elective gastrointestinal endoscopy unit, Internal Medicine Department, Faculty of Medicine, Zagazig University from Marh 2021 to Augustus 2021, and including 300

consecutive Egyptian patients enrolled in this study, who underwent a flexible colonoscopy for different reasons. **Inclusion criteria:** Age from 18 to 75 years old. All patients underwent a flexible colonoscopy for different reasons as lower GI bleeding, screening and surveillance of colorectal polyps, cancers and inflammatory bowel diseases, acute and chronic diarrhea, abnormal radiological examinations, isolated unexplained abdominal pain, chronic constipation, and preoperative localization of colonic lesions.

Exclusion criteria: Grade IV internal hemorrhoids in Goligher's classification. Contraindications for colonoscopy as (toxic megacolon, Acute diverticulitis, fulminant colitis, free colonic perforation, inadequate colonic cleansing, severe coagulopathy, pregnancy, recent cerebral hemorrhage, recent myocardial infarction, pulmonary embolism, immediately post-colonic surgery, and patients refuses consent).

2- Operational design:

Pre-colonoscopy assessment: All patients were subjected to the following: Full history taking, proper clinical examination, and routine laboratory investigations like (CBC, RFT, LFT, and viral screen). All patients were asked not to take any solid foods and drink only water and clear fluids the day before the procedure. The patients were given a laxative preparation MOVIPREP (polyethylene glycol 3350, sodium sulfate, sodium chloride, potassium chloride, sodium ascorbate, and ascorbic acid), this preparation was added to 1liter water and taken as

Oral Solution in two doses at the day before the procedure as advised by *Effects PS* [5] which were effective in most of our patients.

Colonoscopy procedure:

A colonoscopy examination was performed under sedation of patients during the procedure, the patients were given fentanyl (25 -100 μg) IV (and-or) midazolam (5-10 mg) IV.

Patients were in the left lateral decubitus position during the procedure. The vital signs (heart rate, oxygen saturation) were closely observed by the monitor.

The first step is usually a digital rectal examination, to detect any anal or rectal lesion and to determine if preparation has been inadequate and all the colon parts are examined by the colonoscopy.

The procedure was done by (OLYMPUS EVIS EXERA III CV 190) and PENTAX colonoscopies.

Withdrawal criteria from the study:

Patients were not prepared well, Patients were hemodynamically unstable at the examination, or during the procedure and Patients did not cooperate with the procedure.

Post-colonoscopy follow-up:

All patients were observed two hours after the procedure and were discharged after full recovery.

3-**Administrative design:**

Ethical considerations: An approval of the study was obtained from Zagazig University Academic and Ethical Committee **(ZU-IRB#6710/2-3-2021).** Every patient signed an informed written consent for acceptance of the procedure and sharing in this study**. The work described has been carried out in accordance with the code of ethics of the world medical association (Declaration of Helsinki) for experiments involving humans.

Statistics:

Statistics were done by SPSS statistical software, version 25 (IBM, Chicago, Illinois, USA). The Shapiro-Wilk test was used to determine whether the data were distributed normally or not. Continuous data were described as median (IQR) with the minimum, and maximum for non-normally distributed variables **(P<0.05).** Categorical data were described with absolute and relative frequencies (N %). Categorical data were analyzed by the chi-square test or Fisher's exact test for small expected cell frequencies. Additionally, the associations between the complaints, comorbidity, demographics characters with Goligher's, and Colonoscopy grading of internal hemorrhoids were modeled and described with odd ratios and 95% confidence intervals using an ordinal logistic regression model. The statistical significance level was set at **P<0.05.**

RESULTS

According to the site of internal hemorrhoids, 185 (61.7%) of patients had no internal hemorrhoids. Additionally, patients having hemorrhoids were classified colonoscopy as grade I to IV, and the prevalence of grade I -9 (3%), II- 31 (10.3%), III -44 (14.7%), and IV- 31(10.3%) **Table (1).**

According to the size of internal hemorrhoids, (19%) of patients presented internal hemorrhoids with less than 12 mm, and (19.3%) of patients had internal hemorrhoids with a size more than 12 mm, additionally, (25.7%) patients presented with RCS. **Table (1)**

Table (1): Classification of internal hemorrhoids regarding the site, size, and RCS in patients undergoing flexible

colonoscopy.

