



## The ligament of Parks as a key anatomical structure for safer hemorrhoidectomy: Anatomic study and a simple surgical note



Menelaos Zoulamoglou<sup>a</sup>, Ioannis Kaklamanos<sup>a</sup>, Maria Zarokosta<sup>a,b,\*</sup>, Ioannis Flessas<sup>a,b</sup>, Vasileios Bonatsos<sup>a</sup>, Theodoros Piperos<sup>a,b</sup>, Panagiotis Theodoropoulos<sup>a</sup>, Georgia Barla<sup>a</sup>, Ioanna Stathopoulou<sup>a</sup>, Theodoros Mariolis-Sapsakos<sup>a,b</sup>

<sup>a</sup> University Department of Surgery, General and Oncologic Hospital of Kifissia "Agii Anargiri", Athens, Greece

<sup>b</sup> Anatomy and Histology Laboratory, School of Nursing, University of Athens, Greece

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### ABSTRACT

Hemorrhoids are a common anal disorder which affects both men and women of all ages. One out of ten patients with hemorrhoidal disease, requires surgical treatment. Unfortunately though, hemorrhoidectomy is closely related to complications that can be present early or late postoperatively. In the present manuscript, the safe surgical technique which emphasizes to the identification of the key anatomical structure of the ligament of Parks (Trietz's muscle) is adequately described. A total of 200 patients with grades III and IV hemorrhoids, underwent Milligan-Morgan or Ferguson's hemorrhoidectomy. The mucosal ligament of Parks was identified to all patients and was used as a key anatomical structure through the excision of the hemorrhoids. Its identification guides surgeons during the operation and reduces the major problem of postoperative complications. Finally, since the mucosal ligament of Parks represents a constantly identifiable landmark, it allows simple and reliable identification of the internal sphincter muscle and minimizes the probability of postoperative complications.

### 1. Introduction

Hemorrhoidal disease is a common anal disorder which affects both men and women of all ages [1–3]. Hemorrhoids are defined as the enlargement and displacement of the anal cushions [4] that may lead to a variety of symptoms which determine the choice of treatment. One out of ten patients though, requires surgical treatment [5]. Unfortunately, conventional hemorrhoidectomy is related to unpleasant complications that can be present early or late postoperatively [1]. In the present manuscript, after the successful performance of hemorrhoidectomy on 200 patients with grades III and IV hemorrhoids, the safe surgical technique which emphasizes to the identification of the key anatomical structure of the ligament of Parks (Trietz's muscle) is adequately described.

### 2. Methods

During the period 2000–2016, 96 men and 94 women with ages from 23 to 85 proceeded to our institution.

From this total of 200 patients, 106 patients (53%) had grade III and 94 (47%) had grade IV hemorrhoids. None of the patients had any severe comorbidity that could exclude the probability of conventional

hemorrhoidectomy under general anesthesia.

Preoperatively a phosphate enema is administrated to the patient for clearance and better approach to the operative field. In addition, one dose of metronidazole is administrated as antibiotic prophylaxis, two hours before the onset of the surgery. One more dose of the antibiotic is routinely administrated to the patient postoperatively as well. All patients were operated under general anesthesia. Patients underwent Milligan-Morgan or Ferguson's hemorrhoidectomy, placed in lithotomy position, knees flexed (Fig. 1).

### 3. Technique presentation

#### 3.1. Milligan-Morgan procedure

Based on Milligan-Morgan technique, three Foerster clamps were placed on the peri-anal skin, along the axis of the hemorrhoidal pedicles (3, 7, 11 o'clock). Then, three other Foerster clamps were placed at the same points, at the dentate line of the anal canal. A solution of xylocaine with 1% epinephrine was administrated subcutaneously at the level of each hemorrhoidal pedicle, below the dentate line in order to minimize bleeding during the dissection. Afterwards, three Kelly clamps were placed on the rectal mucosa at the same points (3, 7, 11

\* Corresponding author. Anatomy and Histology Laboratory, Nursing School, National and Kapodistrian University of Athens, Papadimitriou 123, Goudi, Athens 15773, Greece.  
E-mail addresses: [mzarokos@nurs.uoa.gr](mailto:mzarokos@nurs.uoa.gr), [mzarokosta@gmail.com](mailto:mzarokosta@gmail.com) (M. Zarokosta).



