



Laser Hemorrhoidoplasty for Treatment of Third and Fourth Degree Hemorrhoids: A Pilot Study

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Article History

Received: 21 June 2020

Reviewed: 22/June/2020 to 29/July/2020

Accepted: 30 July 2020

E-publication: 04 August 2020

P-Publication: September - October 2020

Citation

Mohamed Ali Nada, Mahmoud Ahmed Farghaly, Ali Mohamed Nageb. Laser Hemorrhoidoplasty for Treatment of Third and Fourth Degree Hemorrhoids: A Pilot Study. *Medical Science*, 2020, 24(105), 3093-3100

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General Note



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ABSTRACT

Background: Patients' postoperative discomfort and pain represent the most feared and complained complications after surgical hemorrhoidectomy. In response to the high request of painless treatments, in the recent years, many trials assisted to the widespread of minimal invasive and non-excisional techniques including, HAL, THD and stapled hemorrhoidopexy. **Objective:** The aim of this study is assessment of laser hemorrhoidoplasty for treatment of third and fourth degree hemorrhoids with follow up regarding; post-operative pain, bleeding, wound healing and hospital stay. **Patients and Methods:** This study was conducted at general surgery department of ain shams university hospital from December 2017 through December 2019. It included 20 patients 55% males and 45% females. Their age ranged from 28 to 60 years, with an average of 44 years (\pm 11.6). Patients aged 50 years and older represented 35% of all study participants. The majority of participants (75%) had grade III hemorrhoids. **Results:** In our study the operative time ranged from 15 to 30 minutes, with a mean of 19.3 minutes (\pm 4.37), while the hospital stay ranged from 12 to 18 hours,

with a mean of 13.8 (\pm 2.82) hours. And with regarding the postoperative complications in our study, only two patients were complicated (10%). The first patient had pain (5%) and abscess (5%), while the second patient had bleeding (5%) and edema (5%). No fistula, no stricture, no incontinence, no recurrence have occurred. *Conclusion:* Laser hemorrhoidectomy is a safe and effective procedure associated with low incidence of post-operative complications and it is more effective in grade III than grade IV but we cannot generalize the results as it was a pilot study, so further investigations are needed with larger, preferably randomized and controlled trials to confirm the results of this study in the future.

Keywords: Hemorrhoidal artery ligation, hemorrhoidal dearterialization

1. INTRODUCTION

Hemorrhoidal columns are normal anatomic clusters of vascular and connective tissue, smooth muscle, and overlying epithelium that exist in the left lateral, right anterior, and right posterior anal canal and serve in providing continence (Gardner et al., 2020). They become pathologic when engorged and subsequently symptomatic. Internal hemorrhoids are proximal to the dentate line, covered in columnar epithelium, and have visceral innervation. Clinical classification of symptomatic internal hemorrhoids: Grade 1 non prolapsed hemorrhoids; Grade 2 hemorrhoids prolapse while straining; Grade 3 prolapse reduced manually; and Grade 4 are irreducible hemorrhoids (Riss et al., 2012). Hemorrhoids can be treated medically in the earlier stages, but over a while when the condition become complicated, then it should be treated by non-operative treatments such as, bipolar diathermy, infrared photocoagulation, rubber band ligation and cryotherapy, (Bharat, 2011). When non-surgical treatment or any other alternative methods are failed in managing hemorrhoids then it should be treated surgically. There are several over the counter herbal medicine (oral & ointment base creams), available as botanicals for hemorrhoids (Navarra et al., 2010).

The recent theory about the etiology of hemorrhoids is that symptomatic hemorrhoids occur with deterioration of the tissues that support the anal cushions, causing abnormal downward displacement and venous dilation (Hosking et al., 2013). This process can be exacerbated by lifting, straining, and prolonged sitting. Low fiber diet and constipation are also considered as risk factors. Some studies have shown that diarrhea, rather than constipation, is associated with hemorrhoids (Rex et al., 2015). Given the high prevalence of hemorrhoids in developed countries versus developing countries, some have noticed that posture during defecation may result in symptomatic hemorrhoids. Studies have shown that squatting produces a straighter anorectal angle, compared to sitting on a toilet (Sakakibara et al., 2010). According to screening colonoscopy data, they found that about 38% of the population has hemorrhoids, while 44% were symptomatic. Middle age (45-65 years old) and obesity are the primary risk factors (Gardner et al., 2020).

