

# I - GENERAL PART

## CHAPTER 1

### IMPORTANCE OF THE PROBLEM

### MOTIVATION OF THE STUDY

Although it is not a life-threatening condition, Hemorrhoidal Disease (HD) is an important health problem that, through its symptoms, frequent episodes and complications generated (sometimes worrying for the patient), negatively influences the quality of life of patients.

HD is a condition with a prevalence of around 10% in the general population in Europe and 4.4% in America (taking into account patients who see a doctor for this condition). 50% of the population has at least one episode of hemorrhoidal suffering during their life.

It represents the most frequent reason for which patients address to proctology offices. Among those who go to the doctor, **10% will benefit from surgical treatment.**

A comparative evaluation of admissions in the Bucharest Emergency Hospital shows that Hemorrhoids represent a total of 1.48% of the total surgical interventions and 18.26% of the total interventions in the proctological sphere, occupying the 3rd place after Rectal Tumors and Perianal suppurations (Table 1.1).

**Table 1.1** – Evaluation of Operations in the ano-perineal sphere

	<b>Disease</b>	<b>No (%) – 2011 2696 op</b>	<b>No (%) – 2021 1074 op</b>
1	Anorectal malignant tumors	46	29
2	Perianal abscesses	45	32
3	<b>Hemorrhoids</b>	<b>40 (18,26)</b>	<b>12 (13,33)</b>
4	Perianal fistulas	19	1
5	Anal fissures	10	1
6	Anal polyps	2	2
7	Rectovaginal fistulas	2	
8	Post-radiation rectal stenosis		1
9	Intraanal foreign bodies	1	1
10	Condyloma	1	
11	Pilonidal abscesses	53	11
	Total op perianal sphere	219 (8,12)	90 (8,38)

I chose this topic because of my personal interest in anorectal pathology and HD in particular. Coming into contact with a new treatment method, THD-RAR, and having the chance to practice it among the first in our hospital (in 2009), I quickly understood

the technique, the advantages and the benefits for the patient, which is why I sought to come up with arguments for its application by developing a series of studies on this topic in our hospital and in collaboration with other clinics, culminating in the crystallization of this doctoral thesis.

We set ourselves the problem of following the early and late results of this procedure, by developing some comparative studies in which to observe whether or not its superiority is supported vis-à-vis the traditional excisional methods. These studies were necessary to be able to scientifically support the introduction of THD-RAR in the current therapeutic protocols of HD. Likewise, the use of THD-RAR as a therapeutic method in the hospital should also be accepted by the Insurance Company in order to finance the consumables necessary for the application of this procedure.

## **CHAPTER 2**

### **ABBREVIATIONS, TERMINOLOGY**

**HD** = Hemorrhoidal Disease

**HAL** or **DG-HAL** = Hemorrhoidal Artery Ligation sau Doppler Guided Hemorrhoidal Artery Ligation – term similar to THD

**RAR** = RectoAnal Repair; Mucopexy

**THD** = Transanal Hemorrhoidal Dearterialisation

We define three terms right from the start:

**Hemorrhoidal cushions** – normal entities that describe some mucosal liftings that contain vascular agglomerations of the internal venous plexus

**Hemorrhoids** – pathological term describing the increase in size of hemorrhoidal cushions accompanied by a degree of prolapse

**Hemorrhoidal Disease** – all the symptoms that accompany the presence of hemorrhoids

## **CHAPTER 3**

### **THD-RAR HISTORY**

The treatment of Hemorrhoid Disease has gone through several stages in history that we could systematize in three periods:

1. **The period of empiric therapies** – is the period that corresponds to antiquity (until the middle of the 19th century) characterized by the crystallization of the first

terms related to hemorrhoidal disease, by the promotion of natural cures or by the application of intuitive treatment methods (cauterization of bleeding hemorrhoids, thread ligation or excision of prolapsed hemorrhoids).

2. **The period of classic surgical therapies** – this period is characterized by the improvement and promotion of excisional surgical techniques (Milligan-Morgan, Ferguson, Parks, Langenbeck, Whitehead and the romanian surgeon Vercescu who contributed circumferential excision).

3. **The period of modern minimally invasive therapies** - which could be characterized by the promotion of non-exceptional office techniques or the introduction of modern technologies (Doppler, Stapler surgery, LASER).

**The history of the THD** technique is related to the japanese surgeon *Morinaga* Kazumasa who in 1995 uses an special anoscope with a Doppler probe to detect the branches of the hemorrhoidal plexus. *Dal Monte* Pier Paolo *Tagariello* C. in 1999 associates the THD technique, mucopexy. *Ratto* Carlo also brings a series of changes sustaining the low ligature (DDD). *Giamundo* Paolo (2010) introduces the HeLP (Hemorrhoidal Laser Procedure) replacing the "X" thread suture with LASER wave coagulation.

In the Bucharest Emergency Clinical Hospital, the first interventions were performed in April 2009 by *Concetto* Salafia with a team led by *Lică* I., with whom other surgeons interested in modern treatment techniques for Hemorrhoidal Disease were trained over time.

