International Surgery Journal
De A et al. Int Surg J. 2021 Oct;8(10):2968-2673
http://www.ijsurgery.com
pISSN 2349-3305 | eISSN 2349-2902

DOI: https://dx.doi.org/10.18203/2349-2902.isj20213978

Original Research Article

Hybrid digitally guided hemorrhoidal artery ligation with laser hemorrhoidoplasty: our experience with a new approach to hemorrhoidal disease

Anushtup De*, Prabal Roy

Department of General, Minimally Invasive and Bariatric Surgery, Metro Heart Institute with Multispeciality, Faridabad, Haryana, India

Received: 25 July 2021
Revised: 05 September 2021
Accepted: 06 September 2021

***Correspondence:**
Dr. Anushtup De,
E-mail: anushtup.de@gmail.com

ABSTRACT

Background: Minimally invasive surgeries are currently advocated in hemorrhoidal disease for better patient satisfaction. The aim of our study is to assess the feasibility, efficacy and safety of a hybrid hemorrhoidal artery ligation under digital guidance with laser hemorrhoidoplasty (Hybrid HAL-LHP) in patients with grade II to III hemorrhoids.
Methods: In a prospective clinical study, hybrid HAL-LHP was performed in 75 consecutive patients between May 2018 to February 2020 with grade II to III hemorrhoids. Hemorrhoidal artery ligation was done by digital palpation followed by laser hemorrhoidoplasty using a 1470 nm diode laser. Postoperative pain and bleeding, return to work, resolution of symptoms, recurrence and reoperation was assessed on a follow up upto 1 year.
Results: Postoperative pain assessed on Visual analog score (VAS) was 2.82 on 3rd day, 1.28 on 7th day and till 14th day was extremely low. None of the patients had significant intraoperative or spontaneous postoperative bleeding. Most of the patients had some degree of post defecation bleeding till 7th to 14 days which resolved after 2 weeks. After a mean follow up of 16.6 months, we reported a suspected recurrence rate of 5.33%.
Conclusions: Postoperative pain assessed on Visual analog score (VAS) was 2.82 on 3rd day, 1.28 on 7th day and till 14th day was extremely low. None of the patients had significant intraoperative or spontaneous postoperative bleeding. Most of the patients had some degree of post defecation bleeding till 7 to 14 days which resolved after 2 weeks. After a mean follow up of 16.6 months we reported a suspected recurrence rate of 5.33%.

Keywords: Hemorrhoidal disease, Hemorrhoidal artery ligation, Laser hemorrhoidoplasty

INTRODUCTION

Hemorrhoidal disease, with its different manifestations, is not only one of the commonest referrals to the surgical outpatient departments but also a one of the causes for modest deterioration in quality of life to the patient. The worldwide prevalence varies widely in different studies and ranges from 2.9 to 50%. Many of them develop symptoms, however 20 to 30% finally seek medical opinion. The disease is more common in adult men between 45 to 65 years of age.[1,2]

Hemorrhoidal disease, in general are classified into 4 grades. Grade I when they are seen during anoscopy as congested veins, grade II when they prolapse but reduce spontaneously, grade III when they prolapse and need manual reduction, and grade IV when they are irreducible.[3] Symptomatic hemorrhoids, have a variable presentation with pain, itching, bleeding, discharge, or

prolapse.[4] The treatment option for hemorrhoidal disease varied over time and included a wide range from conservative management and non-surgical treatment to a variety of surgical modalities. The non-surgical therapeutic procedures include rubber band ligation, injection sclerotherapy, infrared coagulation or cryotherapy that can be carried out without anesthesia. They are considered the primary option in Grade I to III hemorrhoids.[5]

Surgical treatment for hemorrhoids can be broadly divided into the classic surgical procedures and minimally invasive techniques. The classic surgical procedures still commonly used and considered to be the gold standard are the open hemorrhoid removal (Milligan-Morgan technique) and the closed hemorrhoid dissection (Ferguson technique). Although they have been widely recognized with good postoperative results, significant postoperative problems like pain, urinary retention, bleeding, anal stenosis or incontinence have resulted in the research for developing newer procedures.