Variables	Frequency	Percentage (%)
According to site		
No	185	61.7
Grade I	9	3.0
Grade II	31	10.3
Grade III	44	14.7
Grade IV	31	10.3
According to size		
No	185	61.7
Less than 12mm	57	19.0
More than 12mm	58	19.3
RCS		
No	223	74.3
Yes	77	25.7

According to Goligher's examination, 233 patients (77.7%) of 300 participants had no internal hemorrhoids. 38 patients (12.7) were grade I hemorrhoids, 27 patients (9%) grade II, and 2 patients (0.7%) grade III. We observed a statistically significant increase in the proportion of patients that had grade IV with an increase in the size of internal hemorrhoids ((93%) of patients who had grade IV internal hemorrhoids had hemorrhoidal size more than 20 mm) **Table (2).**

Table (2): Distribution of patients according to the size grading of internal hemorrhoids

Variables	No	Grade-I	Grade-II	Grade-III	Grade-IV	χ^2	P- value
No	185(100.0%)	00(0.0%)	0(0.0%)	0(0.0%)	0(0.0%)	265.903	**<0.001***
Less than 12mm	0(0.0%)	8(88.9%)	27(87.1%)	20(45.5%	2(6.5%)		
More than 12 mm	0(0.0%)	1(11.1%)	4(12.9%)	24(54.5%)	**29(93.5%)**		

There is an increase in the number of patients who had RCS with increasing the grade of internal hemorrhoids (RCS was seen in 31 patients (100%) who had grade IV internal hemorrhoids) **Table (3)** and with increasing hemorrhoidal size (55 patients (94.8%) with internal hemorrhoids size more than 12 mm had RCS). **Table (4)**

Table (3): Distribution of patients according to RCS with the grading of internal hemorrhoids

According to site	RCS		χ^2	P- value
	No	Yes		
No (n=185)	185(100.0%)	0(0.0%)	210.333	**<0.001***
Grade I (n=9)	9(100%)	0(0.0%)		
Grade II (n=31)	17(54.8%)	14(45.2%)		
Grade III (n=44)	12(27.3%)	32(72.7%)		
Grade IV (n=31)	0(0.0%)	31 (100.0%)		

RCS: Red color sign.

Table (4): Distribution of patients with RCS and the different sizes of internal hemorrhoids.

According to size	RCS		χ^2	P- value
	No	Yes		
No (n=185)	185(100.0%)	0(0.0%)		
Less than 12 mm (n=57)	35(61.4%)	22(38.6%)	211.820	<0.001*
More than 12 mm(n=58)	3(5.2%)	**55(94.8%)**		

In the present study, chronic anemia, lower GI bleeding, are the most independent risk factors for the development of internal hemorrhoids in patients undergoing colonoscopy grading, **(P < 0.001), (AOR = 0.24, 95%CI; 0.08-0.75) and (AOR = 0.18,95%CI;0.08-0.41), (AOR=6.02,95%CI2.39-60.47)** respectively. **Tables (5, 6)**

Table (5): Patients' complaints according to the colonoscopic grading of internal hemorrhoids.

Complaint	Grading internal hemorrhoids undergoing Colonoscopy					χ^2	P-value
	No (n=185)	Grade I (n=9)	Grade II (n=31)	Grade III (n=44)	Grade IV (n=31)		
Abdominal pain(n=44)	34(77.3%)	1(2.3%)	6(13.6%)	3(6.8%)	0(0.0%)		
Lower GI bleeding(n=125)	59(47.2%)	2(1.6%)	12(9.6%)	29(23.2%)	23(18.4%)		
Chronic diarrhea(n=53)	45(84.9%)	1(1.9%)	0(0.0%)	6(11.3%)	1(1.9%)		
Chronic constipation(n=40)	25(62.5%)	1(2.5%)	9(22.5%)	4(10.0%)	1(2.5%)	81.707	<0.001*
Follow up(n=16)	11(68.8%)	3(18.8%)	1(6.3%)	0(0.0%)	1(6.3%)		
Weight loss(n=1)	1(100%)	0(0.0%)	0(0.0%)	0(0.0%)	0(0.0%)		
Anal pain(n=1)	0(0.0%)	0(0.0%)	1(100.0%)	0(0.0%)	0(0.0%)		
Chronic anemia (n=20)	10(50.0%)	1(5.0%)	2(10.0%)	2(10.0%)	5(25.0%)		