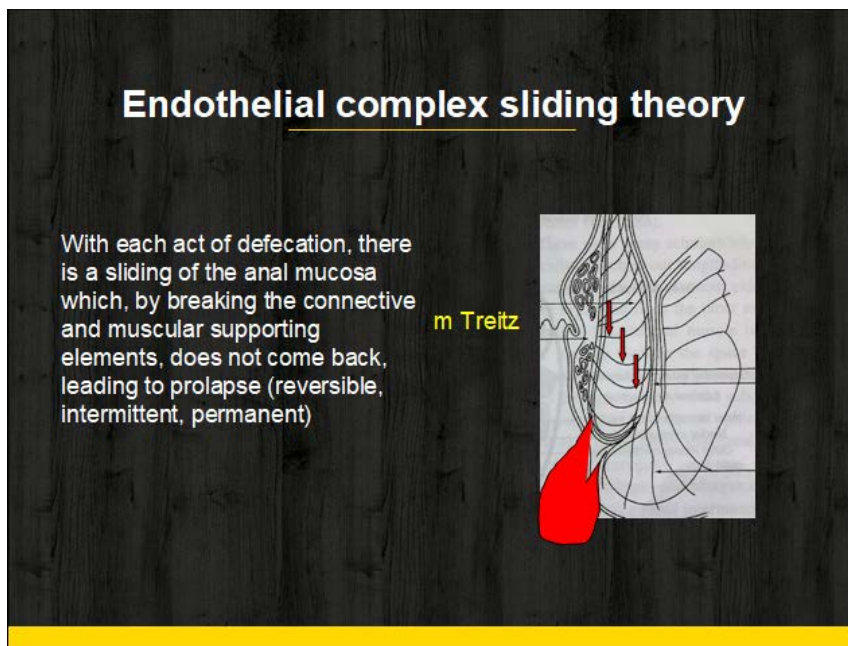
## **CHAPTER 4**

### **ANATOMY, PHYSIOLOGY AND PHYSIOPATHOLOGY OF HEMORRHOIDS**

Embryologically, the anal canal and the rectum have a different origin, hence the differences in epithelium, vasculature and innervation. The lower rectum is covered by mucosa, it has a venous plexus called the internal plexus in the submucosa (at the origin of internal hemorrhoids) whose blood flow is predominantly provided by the superior rectal artery, and the innervation is of a vegetative type that does not have pain receptors, while the anus is covered by stratified epithelium, presents under this epithelium a venous plexus called external plexus (at the origin of external hemorrhoids) supplied by the inferior rectal artery, and the innervation is of the somatic type showing numerous pain receptors.

From a pathophysiological point of view, there are several etiological theories of hemorrhoids:

1. Theory of vascular hyperplasia
2. **The theory of venous varicosities**
  - a. Local increase in intravenous pressure
  - b. Weakening of the resistance of the venous wall
3. **Endothelial complex sliding theory**
4. Theory of sphincteric hypertonia



**Figure 4.1** – Endothelial complex sliding theory

Varicose vein theory and sliding theory are the main pathophysiological theories. F. Aigner's studies showed the increase in the diameter and blood flow in the hemorrhoidal plexus in patients with HD and the anatomical studies showed the damage to the Treitz suspensor m. of the mucosa determined by its degeneration or overload in the defecation process. On the other hand J.P. Schuurman et al demonstrate that the number of branches supplying the internal hemorrhoidal plexus is not 3 as it was classically believed but *varies in number, position and diameter*.

The THD-RAR procedure intervenes in both of these two pathophysiological causes: it corrects the vascular inflow in the superior hemorrhoidal plexus by ligation of the branches of the superior rectal artery after their identification with the Doppler probe, while the RAR procedure completes the THD by correcting the hemorrhoidal



## CHAPTER 5

### DIAGNOSIS AND EVALUATION OF HEMORRHOIDS

The diagnosis of HD, although it seems simple, is often delayed or wrong, either because the patient does not show up to the doctor out of laziness or because of the fear of a serious diagnosis, or because of the incorrect or incomplete examination in which a specialist in this pathology is not necessarily involved.

**DIAGNOSTIC STAGES** – is based on Anamnesis, Clinical examination (Inspection of the anal region and rectal examination), exploration by Anoscopy, to which a series of additional explorations can be added: Rigid or flexible Proctoscopy, Colonoscopy (in patients over 50 years old, with uncharacteristic symptoms, disorders of transit), Transanal ultrasound, Functional explorations) according to the particularities and needs of each patient.

He will pursue the following objectives (Table 5.1):

**Table 5.1** – Stages of Hemorrhoid Disease diagnosis.

Diagnostic stages	Characteristics
<b>Diagnosis of disease</b>	The certainty of the association of symptoms with the disease
<b>Diagnosis of type and stage</b>	Internal-External, Stage I-IV Goligher
<b>Diagnosis of Complication</b>	Trombosis, Thrombophlebitis
<b>Diagnosis of Associated Ailments</b>	Fissure, Polyp, Abscess
<b>Differential Diagnosis with other Diseases</b>	Neoplastic diseases, Inflammatory diseases, Anal fissure

The problem of differential diagnosis arises first of all with neoplasias and then with Inflammatory Intestinal Diseases whose delay in diagnosis and treatment can lead to complications or endanger the patient's life.

**Table 5.3** – Differential diagnosis of HD according to the dominant symptom

	Symptom	Features
	Rectal bleeding	
1	Anal fissure	Bleeding associated with pain during defecation
2	Rectal ulcer	Seen at anoscopy (sigmoidoscopy)
3	Inflammatory colon disease	Characteristic lesions, Biopsy puts Dg
4	Villous tumors	Inflorescența anală, sângerează ușor la atingere
5	Malignant tumor (rectum, colon)	Occult bleeding +, TR Colono puts Dg
	Prolapse	
1	Rectal mucosal prolapse	It's circumferential and pink in color
2	Total rectal prolapse	It involves the entire rectal wall
3	Prolapsed polyps	They do not have the color and consistency of

		hemorrhoids
	<b>Anal pain</b>	
1	Anal fissure	Visible on inspection usually at 6 o'clock
2	Perianal abscess	Inflammatory signs. Puncture draws pus
	<b>Anal swelling</b>	
1	Hemorrhoidal thrombosis	External violaceous painful nodule
2	Skin tags	Skin fold at the anal edge
3	Anal polyps	It usually prolapses through the anus
4	Hypertrophic papilla	Visible on anoscopy
5	Condyloma acuminatum	Conopidiform formation, friable, bleeding
6	Anal tumor	Formation with an irregular, ulcerated surface

Correct classification is one of the main goals of the diagnosis because it is the basis of the choice of the therapeutic method and the evaluation of the postoperative results. The Goliger classification is currently the most used (Table 5.3).

**Table 5.4** – Goligher-Banov classification (modified)

Tip/Grad	Caracteristici	%
<b>Internal</b>		<b>80</b>
I	Dilated hemorrhoidal veins (Hemorrhoids); no prolapse	17,1
II	Hemorrhoids that prolapse during defecation and reduce spontaneously	47
III	Hemorrhoids that prolapse, and are manually reduced	20,1
A	Hemorrhoids that prolapse during defecation	
B	Hemorrhoids that prolapse even outside the act of defecation	
IV	Hemorrhoids that prolapse permanently and cannot be reduced	1,8
<b>External</b>		<b>5</b>
<b>Both</b>		<b>15</b>

The Masuda classification takes into account several parameters (P – the presence of prolapse, E – the presence of associated external hemorrhoids, C – the degree of circumferential extension of the hemorrhoids).