The Longo procedure also called the stapled hemorrhoidopexy first proposed in 1998 and Doppler guided Hemorrhoidal artery ligation (HAL) proposed by Dr Morinaga in 1995 gained support as they offered the operative possibility with decreased postoperative pain.[6,7] However, each had their own advantages and disadvantages. Over the years, HAL technique has been used for treatment of Grade 2 and 3 hemorrhoids and later extrapolated to treat the prolapse associated with hemorrhoids by adding mucopexy sutures to the prolapsed tissue and termed as rectoanal repair and together called HAL-RAR.

In the last two decades there have been significant research and development to establish laser in the treatment of hemorrhoidal disease. Karahaliloglu et al in 2007 first described laser hemorrhoidoplasty.[8] In this procedure, a laser fibre was introduced through a skin incision at the hemorrhoidal base and the hemorrhoidal plexus was coagulated with laser. Later in 2009 Salfi et al proposed another procedure termed as Hemorrhoidal laser procedure (HeLP).[9] In this procedure doppler was used to identify the terminal blanches of the superior rectal artery which was then coagulated with laser.

Recent studies have questioned the use of Doppler guidance for Hemorrhoidal artery ligation.[10] Studies have shown that hemorrhoidal artery ligation by digital palpation without doppler guidance is a safe procedure with similar results compared to doppler guidance.[11,12] Avital et al in their series noted that as the position of terminal branches of superior rectal arteris are relatively constant, the necessity of Doppler for their identification is debatable.[13] In 76% of their patients the branches were located at all the odd numbers clock positions around the anus (1, 3, 5, 7, 9, and 11 o'clock in the lithotomy position).

The aim of our current study is to analyze the feasibility, safety and efficacy of a hybrid procedure of digitally guided hemorrhoidal artery ligation with laser hemorrhoidopexy (Hybrid HAL-LHP) with emphasis on postoperative pain and discomfort and return to routine activities.

METHODS

Between May 2018 and February 2020, 75 consecutive adult patients presenting at QRG Healthcity, Faridabad with symptomatic grade II and III hemorrhoids underwent Hybrid HAL-LHP.

Selection criteria

Inclusion criteria were patients >16 years, patient failure of conservative management and symptomatic patients.

Exclusion criteria were patients with grade III and IV hemorrhoids with large mucosal prolapse, acute thrombosed hemorrhoids and patients with IBD involving rectum and anal canal and patients who were surgically treated for hemorrhoidal disease in the past.

All the data was prospectively collected and analyzed. Approval of the ethics committee of the hospital was appropriately taken.

All patients underwent a thorough clinical evaluation and comprehensive anorectal examination to exclude other causes of bleeding. Information about bowel function, previous pregnancies, episiotomy and previous surgeries if any were recorded. Colonoscopy was done in patients who were suspected to have bleeding from sources other than hemorrhoids. Routine preoperative assessment included laboratory tests, chest X-ray and ECG. 2D echo and cardiology evaluation was done in elderly patients or with history of cardiac disease.

Informed consent was taken which explained about the procedure to be performed.

Operative technique

The patient was placed in lithotomy position after SAB anesthesia. Antibiotic prophylaxis with Injectable cefuroxime was used in all cases. A disposable half circle proctoscope was placed in the anal canal and distal rectum for easy palpation and suturing of the vessel. Manual palpation was started from 3 o clock position and vessel was transfixed with a figure of eight 2-0 absorbable (polyglactin) suture mounted on a 27 mm 5/8 circle round bodied needle. Before tightening and knotting the suture, the hemorrhoidal cushion is compressed with a finger by the assistant. The level of transfixation is kept above the dentate line. The proctoscope is then rotated in the clockwise direction and multiple transfixation sutures are taken at all odd numbered clock positions around the anus.

Subsequently, laser hemorrhoidoplasty was done using a special probe (Corona Hemorrhodal probe, Neolaser) with a conical glass tip which allows easy insertion into tissue and wide illumination. The probe was inserted using a special 14 G metal cannula and locked in position with a luer lock and the glass tip protruding from the tip. The probe was introduced through a small (3 mm) incision at the anal verge at the base of hemorrhoidal mass and gently pushed forward till the base of the hemorrhoid cushion till almost the level of the transfixion suture. The red aiming beam visible through the mucosa provides visual feedback and control of the location of the tip of probe. The probe is then connected with a 1470 mm laser (NeoV 1470 , Neolaser) and the laser was set to a power of 8 W and a single pulse of 3 sec duration. Thus, the energy was delivered in single shots of 3 seconds duration. The probe was held in position and gently rotated around its axis during the shot to ensure uniform application of energy and also prevent adherence of tissues. The tip was then gently pulled back for about 3 mm noting the marking on the cannula and tracking location of tip. Consecutively another pulse was administered in the same fashion. A total of 250 J was the maximum energy delivered per hemorrhoidal quadrant. The same technique was applied to treat the hemorrhoids at 7 and 11 o click positions. Smaller hemorrhoids were treated with lesser energy..