Aim of the work

We aim from our study to assessment of laser hemorrhiodoplasty for treatment of third and fourth degree hemorrhoids with follow up regarding; post-operative pain, bleeding, wound healing, operation time and hospital stay.

2. PATIENTS AND METHODS

This is a pilot study that was conducted in Ain-Shams University Hospitals, colorectal surgery unit over 20 patients who underwent laser hemorrhiodoplasty with minimal follow-up for 6 months from the period from December 2017 through December 2019. Patients who were fit for surgery, both genders, age >18 years and patients who have symptomatic third and fourth degree haemorrhoid candidate for surgical intervention were included in the study. While patients which generally unfit for operation, patients with history of psychiatric illness, patient refusal, patient with recurrent haemorrhoids, patients with peri anal fistula, patients with inflammatory bowel disease, patients with Partial rectal prolapsed, patients with cancer rectum and patients with portal hypertention were excluded from the study.

Methods

Preoperative assessment: An informed consent was taken from all patients who accepted to participate in the study. Full clinical history; personal history, present history, past history. Full clinical examination, vital signs, per rectal examination. Routine preoperative investigations including, complete blood count, random blood sugar, liver function test, kidney function test, coagulation profile, serum electrolytes.

Operative technique: With the patient in the lithotomy position, a dedicated disposable proctoscope with a diameter of 23 mm was inserted in the anal canal. The 1470-nm diode laser served to submucosally denaturize hypertrophic hemorrhoidal tissue and thus makes it smaller. The probe was submucosally introduced intra-anally through mucocutaneous junction (Fig.1).



Figure (1): Introduction of probe.

Through a 1000-micron optic fiber, six laser shots generated at a power of 13 W with duration of 1.5 s each and a pause of 1 s caused shrinkage of tissues to the depth of approximately 5 mm (Fig. 2).

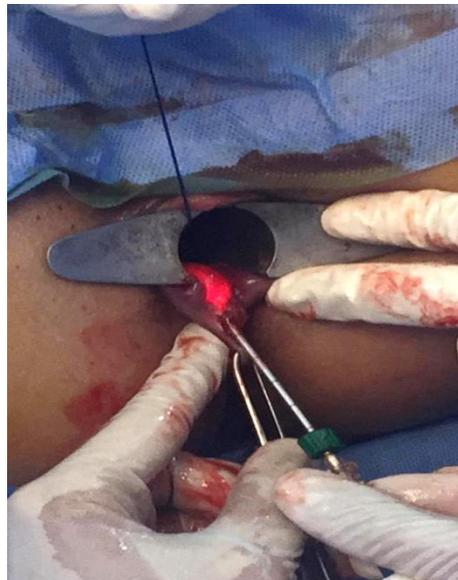


Figure (2): Laser shots.

No need for bowel preparation. Two enemas were administered 2 hours before the intervention. Patients were discharged within 4 to 12 hours, and were followed for 2 to 6 months for healing progress and complications.

Post-operative: Data was collected from patient records, medical files, and interviews. The patients were followed for the level of postoperative pain and duration of operation. Postoperative pain was evaluated by using a visual analog scale (VAS) on which 0 represents no pain and 10 represents the maximum pain. VAS protocol was followed up after 1 week, 2 weeks, 3 weeks, 1 month, 2 months and 6 months. The duration of intervention was recorded in minutes. Post-operative pain (verbal rating scale), post-operative bleeding, wound healing and hospital stay were recorded.

Statistical Analysis

Analysis of data was done using IBM SPSS software (statistical program for social science version 24.0. The data was collected tabulated and statistically analyzed. Description of quantitative variable was done as mean and standard deviation, and qualitative data as frequency. Chi square test was used to compare the groups as regard qualitative variable. Student t-test was used to compare two groups as regard quantitative variable in parametric data. The results were considered significant (S) with $P < 0.05$.

Ethical consideration: An informed consent was taken from all the participants before taking any data.

The consent contained: Explanation of the study in a simple and clear manner to be understood by the common people. Patients were informed about the techniques and its possible side effects. No harmful maneuvers were performed or used. There are no foreseen hazards to be anticipated from conducting the study on these patients. All data was considered confidential and would not be used outside this study without patient's approval. Participants had the right to refuse participation or to withdraw from the study at any time without giving any reason and with neither jeopardized neither the right of the patient to be treated nor affecting the relationship between the patient and the care provider. Signature or fingerprints of the participants.