## CHAPTER 6

### TREATMENT OF HEMORRHOIDS

**THERAPEUTIC METHODS** used in the treatment of Hemorrhoidal Disease (HD) basically include three categories of treatments which obviously do not exclude each other but complement each other:

I. **Basic treatment:** 1. Measures for a healthy lifestyle; 2. Measures for proper defecation; 3. General treatments (a. Laxatives, b. Phlebotonics, c. Herbal teas or tinctures, d. Local treatments – Ointments or Suppositories, e. Antialgesic and Anti-inflammatory)

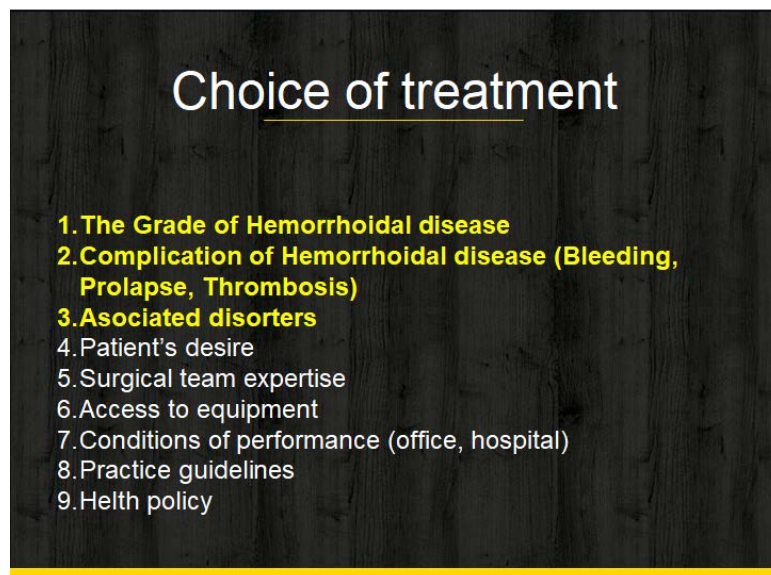
**II. Outpatient procedures:** 1. Rubber Band Ligation (RBL); 2. Sclerosing injections (IS) 3. Infrared Coagulation (IRC); 4. LASER coagulation; 5. Ultroid; 6. Radiofrequency Ablation (RFA); 7. Bipolar Diathermy (BD).

These procedures are based on the induction of a process of scarring fibrosis at the base of the hemorrhoid (by mechanical, chemical or thermal action), a process that has the consequence of reducing the vascular flow in the hemorrhoid and at the same time fixing the hemorrhoid in the anal canal.

**III. Surgical procedures** that include: 1. Classic excisional procedures (Milligan-Morgan, Ferguson, Parks), 2. The ligation-excision techniques and a number of modern techniques such as 3. THD-RAR and 4. PPH.

*Excisional techniques are still the gold standard* in the surgical treatment of HD due to the low percentage of recurrences.

The criteria for choosing the treatment are systematized in figure 6.1.



**Figure 6.1** – Criteria for choosing treatment for HD

**Principles when considering the type of HD approach:** 1. First we make sure that we have applied the basic recommendations to relieve symptoms; 2. The approach to surgical treatment will be done in stages - the less aggressive techniques first; 3. The presence of postoperative pain should be minimized as much as possible; 4. We will choose the procedure with the fewest postoperative complications; 5. We will choose the procedure with the fewest recurrences.

The tilting of the balance between risks and benefits, along with the patient's expectations will be the ones that will lead to the final choice.



## II – PERSONAL CONTRIBUTIONS

### CHAPTER 7

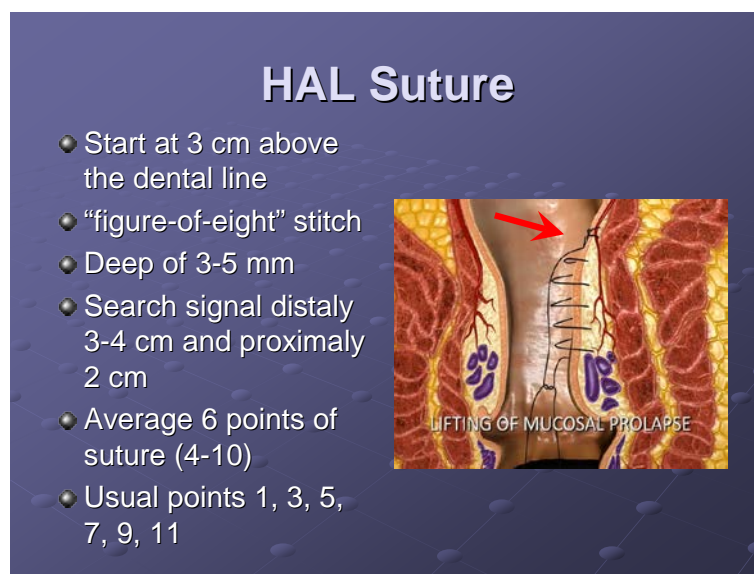
### THD-RAR TECHNIQUE

The THD-RAR intervention is a non-excisional mini-invasive operation based on two pathophysiological principles:

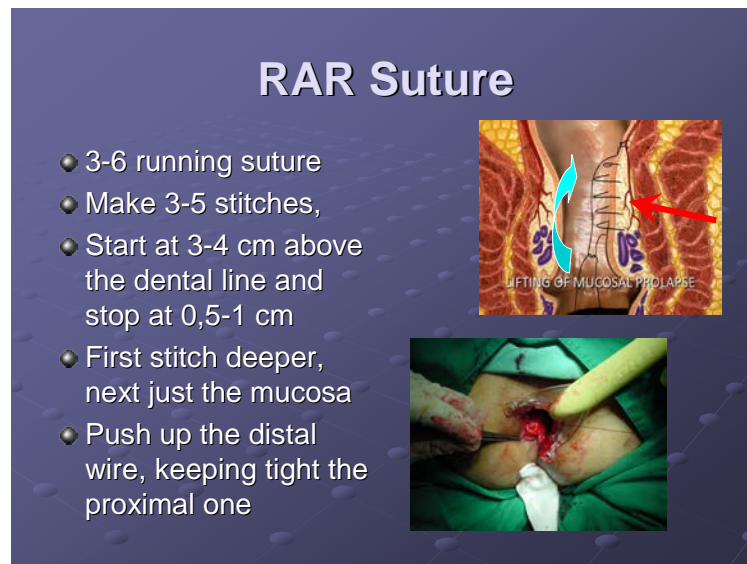
1. Decrease of blood flow in the internal hemorrhoidal plexus by echo-guided ligation of the branches of the superior rectal artery
2. Reduction of hemorrhoidal prolapse by inducing a process of fibrosis secondary to mucopexy performed by a muco-submucosal surge. Vascular ligature threads also contribute to this process to a lesser extent.