Table (6): Patients' complaints according to RCS

Complaint	RCS		χ^2	P- value
	No	Yes		
Abdominal pain(n=44)	40(90.9%)	4(9.1%)		
Chronic anemia (n=20)	13(65.0%)	7(35.0%)		
Lower GI bleeding(n=125)	68(54.4%)	57(45.6%)		
Chronic diarrhea(n=53)	49(92.5%)	4(7.5%)	51.401	<0.001*
Chronic constipation(n=40)	36(90.0%)	4(10.0%)		
Follow up(n=16)	15(93.8%)	1(6.3%)		
Weight loss(n=1)	1(100.0%)	0(0.0%)		
Anal pain(n=1)	1(100.0%)	0(0.0%)		

RCS: Red color sign. **n**: numbre

There is no significant association between, anemia, and lower GIT bleeding with standard Goligher's classification. **Tables (7, 8)**

Table (7): Ordinal logistic regression output for the factors (complaints and and demographics) associated with internal hemorrhoids undergoing colonoscopy grading.

Variable	Grading internal hemorrhoids undergoing Colonoscopy					B	Un-adjusted OR (95%CI)	P-value	Adjusted OR (95%CI)	P-value
	No (n=185)	GI (n=9)	GII (n=31)	GIII (n=44)	GIV (n=31)					
Age (Median (IQR)	41(31.5-60)	45(37-61)	56(41-63)	48.5(35.25-60)	55(35-61)	-0.022	0.98(0.96-0.99)	**0.005**	0.99(0.98-1.02)	0.639
Sex, N (%) Males Females	84(45.4%) 101(54.6%)	6(66.7%) 3(33.3%)	15(48.4%) 16(51.6%)	31(70.5%) 13(29.5%)	21(67.7%) 10(32.3%)	0.766	R 2.15(1.35-3.42)	**0.001**	R 1.66(0.96-2.87)	0.071
Complaint, N (%)										
Abdominal pain	34(18.4%)	1(11.1%)	6(19.4%)	3(6.8%)	0(0.0%)		R		R	
Lower GI bleeding	59(31.9%)	2(22.2%)	12(38.7%)	29(65.9%)	23(74.2%)	-1.541	0.21(0.1-0.46)	**0.001<**	0.18(0.08-0.41)	**0.001<**
Chronic diarrhea	45(24.3%)	1(11.1%)	0(0.0%)	6(13.6%)	1(3.2%)	0.387	1.47(0.53-4.09)	0.458	1.34(0.47-3.86)	0.587
Chronic anemia	10(5.4%)	1(11.1%)	2(6.5%)	2(4.5%)	5(16.1%)	-1.459	0.23 (0.08-0.7)	**0.009**	0.24(0.08-0.75)	**0.014**
Chronic constipation	25(13.5%)	1(11.1%)	9(29.0%)	4(9.1%)	1(3.2%)	-0.645	0.53(0.21-1.32)	0.170	0.61(0.23-1.6)	0.312
Follow up	11(5.9%)	3(33.3%)	1(3.2%)	0(0.0%)	1(3.2%)	-0.320	0.73(0.21-2.49)	0.611	0.28(0.06-1.3)	0.103
Weight loss	1(100.0%)	0(0.0%)	0(0.0%)	0(0.0%)	0(0.0%)	19.878	-	1.000	-	1.000
Anal pain	0(0.0%)	0(0.0%)	1(100.0%)	0(0.0%)	0(0.0%)	-1.723	0.18(0.01-3.19)	0.242	0.72(0.03-17.51)	0.840

R: Reference category. **OR:** odds ratio. **CI:** Confidence interval. **P values:** Ordinal logistic regression analysis

Table (8): Ordinal logistic regression output for the factors (complaints and demographics) associated with internal hemorrhoids undergoing Goligher's grading