Anal Ice pack was placed postoperatively and removed 6 hours after surgery. All patients were prescribed non-steroidal anti-inflammatory medicines postoperatively twice daily for 5 days and antibiotic (Tab cefuroxime 500 mg mg) twice daily for 5 days. Additionally, laxatives were given for 15 days and advised to take sitz bath twice daily.

Outcome measures

Postoperative pain, considered the main outcome measure in our study was assessed on Visual analog scale (VAS) on 3rd, 7th and 14th postoperative day. Post-operative bleeding or serous discharge was evaluated on 7th and 14th day. Postoperative bleeding was classified as spontaneous, post defecatory or no bleeding. Time needed to return to daily activity was also evaluated and expressed in days. The patients were followed up at 6 months and 1 year for resolution, recurrence or reoperation.

Resolution defined as absence of symptoms or prolapse postoperatively.

Recurrence defined as postoperative reappearance of symptoms of hemorrhoidal disease after a resolution.

Reoperation defined as any procedure performed for hemorrhoidal disease after laser therapy.

Statistical analysis was done using Excel to assess the incidence of intraoperative and postoperative complications and resolution of symptoms. Mean and range of postoperative VAS score was also assessed similarly.

RESULTS

Seventy-five patients (54 males and 21 females) with average age of 46.88 (range 26–80) years were enrolled in this study from May 2018 to February 2020. Overall 25.4% (19 of 75) patients had Grade II hemorrhoids and 74.6% (56 of 75) patients had grade III hemorrhoids. Our mean follow up time was 16.6 months (range 12–24 months). The most frequently reported symptoms were bleeding in 85% (64 of 75) and prolapse in 56% (42 of 75). The patient characteristics are detailed in Table 1.

Table 1: Patient characteristics.

Patient characteristic	Study group (n=75)
Average age (in years) (range)	46.88 (26-80)
Gender (%)	
Males	54 (72)
Females	21 (28)
Preoperative symptoms (%)	
Bleeding	64 patients (85)
Prolapse	42 patients (56)
Hemorrhoidal grade (%)	
II	25.4 (19 of 75)
III	74.6 (56 of 75)
Number of columns (%)	
2	37.3 (28 patients)
3	62.7 (47 patients)

All the procedures were done under spinal anesthesia. Minor intraoperative bleeding was observed in 5 (6.6%) patients. They could be managed by repeat laser coagulation in 2 and suturing with an absorbable suture in the other 3 patients.

Post-operative average VAS score was 2.82 on 3rd day (range 1–5), and 1.28 on 7th day (range 0-3) and negligible on 14th day. All the patients were prescribed oral non-steroidal anti-inflammatory analgesics twice daily for 5 days. After 5 days regular analgesic medications were stopped and only taken as and when required. However, requirement of analgesics after 5 days was very minimal.

None of the patients had spontaneous bleeding postoperatively but 90.6% (68 patients) had a few occasional episodes of post defecatory bleeding till about 5 to 7 days after surgery which then resolved. In 4 patients the occasional bleeding persisted for 2 weeks post procedure. None of the patients had sero-mucous discharge postoperatively. All patients were able to resume their normal activities within an average of 5.8 days (range 4-9 days) of surgery. The results of our study are given in Table 2.

Table 2: Intraoperative and postoperative results of our study (n=75).

Variables	Results
Minor intraoperative bleeding	5 (6.6%)
Postoperative VAS score	
3rd day	2.82 (Range 1- 5)
7th day	1.82 (Range 0 -3)
Return to routine activities	5.8 days (Range 4-9 days)
After 12 months	
Occasional bleeding	4 (5.33%)
Incomplete resolution of prolapse	2 out of 42 (4.7%)

At follow up at 6 and 12 months, 4 patients (5.33%) reported occasional bleeding suspicious of recurrence. Out of the 42 patients who had presented with prolapse, 2 patients (4.7%) reported to have incomplete resolution. However, none of them had any severe bleeding or prolapse requiring reoperation or outpatient visit.