The THD-RAR technique requires dedicated wires and instrumentation. It also requires a special anoscope with a working window equipped with a Doppler miniprobe that transmits the signal to an external device, a signal that can be heard and visualized.

The first time of the intervention requires the passage of wires in an "X" in the areas of maximum signal that suture the branches of the superior rectal artery (6 on average but with variable number, position and depth). With the same wire or with an auxiliary wire (V-Loc), the surjet is practiced that grasps the rectal wall high and takes 3-5 steps towards the distal at about 4-5 mm from each other, stopping 5 mm from the pectinate line in order not to cause postoperative pain.



**Figure 7.5** – HAL (THD) suture



**Figure 7.6** – RAR suture (Mucopexy)

## PERSONAL CONTRIBUTIONS TO THE HAL-RAR TECHNIQUE

**Preparation of the intervention** - *must aim to check the functionality of the device and the availability of the instruments as well as a good collaboration with the anesthetist who must ensure an adequate tension (at least 120 mmHg) and a relaxation of the anal sphincter.*

**Initial assessment** – *we perform it before the start of the intervention to assess the extent and reducibility of the prolapse.*

**THD suture** – *it can be done both at high level and low looking for the strongest Doppler signal at both levels.*

**Rectopexy (RAR)** – *is indicated in patients with prolapse but it must be adapted to the location and vertical and horizontal extent of the prolapse.*

**Final evaluation** – *at the end of the procedure, we digitally and visually check the quality of the intervention.*

**The intrarectal message** – *Instead of the hemostatic sponge, we recommend the message with Hemorzon as a variant.*

**Associated operations** – *certain anorectal pathologies (Polyps, Skin tags, Fissures) we recommend to be treated simultaneously with the HAL-RAR prodeed.*

**Particular situations** – *in patients with increased friability of the rectal mucosa or coagulation disorders, we successfully applied the HAL procedure without particular complications.*

**Correlation with other Proceedings –** *THD-RAR can follow other surgical therapeutic procedures performed for HD in the antecedents, it can be followed by a new HAL-RAR procedure or Ligation-Excision or Hemorrhoidectomy in case of more or less complex prolapse recurrence.*

## **CHAPTER 8**

### **TECHNICAL VARIATIONS OF THE THD-RAR PROCEDURE**

In order to understand all the possibilities related to this procedure we have made an exhaustive study of all types of devices and instruments on the medical market and all technical variants of THD-RAR or related variants.

#### **Variants of the THD-RAR technique:**

- THD with low or high ligature – the low ligature variant (supported by C. Ratto) is done closer to the pectinate line (1-1.5 cm) having the advantage that the vessels are more superficial and easier to detect and with more ligature sure, but more in number.

- THD with or without RAR (Mucopexy) – for grade I-II hemorrhoids or with partial prolapse, mucopexy can be omitted or the number of sutures can be adapted to the areas of prolapse, knowing that in this way the technique also simplifies postoperative pain are smaller.

- RAR without THD – supported by C. Iachino. M. Tagliabue applying an empirical suturing and mucopexy technique at 1, 3, 5, 7, 9, 11 o'clock without Doppler guidance stating that postoperative results are comparable.

#### **Derivative techniques:**

- HeLP (Hemorrhoid Laser Procedure) – is a derived technique in which Doppler detected vessels are coagulated with LASER wave.

- HPS (HemoPex System) – is the RAR suture device without THD.

- Emboroid is an interventional radiology technique in which the embolization of the upper rectal branches is practiced.

#### **Device models:**

- The THD system manufactured by Balmer S.A. and THD S.p.A. Italy

- AMI HAL-II and AMI Trilogy systems manufactured by AMI GmbH Austria

- Hemo-Dop System manufactured by Compumedics DWL Doppler Company

- HeLP system manufactured by Biolitec with LASER wave

**Figure 8.3** – THD system**Figure 8.4a** – A.M.I. HAL-II system

## CHAPTER 9

### TIPS AND TRICKS ABOUT THD-RAR TREATMENT

One of the important elements of ensuring the efficiency of the THD-RAR technique is next to the correct choice of cases and the correct execution of the technique. The avoidance of unwanted incidents and accidents and the late results of the operation depend on this.

*We consider the learning curve for this method to be 10 operations.*

**Categories of elements** in the training process:

1. Understanding the anatomical, physiological and pathophysiological principles on which this surgical technique is based;
2. Knowledge of the device and materials required for the intervention;

3. Knowing the main intervention times;
4. Knowing how to avoid unwanted intraoperative events.

**Types of incidents and accidents** we have encountered:

1. Incidents related to insufficient knowledge of the device or lack of testing it  
Incidente legate de lipsa unor dispozitive sau consumabile de rezervă
2. Incidents related to insufficient visibility
3. Accidents related to the inappropriate use of tools
4. 4. Accidents related to non-compliance with technical principles

**Table 9.2** – Decalogue of THD-RAR

<b>DECALOGUE OF THD-RAR</b>	
1	<b>Do not</b> start intervention before testing the device
2	<b>Do not</b> perform the procedure without adequate lighting
3	<b>Do not</b> use but the instruments and threads specifically dedicated to the procedure
4	<b>Do not</b> allow a systolic BP less than 120 mmHg during the procedure
5	<b>Do not</b> use jerky movements when passing the needle through the rectal wall
6	<b>Do not</b> hesitate to use an auxiliary port to secure the needle as it exits the rectal wall
7	<b>Do not</b> loosen thread tension after passing the first stitch when performing the "8" stitch of the THD procedure
8	<b>Do not</b> push but only the distal wire while keeping the proximal wire taut when tightening the mucopexy suture
9	<b>Do not</b> extract the proctoscope with forceful movements, use rotation and index to protect the mucosa
10	<b>Do not</b> insert unlubricated hemostatic sponge or gauze

## CHAPTER 10

### HD TREATMENT BY THD-RAR IN SPECIAL CONDITIONS

**Introduction:** The prevalence of hemorrhoids in the general population ranks first among benign anorectal conditions. In the last 20 years, however, the number of cases operated on for hemorrhoidal disease has decreased and consequently the experience of surgeons in treating this condition has decreased, and even less cases with complex associated pathologies that sometimes pose special treatment problems.