Variable	Grading internal hemorrhoids undergoing Goligher's				B	Un-adjusted OR (95%CI)	P-value	Adjusted OR (95%CI)	P-value
	No (n=233)	GI (n=38)	GII (n=27)	GIII (n=2)					
Age (Median IQR)	44(32-60)	56(35.5-63)	55(44-60)	38.5(22)	-0.026	0.96(0.95, 0.99)	**0.007**	0.99(0.97-1.02)	0.605
Sex, N (%) Male Female	109(46.8%) 124(53.2%)	26(68.4%) 12(31.6%)	20(74.1%) 7(25.9%)	2(100%) 0(0.0%)	1.067	R 2.91(1.616, 5.23)	**0.001<**	R 4.31(2.12-8.75)	**0.001<**
Complaints, N (%)									
Abdominal pain	44(18.9%)	0(0.0%)	0(0.0%)	0(0.0%)		R			
Chronic anemia	17(7.3%)	1(2.6%)	2(7.4%)	0(0.0%)	-19.955	-	0.998	-	-
Anal pain	1(0.4%)	0(0.0%)	0(0.0%)	0(0.0%)	-	-	1.000	-	-
Weight loss	1(0.4%)	0(0.0%)	0(0.0%)	0(0.0%)	-	-	1.000	-	-
Follow up	16(6.9%)	0(0.0%)	0(0.0%)	0(0.0%)	-	-	1.000	-	-
Chronic constipation	36(15.5%)	2(5.3%)	2(7.4%)	0(0.0%)	-19.454	-	0.998	-	-
Chronic diarrhea	53(22.7%)	0(0.0%)	0(0.0%)	0(0.0%)	-	-	1.000	-	-
Lower GI bleeding	65(27.9%)	35(92.1%)	23(85.2%)	2(100.0%)	-21.527	-	0.998	-	-

R: Reference category. **OR:** odds ratio. **CI:** Confidence interval. **P values:** Ordinal logistic regression analysis

DISCUSSION

Internal hemorrhoid is a common anorectal lesion in which are dilated veins present in the anal canal and lower gastrointestinal bleeding is the main clinical symptom. However, the symptoms of HD differ according to the type and location of internal hemorrhoids and. In recent years, the incidence of HD has shown an upward trend causing a decrease in the quality of life of patients. [1]

Colonoscopy can be used for many reasons such as lower gastrointestinal bleeding, abdominal pain, unexplained changes in bowel habits, suspicion of malignancy, or a radiological abnormality[6].

- Our study showed a significant association between colonoscopy classification dependant on site, size, red colour sign (RCS) with lower GIT bleeding, and chronic anemia as correlation with clinical manifestations of hemorrhoids, **(P<0.05).**
- We observed a statistically significant increase in the proportion of patients who had grade IV colonoscopy classification with an increase in the size and presents of RCS, also there is a significant increase in the proportion of patients who had RCS with increasing the size of internal hemorrhoids, **(P<0.05).**
- In the present study, chronic anemia, lower GI bleeding, and are the most independent risk factors for the development of internal hemorrhoids in patients undergoing colonoscopy grading, **(P < 0.001), (AOR = 0.24, 95%CI; 0.08-0.75) and (AOR = 0.18,95%CI;0.08-0.41)** respectively.

In the present study, we revealed that hemorrhoids increasing with aging, the median age of the patients were 46 years old (IQR: 34-60), and this agrees with *J.-H. Lee et al.*[7] which also reported that the prevalence of hemorrhoids is already high by the age of 30. This accord with our findings that the anchoring mechanism of the rectal mucosa deteriorates with advancing age.

In certain patients, hemorrhoids may appear earlier than others, just like wrinkles on the face or sagging skin. Eventually, everybody will have hemorrhoids because the anchoring system of the anal mucosa deteriorates as a part of the aging process; however, not everybody will have symptoms of hemorrhoids. Environmental or other unknown factors, yet unknown, may also play a role *(Aiken, 2002).* [8]

Sadahiro et al.[9] *and Fukuda et al.*[4] reported significant correlations between RCS and bleeding by the retroflexed colonoscopy for evaluation of the internal hemorrhoids. These studies adopted only range, form, and RCS as the criteria of endoscopic classification of internal hemorrhoids.