DISCUSSION

The patient's presentation and need for hemorrhoidal surgery is primarily based on their perception of severity of symptoms and surgical treatment is based on the traditional grading of hemorrhoids. However, with the current array of treatment modalities available to the surgeon, it is difficult to decide the optimal treatment for the disease.

The traditional resective approach, open (Milligan-Morgan) or closed (Ferguson) has been associated with very low recurrence rates. However, one cannot ignore the variable and sometimes severe intensity of postoperative pain and bleeding, occasional incontinence to flatus and liquid feces, delayed return to work and sometimes in the open procedure, continuous serous discharge from the open wound.[14] This information, specially passed from previous experiences of friends and relatives brings an obvious fear in patients minds who either refrain from being adequately treated or delay their surgery.

There have been ample studies that prove the benefit of HAL -RAR as a minimally invasive technique for hemorrhoids with early recovery, less pain, early return to work and minimal complication.[15-17] However the cost and availability of doppler guidance in most centre remains in primary limiting factor and studies have questioned the validity and usefulness of doppler in Hemorrhoidal artery ligation.[11,12] The Study protocol clinical trial (SPIRIT compliant) initiated in 2020 hopefully will be able to provide some conclusive evidence in this regard.[18]

Laser hemorrhoidoplasty as an independent procedure has also been studied and researched. Initially a lower wavelength generator (980 nm) was used in several studies. Authors reports no recurrence rates at 1 year follow up and a low complication rate of 3.5%.[19-22] Luigi Brusciano et al in their series of 60 patients using 1470 nm laser wavelength also reported 100% resolution at 6 months.[23]

The results, in our study, are extremely encouraging in terms of postoperative pain and discomfort which were our primary endpoints. In detail, the early postoperative average VAS score was 2.82 (range 1-5) and 1.28 on 3rd and 7th postoperative day respectively which later deceased significantly, therefore obviating one of the feared drawback's associated with hemorrhoidal surgery. Luigi Brusciano et al in their LHP series reported a mean VAS value of 2 (range 0–3) in the first 3 days which subsequently decreased to 0.[23] Deeba and Ramirez in their series with Doppler guided HAL also reported mild pain with occasional analgesic requirement till 1 week after surgery.[24,25] In our opinion, combining the two procedures would not have any adverse effect on postoperative satisfaction for the patient (Table 3).

Table 3: Comparison of complications and postoperative outcome with some relevant studies.

Author	Study/procedure	Sample size	Complications	Post-operative outcome
Brusciano et al[23]	Laser hemorrhoidoplasty (1470 nm)	50	No significant intraoperative complications	Mean post op pain intensity: VAS 2 (first 3 days). No spontaneous bleeding. No recurrence at 8.6 months follows up
Paolo Giamundo[28]	Comparison: hemorrhoid laser procedure (980 nm) vs band ligation	30 in each group	None significant	Median post op pain VAS score 1.1 in LH. Resolution of 90% at 6 months in LH.
İbrahim Yilmaz[27]	Doppler guided HAL	50	No intra operative complications	Mean post op VAS 1.56 (Range 0-5) (First week). No post op complications. Recurrence 8% at 12 months and 12% at 24 months.

Continued.

Author	Study/procedure	Sample size	Complications	Post-operative outcome
Ferhatoglu et al[29]	Laser hemorrhoidoplasty (1470 nm)	47	Post op complications were observed in 5 cases (Anal stenosis- 1, Abscess formation-1, hemorrhage -2, thrombosis- 1)	Post op day 2 mean VAS score 2.85. Recurrence of bleeding: 14.7%. Recurrence of prolapse 21.3%.
Our study	Hybrid digital Guided HAL with Laser hemorrhoidoplasty	75	Minor intraoperative bleeding in 5 (6.6%) patients. Managed with suturing or repeat laser	Post op VAS score 2.82 and 1.28 on day 3rd and day 7th. Recurrence of Bleeding 4 (5.33%) patient. Incomplete resolution of prolapse in 2 patients (4.7%).