**Materials and Method:** we studied the articles published in the period 1990-2020, with reference to the special conditions in patients with hemorrhoidal disease (Young, Elderly, Pregnant woman, Coagulation disorders, Immunosuppressive

**conditions, Inflammatory colonic diseases, Cirrhosis, Renal failure, Neurological diseases, Associated perianal conditions). The recommendations we made were based on the critical review of these results with special reference to the Transanal Hemorrhoidal Disarterialization (THD) technique.**

Discussion: Our experience using THD-RAR in special situations is encouraging. However, the particularities of the diseases in which we intervene must be taken into account, so as to correct any associated deficits (anemia, coagulation disorders, treatment of acute pustules) and to choose the optimal moment for surgical treatment. We will also take into account that in some conditions this treatment is still in the evaluation phase.

Performing THD-RAR in acute complications of hemorrhoidal disease (Incarcerated Hemorrhoids Hemorrhoidal Thrombosis) is contraindicated. Medical treatment followed where needed within 30 days of THD-RAR surgery is preferred.

In the elderly patient, the intervention is indicated in case of bleeding or prolapse except for cases with anal stenosis or severe incontinence.

In pregnant women, conservative treatment is preferred, with surgical intervention generally performed after the third month.

In patients with coagulation disorders, THD-RAR is preferable to hemorrhoidectomy as it has a lower risk of bleeding.

In patients with inflammatory diseases (Ulcerative colitis, Crohn's disease), THD causes minimal aggression on the rectal mucosa, being preferable to more aggressive excisional techniques. It should be noted that in the case of Crohn's disease, the time of intervention must be chosen during a period of remission of the disease.

In patients with Portal hypertension, surgical intervention should be avoided, but where bleeding persists and depending on their hemorrhoidal or variceal source, THD-RAR surjet can be successfully performed, also having a hemostatic role in the case of varices. Correction of coagulation disorders and thrombocytopenia should be considered.

The patient with chronic renal failure can be operated in good conditions by THD-RAR taking care of the maneuvers of the anoscope that can accidentally damage the mucosa and careful control of hemostasis at the end of the intervention.

**Table 10.1** – Cases with Special Situations operated in BCEH through THD-RAR

<b>Nr = 9</b>	<b>Affection</b>	<b>Early Complications = 1</b>
3	Chronic renal failure	1 - Rebleeding
2	Charcot-Marie-Tooth disease	
2	Incarcerated hemorrhoids	
2	Hemorrhoids in pregnant women (postpartum)	
		<b>Late Complications = 3</b>
		3 – Relapses (1 – HAL-RAR) 1 – HAL-RAR 1 – Hemi-Whitehead 1 – RBL

**Conclusions:** It is clear that the physiological peculiarities of various stages in human evolution influence hemorrhoidal disease. The association of special conditions or conditions that influence the symptomatology and evolution of hemorrhoids, requires understanding in their close interdependence.

In some situations it is necessary to treat the associated condition simultaneously (Coagulation disorders, Immune disorders, Inflammatory colonic diseases), in others it is necessary to adapt the hemorrhoidal therapeutic technique to the particularities induced by the associated condition (Old age, Pregnancy, Associated perianal conditions, Cirrhosis, Renal insufficiency).

Although hemorrhoidal disease is not a severe condition, it can affect the patient's social life or lead to unwanted complications or reoperations if the therapeutic attitude is not adapted to the patient's associated conditions.

THD-RAR is a modern method, with proven effectiveness for hemorrhoidal bleeding and hemorrhoidal prolapse stage II-III, and which, *due to the minimal damage to the mucosa, minimal direct vascular damage and the lack of leaving bare areas, can represent a minimally invasive surgical solution in patients at risk increased associated: Elderly, Associated coagulation disorders, Immunosuppression, Diseases with inflammation, Friability or deficient scarring of the rectal mucosa, situations approaching the percentage of 20%.*

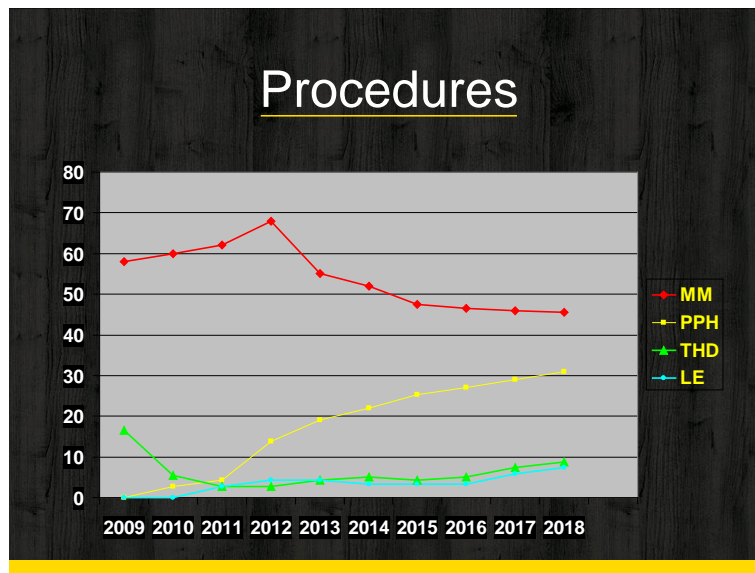
Knowing all these situations, their particularities, the influence they sometimes have on the evolution of hemorrhoidal disease, is important in making the best decision regarding the treatment of hemorrhoidal disease.

## CHAPTER 11

### TRENDS IN THE TREATMENT OF HD THD-RAR PLACE

**Objectives:** the paper aims to evaluate the evolution of surgical techniques applied in the treatment of hemorrhoidal disease, taking as terms of comparison the evolution in time (10 years) and space (eastern - Romania and western - Great Britain).