3. RESULTS

This study included 20 patients (55% males and 45% females). Their age ranged from 28 to 60 years, with an average of 44 years (± 11.6). Patients aged 50 years and older represented 35% of all study participants. The majority of participants (75%) had grade III haemorrhoids (Table 1).

Table (1): Patients demographic and clinical characteristics (N=20).

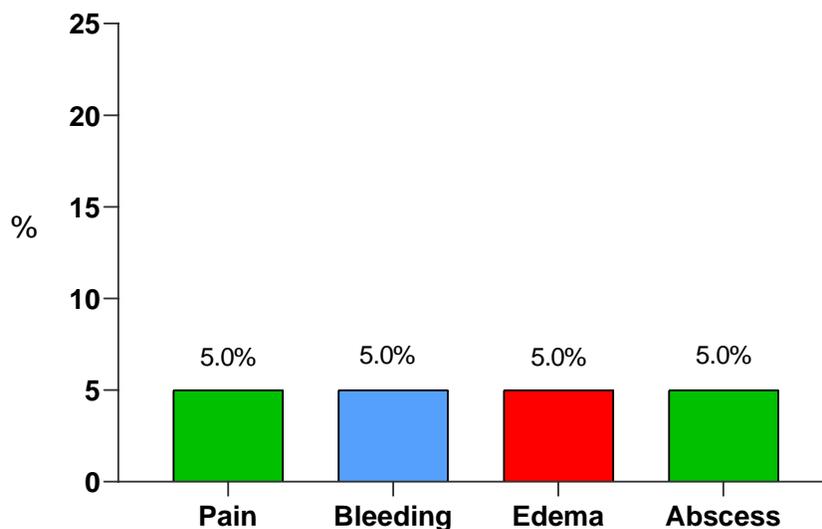
	No. (%) or Mean \pm SD
Age (years)	44.1 \pm 11.6 (28 – 60)
Age groups:	
20 – 29	2 (10.0%)
30 – 39	6 (30.0%)
40 – 49	5 (25.0%)
50 – 60	7 (35.0%)
Sex	
Male	11 (55.0%)
Female	9 (45.0%)
Grade of hemorrhoids:	
Grade III	15 (75.0%)
Grade IV	5 (25.0%)

The operative time ranged from 15 to 30 minutes, with a mean of 19.3 minutes (± 4.37), while the hospital stay ranged from 12 to 18 hours, with a mean of 13.8 (± 2.82) hours (Table 2). Regarding the postoperative complications, only two patients were complicated (10%). The first patient had pain (5%) and abscess (5%), while the second patient had bleeding (5%) and edema (5%). No fistula, stricture, incontinence, or 6-month recurrence have occurred to the patients in this study (Table 2).

In Table 3, although the operation in female patients took longer time than in male patients, there was no statistically significant difference in the mean operative time. Likewise, there was no statistically significant difference in the mean hospital stay between female and male patients. On the other hand, the only patient who had postoperative pain and abscess was a male patient, while the other patient who had bleeding and edema was a female patient (Table 3). These differences in postoperative complications were not statistically significant.

Table (2): Operative and Postoperative complications (N=20)

	No. (%) or Mean \pm SD
Operative time (minutes)	19.25 \pm 4.37 (15 – 30)
Hospital stay (hours)	13.8 \pm 2.82 (12 – 18)
Early postoperative complications	
Pain	1 (5.0%)
Bleeding	1 (5.0%)
Edema	1 (5.0%)
Abscess	1 (5.0%)
Late postoperative complications	
Fistula	0
Stricture	0
Incontinence	0
Recurrence within 6 months	0