None of the patients in our study had spontaneous bleeding post operatively. Most of the patients had few episodes of post defecatory bleeding which lasted for a maximum of 1-2 weeks postoperatively. 5.33% (4) patients reported recurrence of occasional bleeding and 4.7% (2 out of 42) patients reported to have incomplete resolution of prolapse after an average follow up of 16 months. Comparatively Doppler guided HAL has a varying recurrence rate. Pasquale Giordano et al in their systematic review on transanal hemmorhoidal dearterialization reported a relapse rate of 4.8% for grade III hemorrhoids at 1 year follow up in some studies while İbrahim Yilmaz reported a higher recurrence rate of 8% to 12% at 12 and 24 years respectively in their series (Table 3).[26,27]

To the best of our knowledge, our study is possibly the one of the first to combine both hemorrhoidal artery ligation with laser hemorrhoidoplasty. The effectivity of HAL with the use of digital guidance helps in shrinking the size of hemorrhoidal mass initially followed by Laser hemorrhoidoplasty to treat the residual hemorrhoidal plexus. We think that the combination of both the procedures will be able to increase the efficacy while preventing any increase in postoperative discomfort and adverse effects.

The current study certainly has some limitations with respect to a small sample size and relatively short follow up. An analysis of postoperative complications like incontinence on long term would also need to be assessed. A multicentre trial with a larger patient sample would be needed to address the limitations.

CONCLUSION

In spite of the limitations in our study, the fact that our study was mainly focused on the feasibility, safety and short-term outcome of the procedure, we could say that that the hybrid HAL-LHP procedure is easy to perform, has shorter hospital stay with early return to work, minimal postoperative complication, good patient satisfaction and reasonably effective resolution of symptoms in the short term.

Funding: No funding sources
Conflict of interest: None declared
Ethical approval: The study was approved by the Institutional Ethics Committee

REFERENCES

1. Loder PB, Kamm MA, Nicholls RJ, Phillips RK. Haemorrhoids: Pathology, pathophysiology and aetiology. Br J Surg. 1994;(7):946-54.
2. 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;(6):365-7.
3. Goligher J. Surgery of the anus, rectum and colon. 4th ed. London, UK, Balliere Tindall: 1980.
4. Van Tol RR, Kleijnen J, Watson AJM, Jongen J, Altomare DF, Qvist N, et al. European society of ColoProctology: Guideline for hemorrhoidal disease. Color Dis, 2020;22(6):650-62.
5. MacRae HM, McLeod RS. Comparison of Hemorrhoidal Treatment Modalities. A meta-analysis. Dis Colon Rectum 1995;38(7):687–94.
6. Longo A. Treatment of hemorrhoids disease by reduction of mucosa and hemorrhoidal prolapse with a circular suturing device: a new procedure. 6th World Congress of Endoscopic Surgery, Rome, Bologne. 1998;3-4:777-84.
7. Morinaga K, Hasuda K, Ikeda T. A novel therapy for internal hemorrhoids: ligation of the hemorrhoidal artery with a newly devised instrument (Moricorn) in conjunction with a Doppler flow meter. Am J Gastroenterol. 1995;90(4):610-3.
8. Karahaliloglu A. First results after laser obliteration of first and second-degree hemorrhoids. Coloproctology. 2007;29:327–36.
9. Salfi R. A new technique for ambulatory hemorrhoidal treatment. Coloproctology 2009;31(2):99–103.
10. Aigner F, Kronberger I, Oberwalder M, Loizides A, Ulmer H, Gruber L. et al. Doppler-guided haemorrhoidal artery ligation with suture mucopexy compared with suture mucopexy alone for the