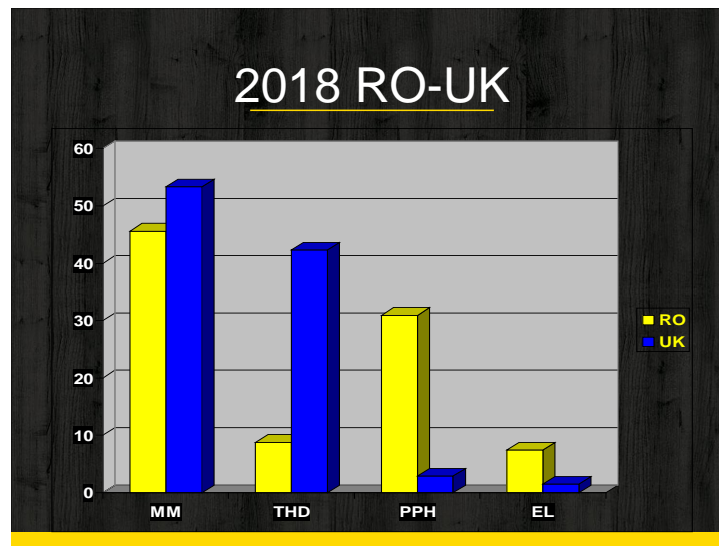
**Material and method:** we performed a comparison on the cases of hemorrhoids operated on in Bucharest Clinical Emergency Hospital (BCEH) between 2008-2018 and between BCEH and Reign Elizabeth King's Lynn Hospital (REKLH) in 2018, highlighting the types of operations performed, the factors that influenced their choice and current trends.



**Figure 11.4** – Procedures performed in BCEH during 2008-2018

**Results:** We observed a decrease in the number of hospitalized hemorrhoid cases by about 5% per year, these reaching the outpatient services. In BCEH, the percentage of operated cases reaches 25-32% with a tendency to increase the percentage. If in 2008 resection interventions prevailed, reaching 90%, being the preferred open procedures of the Milligan-Morgan (MM) type, in 2018 the mini-invasive procedures of the RBL type (7.4%), THD (8.8%), PPH (30, 9%) end up exceeding 50% of the performed operations. In REKLH, miniinvasive procedures reach a much higher THD percentage (44.2%), tending to exceed MM.





**Figure 11.5** – Frequency of Operations for HD - Comparison BCEH (Romania) - REKLH (United Kingdom)

The ideal qualities that a therapeutic technique addressing BH should meet are summarized in Figure 11.8.



**Figure 11.8** – Applying the criteria of an ideal condition to THD-RAR

THD-RAR meets all these criteria, except for accessibility (few centers with the necessary equipment and few doctors who know the technique) and price (if the home does not pay for the consumables, they are purchased by the patient).

The THD-RAR method has many advantages proven by numerous studies: It is a mini-invasive technique that does not modify the local anatomy; It addresses the two main pathophysiological changes of the disease – the reduction of vascular flow and the weakening of the supporting structures; The method can be performed on an outpatient basis; Postoperative pain is low (adding the RAR procedure improves distant prolapse outcomes but is associated with greater postoperative pain; The low rate of early

complications, which are in the category of minor complications according to the Dindo-Clavier classification (cited mainly for TDH+RAR – Early pain, Tenesmus 12%, Urinary retention 8.6%, Bleeding 4%); Good long-term results (recurrence rates approaching the gold standard – HE – in the THD-RAR procedure, 2.4% for bleeding and 6.3% for prolapse).

However, the procedure also has some disadvantages: The external component cannot be resolved by HAL-RAR; Postoperative scars or fibrous reaction accompanying old prolapses can negatively influence the process of mucosal ascent reproduced by the RAR procedure; The price factor - can negatively influence the choice of the method either due to the health policy of the respective health facility or, if the operation takes place privately, due to the negative option of the patient who is not willing to pay the price of the device; The relatively high percentage of prolapse recurrences for the THD method (22% stated by Morinaga), a disadvantage overcome by the association of RAR.

**Conclusions:** It is obvious the tendency of mini-invasive procedures to increase as they became known, more accessible and proved their efficiency. The choice of the procedure depends on factors related to the patient - the degree and complications of the hemorrhoidal disease, the associated conditions, the patient's desire. On the other hand, in Romania the expertise of the surgical team, the equipment and the conditions of performance (inpatient-outpatient) greatly influence the choice, while in the UK the policy of the health unit dictates the choice made.

## **CHAPTER 12**

### **THE COST-EFFECTIVENESS RATIO**

#### **COMPARISON OF THD-RAR WITH HE (Statistical Study)**

**Introduction:** Choosing the optimal treatment for Hemorrhoidal Disease (HD) still poses problems for both patients and physicians. Although the THD-RAR technique has proven its superiority regarding postoperative complications, the length of hospitalization, the time of social reintegration compared to Hemorrhoidectomy (HE), it still has a low weight below 10% in our hospital, the main reason being the cost of consumables. We set out to study the veracity of this factor.

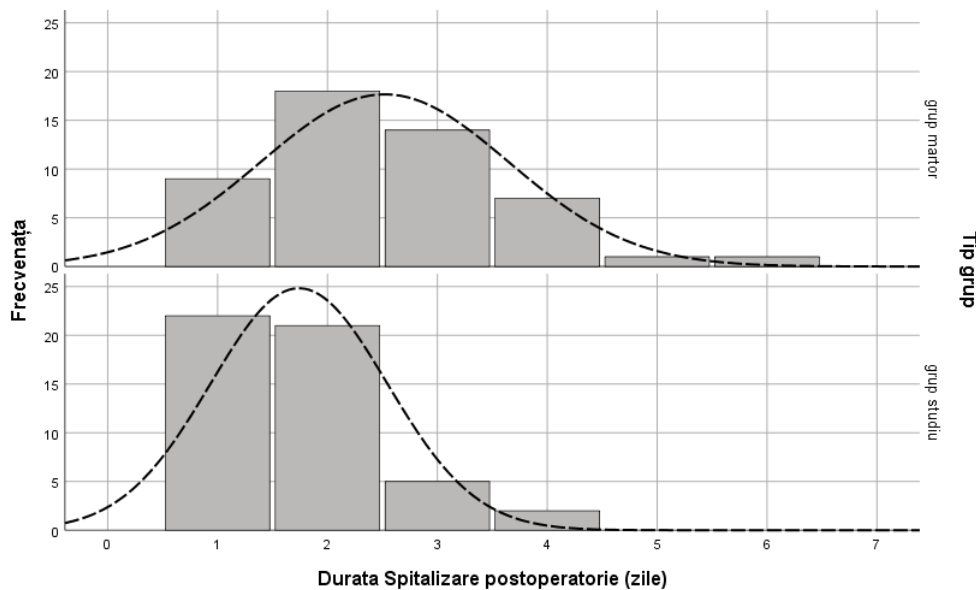
**Material and method:** We performed a case-control study in the period 2009-2022 in BCEH in which we evaluated two groups of 50 patients each, operated by the THD-RAR method and HE respectively. We had as the main objective the comparison of average hospitalization costs and as secondary objectives the evaluation of

postoperative hospitalization, complications, relapses, the influence on the final cost of social costs.