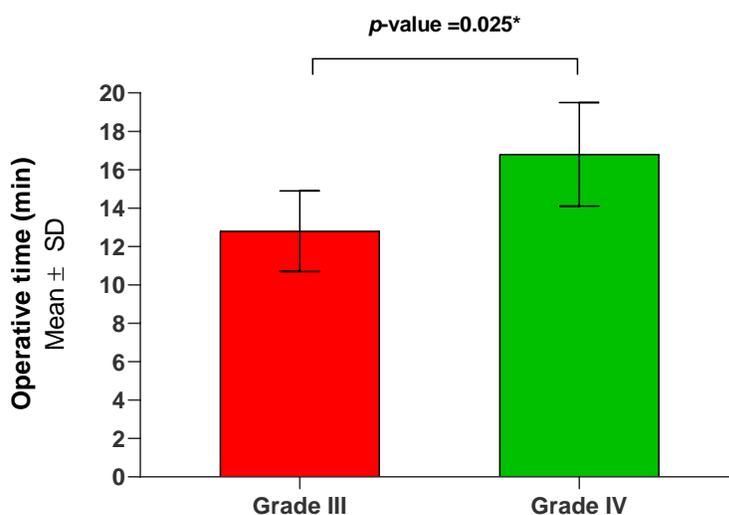
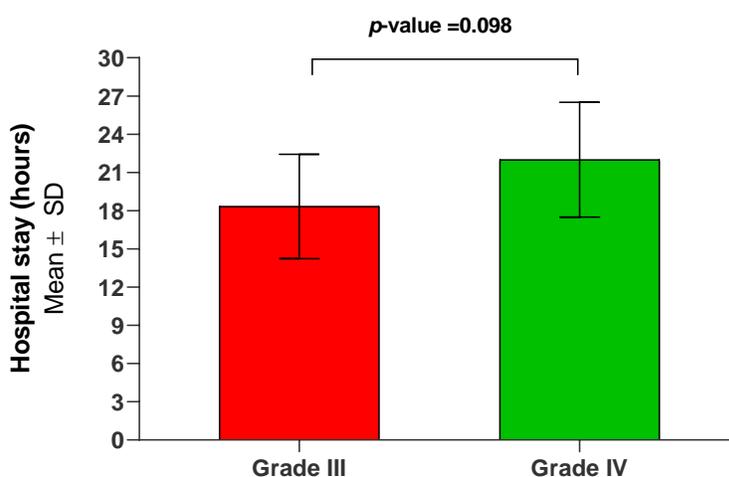
**Figure (3):** Distribution of patients according to Post-operative complications (n=20).**Table (3):** Operative and Postoperative complications by gender (N=20).

	Male (n = 9)	Female (n=11)	p-value
Operative time (min)	13.33 \pm 2.6	14.18 \pm 3.0	0.603
Hospital stay (hours)	20.0 \pm 4.3	18.64 \pm 4.5	0.412
Postoperative complications			
Pain	1 (11.1%)	0	0.450
Bleeding	0	1 (9.1%)	1.00
Edema	0	1 (9.1%)	1.00
Abscess	1 (11.1%)	0	0.450

In Table 4, the operation in patients with grade IV hemorrhoids took statistically significant longer time than in patient with grade III. Patients with grade IV hemorrhoids have stayed at hospital for longer time than patients with grade III, however, this difference was not statistically significant. On the other hand, all complications (pain, bleeding, edema, and abscess) have occurred to patients with grade IV hemorrhoids (Table 4).

Table (4): Operative and Early Postoperative complications by grade of hemorrhoids (N=20).

	Grade III	Grade IV	p-value
Operative time	12.80 ± 2.1	16.80 ± 2.7	0.025*
Hospital stay (hours)	18.33 ± 4.1	22.0 ± 4.5	0.098
Pain	0	1 (20.0%)	0.250
Bleeding	0	1 (20.0%)	0.250
Edema	0	1 (20.0%)	0.250
Abscess	0	1 (20.0%)	0.250

**Figure (4):** Comparison of the mean operative time between patients with grade III and IV (n=20).**Figure (5):** Comparison of the mean hospital stay between patients with grade III and IV (n=20).

4. DISCUSSION

Laser Hemorrhoidoplasty have been available recently as additional minimally-invasive alternative treatment of advanced hemorrhoid problems (Weyand et al., 2019). To the best of our knowledge, few studies (Awazli, 2018, Bruscianno et al., 2019 and

Poskus et al., 2020) have discussed this area of research involving laser hemorrhoidoplasty for treatment of third or fourth degree hemorrhoids. So, there is a need of a longer follow-up period to verify long-term outcomes of such treatment for HD and to compare this technique to the current conventional ones. So, the aim of this study is assessment of laser hemorrhoidoplasty for treatment of third and fourth degree hemorrhoids with follow up regarding; post-operative pain, bleeding, wound healing and hospital stay.