The colonoscopy classification of internal hemorrhoids done by *Fukuda et al.* [4] observed a significant correlation between RCS and bleeding, between the size and both bleeding and prolapse. This study depends only on the site, size, and RCS as the category of colonoscopic classification of internal hemorrhoids.

In the present study, we found that the colonoscopy scoring system (site, size, and RCS) for internal hemorrhoids was significantly related to symptoms, especially lower gastrointestinal bleeding. As well, we observed a significant increase in the proportion of patients who had RCS with increasing the size and grading of internal hemorrhoids. A proportional relationship between size and site scores has been noticed.

In the present study, colonoscopy classification in our study gives more clarification in explaining and interpreting the relationship between internal hemorrhoids and symptoms by studying the relationship between the RCS, size, and site of internal hemorrhoids.

On other hand, we found that there is no significant correlation between internal hemorrhoids and symptoms in patients who underwent Goligher's scoring system.

Our results indicated that examination of the anal canal by retroflexed colonoscopy in the rectum gives valuable information about the hemorrhoids state.

The investigators which study by *Fukuda et al.*[4] and *Sadahiro et al* [9] reported that retroflexed colonoscopy was better than traditional anoscope for examining and evaluating internal hemorrhoids because it can give a good assessment of the color and the fine appearance of the surface of the anal canal due to increases the distance between the lesion and the examiner's eye when using a conventional anoscope

A significant correlation between lower GIT bleeding as a complaint, with internal hemorrhoids which are similar to a study done by *Fukuda et al.* [4]and *Anwar et al.* [10] that used colonoscopy for diagnoses and evaluation of internal hemorrhoids and showed a significant correlation between lower GI bleeding and internal hemorrhoids.

Additionally, our study revealed a significant correlation between chronic anemia and internal hemorrhoids. It was found that the patients who had chronic anemia were (0.24) times higher of having hemorrhoids as compared to other compliant. Chronic anemia could be explained by recurrent blood loss from bleeding internal hemorrhoids, over a long time with resulting iron deficiency anemia.

Unlike previous studies, our study showed that colonoscopy was more accurate in detecting internal hemorrhoids in asymptomatic patients. So we found a difference in the number of patients who had internal hemorrhoids, depending on the type of classification, there were more patients in colonoscopy classification (115) than Goligher's grading (67) patients.

In addition, our study is the first to our knowledge that compared the difference between colonoscopic classification and standard Goligher's classification at the same time and on the same patients and to prove the effectiveness and accuracy of colonoscopic classification in the diagnosis and evaluation of internal hemorrhoids.

In addition, colonoscopy was found to be extremely safe and no complication was detected. The safety of colonoscopy has been proved in many other studies all over the world.

This cross-sectional study was studied the difference between both classifications and to prove the effectiveness and accuracy of colonoscopy in the diagnosis, and evaluation of internal hemorrhoids only, but it has not studied the effectiveness of colonoscopy in treating hemorrhoids, as in some studies as *Fukuda et al* [4], *Albuquerque.* [11]

One of the limitations in the current study is the cross-sectional design that can not provide follow-up data for the patients, besides it has not studied the effectiveness of colonoscopy in treating hemorrhoids, as in some studies as in *Fukuda et al.* [4] and *Albuquerque.* [11]

CONCLUSION:

We can conclude that the use of retroflexed colonoscopy is accurate and effective in diagnosing and evaluating internal hemorrhoids also, the colonoscopic classification is more accurate in describing the relationship between the degree of hemorrhoids and symptoms than Goligher's classification.

RECOMMENDATION

Other future studies are required to explain the association of internal hemorrhoids with many diseases. In addition, the correlation between the severity and other symptoms and sign of hemorrhoids required more future studies. Other future studies are needed to evaluate the effectiveness of colonoscopy in the treatment of internal hemorrhoids

Written informed consent was obtained from all patients and the study was approved by the research ethical committee of Faculty of Medicine, Zagazig University (International review board (**ZU-IRB#6710/2-3-2021**). The study was done according to The Code of Ethics of the World Medical Association (Declaration of Helsinki) for studies involving humans.

-Consent for publication

Not applicable

Competing interests

The authors declare that they have no competing interests.

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