**Results:** Financially, the elderly had a lower accessibility to THD-RAR. Internal hemorrhoids predominated in the THD-RAR group and small ones in the HE group (64% and 48%, respectively;  $p < 0.001$ ). Bleeding was the dominant symptom predominated in the THD-RAR group versus prolapse in the HE group while in the HE group it was prolapse. The mean operation time was longer in the THD-RAR group compared to HE (48 and 56 min respectively; not significant). The significantly longer postoperative hospital stay in the OH group compared to the THD-RAR group (2.52 versus 1.74 days;  $p < 0.001$ ) (Table 12.11, Figure 12.9), obviously influenced the hospitalization expenses (4127 compared to 2403 RON;  $p < 0.001$ ). Thus, although the expenses with the operation were higher for THD-RAR compared to HE, in the end summing up the hospitalization expenses and the social expenses, the difference tilted in favor of HE (by 1373 RON).

**Table 12.11.** Comparison of groups by length of postoperative hospital stay

Post-operative hospitalization (days)	min	max	<i>m</i>	<i>sd</i>	<i>md</i>	<i>sk</i>	<i>k</i>	K-S
Control group	1	6	2,52	1,13	2,00	0,71	0,61	0,22**
Study group	1	4	1,74	0,80	2,00	1,01	0,77	0,26**

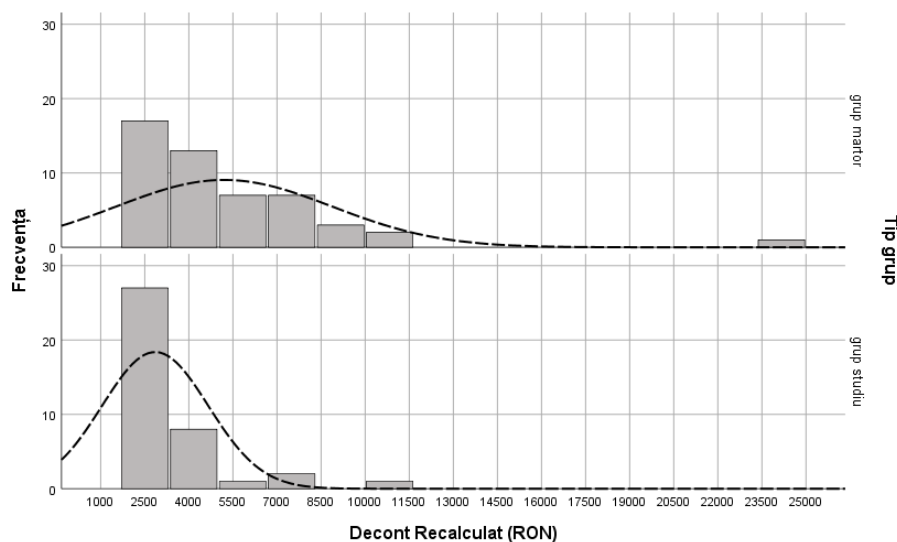


**Figure 12.9** – Postoperative Hospitalization Distribution

**Table 12.14.** Revised checkout

Revised Checkout	min	max	<i>m</i>	<i>sd</i>	<i>md</i>	<i>sk</i>	<i>k</i>	K-S
Control group	1697	24274	5198,85	3667,85	4127,00	3,12	14,25	0,18**
Study group	1173	10815	2852,81	1808,14	2403,00	2,54	7,90	0,26**

ote: *m* – arithmetic mean, *sd* – standard deviation, *md* – median value, *sk* – skewness coefficient, *k* – skewness coefficient, K-S – Kolmogorov-Smirnov normality test value

**Figure 12.11** – Distribution Recalculated settlement (RON)**Table 12.15.** Analysis of expenses by Cost Types

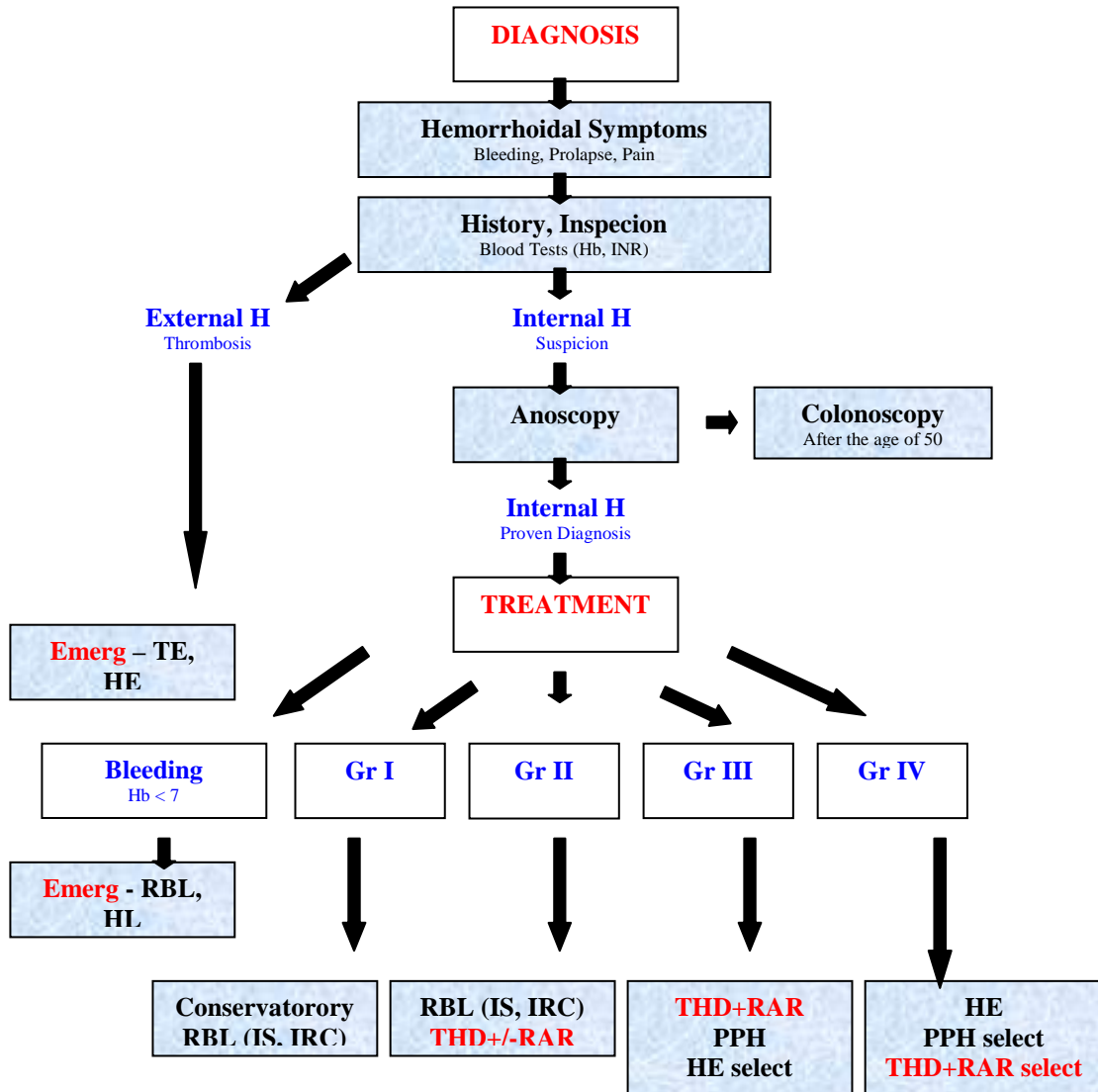
Costs (RON)	THD	HE
<b>I – Procedural Costs</b>		
Apparatus amortization	260	-
Instrumental amortization	37	110
Anoscope (consumable)	1576	-
<b>II – Hospitalization costs</b>		
Revised checkout	2403	4127
<b>III – Social Costs (SL days)</b>		
SL days during the hospitalization	228	330
SL days upon discharge	655	1965
<b>Total =</b>	<b>5159</b>	<b>6532</b>