This study included 20 patients 55% males and 45% females. Their age ranged from 28 to 60 years, with an average of 44 years (± 11.6). Patients aged 50 years and older represented 35% of all study participants. The majority of participants (75%) had grade III hemorrhoids. This is comparable with Bruscianno et al. (2019) that is reported according to the Strengthening the Reporting of Observational Studies in Epidemiology (STROBE) statement for cohort studies. Fifty patients were included in this study (28 females and 22 males). All patients were symptomatic grade II–III HD. Mean age was 42 ± 12.6 years (range 22–70 years). Increased operative time is associated with increased odds of complications and, therefore, decreased operative times must be a target for all surgeons and hospitals (Cheng et al., 2018).

In our study the operative time ranged from 15 to 30 minutes, with a mean of 19.3 minutes (± 4.37), while the hospital stay ranged from 12 to 18 hours, with a mean of 13.8 (± 2.82) hours. In linear with our study, Awazli (2018) reported that the operative time ranged from 10 to 30 minutes with an average of 22 minutes and the postoperative hospital stay ranged from 3 to 9 hours. Likewise Bruscianno et al. (2019) reported Intraoperative mean time was 14 min while mean hospitalization was 2 days (one night).

Complications after hemorrhoidal surgery such as urinary retention in case of spinal anesthesia (20.1%), bleeding (2.4–6%), and subcutaneous abscess (0.5%) should not be neglected. The long-term complications such as anal stenosis (1%), incontinence (0.4%), anal fissure (1–2.6%), fistula (0.5%) and recurrence of hemorrhoids (Bleday et al., 1992; Halverson, 2007). Postoperative pain is one of the most important complication that worries patients and makes them reluctant to surgery. Therefore, for the fear of postoperative pain and complications, mildly symptomatic patients often hesitate and delay undergoing to surgical treatment for this benign disease. Laser hemorrhoidoplasty is a painless and minimal invasive procedure for day-surgery treatment of hemorrhoids determining the shrinkage of the hemorrhoidal piles by mean of a diode laser (Maloku et al., 2014; Naderan et al., 2017).

Regarding the postoperative complications in our study, only two patients were complicated (10%). The first patient had pain (5%) and abscess (5%), while the second patient had bleeding (5%) and edema (5%). No fistula, stricture, incontinence, or 6-month recurrence have occurred to the patients in this study. In accordance to our study, Jahanshahi et al. (2012) reported a low complication rate of 3.51% (abscess (0.6%), bleeding (0.6%) and edema (2%). No fistula, no stricture and no case of recurrence at 1 year follow-up). Similar results were reached by Maloku et al. (2014) on 20 patients treated by 980 nm diode laser coagulation. Likewise, Awazli, reported no pain (64%) mild to moderate (28%) severe in (8%), Mild bleeding occurred in 3 cases (12%), infection 2 patients (8%), retention of urine four patients (16%), mild anal stenosis 3 patients (12%), Mild incontinence that returned to normal within 10 days occurred in 2 patients (8%), and recurrence zero. Bruscianno et al. (2019) reported that no significant intraoperative complications occurred.

Although the operation in female patients took longer time than in male patients, there was no statistically significant difference in the mean operative time. Likewise, there was no statistically significant difference in the mean hospital stay between female and male patients. On the other hand, the only patient who had postoperative pain and abscess was a male patient, while the other patient who had bleeding and edema was a female patient. These differences in postoperative complications were not statistically significant.

In the current study, the operation in patients with grade IV hemorrhoids took statistically significant longer time than in patient with grade III and Patients with grade IV hemorrhoids have stayed at hospital for longer time than patients with grade III, however, this difference was not statistically significant. And so, all complications (pain, bleeding, edema, and abscess) have occurred to patients with grade IV hemorrhoids. However, Poskus et al. (2020) see that Patients with grade 4 prolapse have to be excluded from the study, as, based on their experience, LHP is not a suitable technique for grade 4 prolapse.

5. CONCLUSION

Laser hemorrhoidectomy is a safe and effective procedure associated with low incidence of post-operative complications and it is more effective in grade III than grade IV but we cannot generalize the results as it was a pilot study, so further investigations are needed with larger, preferably randomized and controlled trials to confirm the results of this study in the future.

Acknowledgement:

We thank the patients who were all participated in and contributed samples to the study. We also thank Ain shams university hospitals especially General surgery department.