treatment of Grade III haemorrhoids: a prospective randomized controlled trial. Colorectal Dis. 2016;18:710–6.
11. Schuurman JP, Rinke I, Borel HM, Peter MN. Hemorrhoidal Artery Ligation Procedure with or Without Doppler Transducer in Grade II and III Hemorrhoidal Disease A Blinded Randomized Clinical Trial. Ann of Surg. 2012;255(5):840-5.
12. Gupta PJ, Kalaskar S, Taori S, Heda PS. Doppler-guided hemorrhoidal artery ligation does not offer any advantage over suture ligation of grade 3 symptomatic hemorrhoids. Tech Coloproctol. 2011;15(4):439-44.
13. Shmuel Avital, R Inbar, E Karin, R Greenberg. Is Doppler ultrasonography essential for hemorrhoidal artery ligation? Techniques in Coloproctology. 2012;16(4):291-4.
14. Knight JS, Senapati A, Lamparelli MJ. National UK audit of procedure for prolapsing haemorrhoids on behalf of the Association of Coloproctology of Great Britain and Ireland. Colorectal Dis 2003;10:440–5.
15. Brown SR, Tiernan JP, Watson AJ Biggs K, Shephard N, Wailoo AJ, et al. HubBLe Study team. Haemorrhoidal artery ligation versus rubber band ligation for the management of symptomatic second-degree and third-degree haemorrhoids (HubBLe): a multicentre, open-label, randomised controlled trial. The Lancet. 2016;388(10042):356-64.
16. Zagryadskiy E, Goreloc SI. Transanal doppler-guided hemorrhoidal artery ligation and recto anal repair vs closed hemorrhoidectomy for treatment of grade III-IV hemorrhoids. a randomized trial. Pelviperineology 201;30:107-2.
17. Jeong WJ, Cho SW, Noh KT, Chung SS. One year follow-up result of Doppler-guided hemorrhoidal artery ligation and recto-anal repair in 97 consecutive patients. Journal of the Korean Society of Coloproctology. 2011;27(6):298-302.
18. Daniil M, Inna T, Tatiana G, Mikhai B, Aftandil A, et al. Hemorrhoidal artery ligation with Doppler guidance vs digital guidance for grade II-III hemorrhoidal disease treatment. Study protocol clinical trial (SPIRIT Compliant). Medicine 2020;99(15):e19424.
19. Plapler H, Hage R, Duarte J, Lopes N, Masson I, Cazarini C, et al. A new method for hemorrhoidsurgery: intrahemorrhoidal diode laser, does it work? Photomed Laser Surg. 2009;27:819-23.
20. Maloku H, Gashi Z, Lazovic R, Islami H, Juniku-Shkololli A, et al. Laser hemorrhoidoplasty procedure vs open surgical hemorrhoidectomy: a trial comparing 2 treatments for hemorrhoids of third and fourth degree. Acta Inform Med. 2014;22:365–7.
21. Naderan M, Shoar S, Nazari M, Elsayed A, Mahmoodzadeh H, Khorgami Z, et al. A randomized controlled trial comparing laser intra-hemorrhoidal coagulation and Milligan–Morgan hemorrhoidectomy. J Invest Surg. 2017;30:325–31.
22. 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. Pol Przegl Chir. 2012;84(7):329–32.
23. Brusciano L, Gambardella C, Terracciano G, Gualtieri G, di Visconte MS, et al. Postoperative discomfort and pain in the management of hemorrhoidal disease: laser hemorrhoidoplasty, a minimal invasive treatment of symptomatic hemorrhoids. Updates Surg. 2020;72(3):851-7.
24. Deeba S, Mokalled I, Jaafar RF, Habib S, Doughan S. Hybrid Hemorrhoid Artery Ligation: A Novice Technique to Treat Non Reducing Hemorrhoids. Journal of Surgical Techniques and Procedures. 2019;3(1):1026.
25. Ramírez JA, Aguilella V, Elía M, Gracia JA, Martínez M. Doppler-guided hemorrhoidal artery ligation in the management of symptomatic hemorrhoids. Rev Esp Enferm Dig. 2005;97:97-103.
26. Giordano P, Overton J, Madeddu F. Transanal Hemorrhoidal Dearterialization: A Systematic Review. Diseases Colon Rectum. 2009;52(9):1665-71.
27. Yilmaz I, Sücüllü I, Karakaş DO, Özdemir Y, Yücel E, Akin ML. Doppler-guided hemorrhoidal artery ligation: experience with 2 years follow-up. Am Surg. 2012;78(3):344-8.
28. Giamundo P, Salfi R, Tibaldi MGL, Murru L, Valente M. The hemorrhoid laser procedure technique vs rubber band ligation: a randomized trial comparing 2 mini-invasive treatments for second- and third-degree hemorrhoids. Dis Colon Rectum. 2011;54(6):693-8.
29. Ferhatoglu MF, Kıvılcım T, Ekici U, Kebudi A. Laser hemorrhoidoplasty procedure for grade two and three hemorrhoidal disease. A retrospectively prospective study, analysis of forty-seven patients. OSP J Surg. 2019;1:101.

Cite this article as: De A, Roy P. Hybrid digitally guided hemorrhoidal artery ligation with laser hemorrhoidoplasty: our experience with a new approach to hemorrhoidal disease. Int Surg J 2021;8:2968-73.