**Conclusions:** Our study shows that if we subtract from amortization expenses, savings made from hospital expenses and social expenses then the THD-RAR balance against HE will be in favor of THD. THD-RAR must take its place both in hospitals' own therapeutic protocols and in national guidelines, being a cost-effective method.

# CHAPTER 13

## PROTOCOL AND ALGORITHM GUIDELINES FOR THE DIAGNOSIS AND TREATMENT OF HD

### DIAGNOSTIC AND TREATMENT ALGORITHM OF HEMORRHOIDAL DISEASE



---

---

## BIBLIOGRAPHY

1. Aigner F, Bodner G, Conrad F et al. The superior rectal artery and its branching pattern with regard to its clinical influence on ligation techniques for internal hemorrhoids. *Am J Surg.* 15; 187: 102-108. doi:10.1016/j.amjsurg.2002.11.003.
2. Alshreef A, Wailoo A, Brown S et al. Cost-effectiveness of Haemorrhoidal artery ligation versus Rubber band ligation for the treatment of grade II-III haemorrhoids: analysis using evidence from HubBL e trial. *PharmacoEconomics Open.* 2017; 1: 175-184.
3. Azimuddin K. Diagnosis. In Khubchandani I, Paonessa N, Khawaja A, eds. *Surgical treatment of hemorrhoids.* 2<sup>nd</sup> ed. Springer-Verlag, London, 2009: 19-32.
4. Dal Monte PP, Tagariello C, Sarago M, et al. Transanal haemorrhoidal dearterialisation: nonexcisional surgery for the treatment of haemorrhoidal disease. *Tech Coloproctol* 2007; 11: 333-338.
5. Giamundo P. Advantages and limits of hemorrhoidal dearterialization in the treatment of symptomatic hemorrhoids. *World J Gastrointest Surg.* 2016; 27(8): 1-4.
6. Lohsiriwat V. Anatomy, physiology and pathophysiology of hemorrhoids. In Ratto C et al. *Hemorrhoids, Coloproctology 2.* Springer International Publishing AG. 2018:9-17.
7. Mehic R, Chiotoroiu AL, Beuran M. Tendințe moderne în diagnosticul și tratamentul bolii hemoroidale. *Ro J Med Pract.* 2018; 13(1): 47-53.
8. Mehic R, Indreica Veronica, Marcu Vasilica, Beuran M, Chiotoroiu AL. Special conditions in the treatment of hemorrhoidal disease. The advantages of THD-RAR in the treatment of hemorrhoidal disease in these situations. *Ro Med J.* 2020; 67(3): 259-267.
9. Mehic R, Diaconeasa Alexandra, Beuran M, Chiotoroiu A. The place of mini-invasive Transanal Hemorrhoidal Dearterialization and Rectopexy technique in the treatment of hemorrhoidal disease, an evaluation from cost-effectiveness point of view. *Ro J Med Pract.* 2023; 18(1): 20-27.

10. 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 flowmeter. *Am J Gastroenterol.* 1995; 90: 610-613.
11. Papilian V. Anatomia omului. Splanhnologia. ed. Bic All, București, 2006: 111-120.
12. Ratto C, Parello A, Litta F, De Simone Veronica. Dearterialization of hemorrhoids and mucopexy: Techniques and results. In Ratto C et al. Hemorrhoids, Coloproctology 2. Springer International Publishing AG. 2018:9-17.
13. Ratto C, Parello A, Litta F, De Simone Veronica, Grossi U. Clinical assessment of hemorrhoids. In Ratto C et al. Hemorrhoids, Coloproctology 2. Springer International Publishing AG. 2018:35-45.
14. Satzinger U, Wolfgang F, Glaser K. Recto Anal Repair (RAR): a viable new treatment option for high-grade hemorrhoids. One year results of a prospective study. *Pelvipерineology.* 2009; 28: 37-42.
15. Schuurman JP, Go PMNYH, Bleys RLAW. Anatomical branches of the superior rectal artery in the distal rectum. *Colorectal Dis.* 2009; 11:967-71.
16. Sheyer M, Antonietti E, Rollinger G, Lancee S, Pokorny H. Hemorrhoidal artery ligation (HAL) and rectoanal repair (RAR): retrospective analysis of 408 patients in a single center. *Tech Coloproctol.* 2015; 19(1): 5-9.
17. Walega P, Scheyer M, Kenig J et al. Two-center experience in the treatment of hemorrhoidal disease using Doppler-guided hemorrhoidal artery ligation: functional results after 1-year follow-up. *Surg Endosc.* 2008; 22: 2379-2383.
18. Yang HK. Diagnosis of hemorrhoids. in Hemorrhoids. Springer-Verlag, Berlin Heidelberg, 2014: 25-40.