Author Contributions:

This work was carried out in collaboration between all authors. All authors equally designed the study, performed the statistical analysis, wrote the protocol, wrote the first draft of manuscript, managed the analyses of the study and managed the literature searches. All authors read and approved the final manuscript.

Funding: This study has not received any external funding.

Conflict of Interest: The authors declare that there are no conflicts of interests.

Informed consent: Written & Oral informed consent was obtained from all individual participants included in the study.

Ethical approval: The study was approved by the Medical Ethics Committee of Department of General Surgery, Faculty of Medicine, Ain Shams University, Cairo, Egypt Code (No.IRB 00006379).

Data and materials availability: All data associated with this study are present in the paper.

Peer-review: External peer-review was done through double-blind method.

REFERENCES AND NOTES

1. Awazli LG. Hemorrhoidectomy Using (10600 nm) CO2 Laser. *Iraqi Journal of Laser*, 2018; 13(B): 33–39.
2. Bharat. Hemorrhoids- a common ailment among adults, causes & treatment: A review. *International Journal of Pharmacy and Pharmaceutical Sciences*. 2011; 03(05): 5-1.
3. Bleday R, Pena JP, Rothenberger DA, Goldberg SM, Buls JG. Symptomatic hemorrhoids: current incidence and complications of operative therapy. *Diseases of the Colon & Rectum*, 1992; 35(5): 477–481.
4. Bruscianno L, Gambardella C, Terracciano G, et al. Postoperative discomfort and pain in the management of hemorrhoidal disease: laser hemorrhoidoplasty, a minimal invasive treatment of symptomatic hemorrhoids. *Updates Surg*. 2019.
5. Cheng H, Clymer JW, Po-Han Chen B, Sadeghirad B, Ferko NC, Cameron CG, Hinoul P. Prolonged operative duration is associated with complications: a systematic review and meta-analysis. *Journal of Surgical Research*, 2018; 229: 134–144.
6. Gardner IH, Siddharthan RV, Tsikitis VL. Benign anorectal disease: hemorrhoids, fissures, and fistulas. *Annals of gastroenterology*, 2020; 33(1): 9–18.
7. Halverson A. Hemorrhoids. *Clinics in Colon and Rectal Surgery*, 2007; 20(2): 77–85.
8. Hosking SW, Smart HL, Johnson AG, Triger DR. Anorectal varices, haemorrhoids, and portal hypertension. *Lancet*. 2013; 1:349–352.
9. Jahanshahi A, Mashhadizadeh E, Sarmast MH. Diode laser for treatment of symptomatic hemorrhoid: a short term clinical result of a mini invasive treatment, and one year follow up. *Polish Journal of Surgery*, 2012; 84(7): 329–332.
10. Maloku H, Gashi Z, Lazovic R, Islami H, Juniku-Shkololli A. Laser hemorrhoidoplasty procedure vs open surgical hemorrhoidectomy: a trial comparing 2 treatments for hemorrhoids of third and fourth degree. *Acta Inform Med*. 2014; 22:365–367.
11. Naderan M, Shoar S, Nazari M, Elsayed A, Mahmoodzadeh H, Khorgami Z. A randomized controlled trial comparing laser intra-hemorrhoidal coagulation and Milligan–Morgan hemorrhoidectomy. *J Invest Surg*. 2017; 30:325–331.
12. Navarra L, Pietroletti R, Maggi G, Leardi S, Simi M. Diagnosis and treatment of haemorrhoids in the elderly: results from 291 patients. *Techniques in Coloproctology*. 2010; 3(3): 127–130.
13. Rex DK, Schoenfeld PS, Cohen J, et al. Haemorrhoids—postulated pathogenesis and proposed prevention. *Postgrad Med J*. 2015; 51:631–636.
14. Riss S, Weiser FA, Schwameis K, et al. The prevalence of hemorrhoids in adults. *Int J Colorectal Dis*. 2012; 27:215–220.
15. Sakakibara R, Tsunoyama K, Hosoi H, et al. Influence of body position on defecation in humans. *Low Urin Tract Symptoms*. 2010; 2:16–21.
16. Weyand G, Theis CS, Fofana AN, Rüdiger F, Gehrke T. Laser hemorrhoidoplasty with 1470 nm diode laser in the treatment of second to Fourth degree hemorrhoidal disease - a Cohort study with 497 patients. *Zentralbl Chir*. 2019; 144(4):355–363