Fig. 1. Prolapsing hemorrhoids.

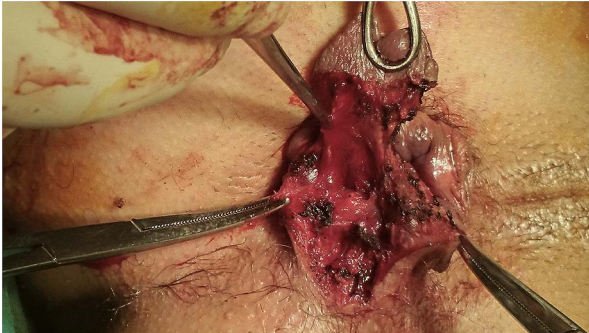


Fig. 2. Dissecting in the submucosal plane in order to divide the Parks' ligament.

o'clock).

All pedicles were meticulously dissected and only a mucocutaneous bridge was maintained between each pedicle. Hence, a cutaneous triangle of exposure was created (Fig. 2). The inside summit of this triangle is defined by the second Foerster clamp. The dissection continued progressively and in the submucosal level, below the level of the dentate line, the mucosal ligament of Parks was identified (Fig. 3). The Parks' ligament (Triezt's muscle) passes through the internal sphincter muscle and fixes the submucosal tissues to the conjoined longitudinal muscle. This anatomic landmark that is consisted of mucosal suspensory ligament and anal submucosal muscle, was promptly divided and below it, the muscular fibers of the internal sphincter were revealed. In fact, this ligament was used as the lateral border of dissection. Subsequently, surgeons swept the internal sphincter muscle upwards with a gauze, in order to perform a safe excision of the hemorrhoidal pile without any potentiality of accidental muscular damage. Then, each pedicle was ligated with absorbable sutures. Additionally, the preserved mucocutaneous bridges were placed inside-out with a Chaput-Mayo grasper in order to remove the underlying remaining hemorrhoidal tissues. Finally, division of the pedicles with the cautery was performed with emphasis to careful hemostasis, for avoidance of postoperative

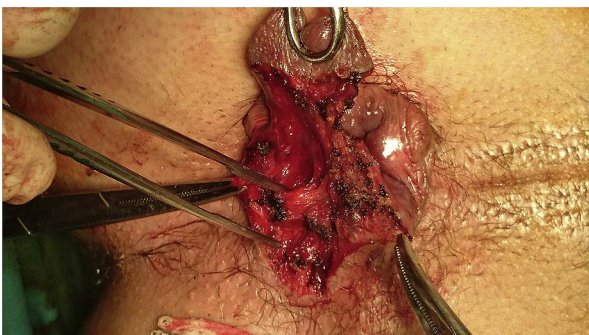


Fig. 3. The identified mucosal ligament of Parks' pointed with the anatomic clamp.

bleeding, and a wound dressing was placed.

### 3.2. Ferguson's procedure

According to the basic steps of closed pedicular hemorrhoidectomy, at first, a Hill - Ferguson retractor was inserted in the anus, a Kelly clamp was used to retract the hemorrhoid pedicle and an incision of elliptic shape around the hemorrhoidal pile was meticulously performed. Then, a grasper was used for the elevation of the hemorrhoidal tissue and its bordering mucosa. The dissection was performed through the skin that is suited 1 cm above the dentate line of the anal canal. At the lateral border of the incision the Parks' ligament was identified and divided by the surgeons. Beneath this mucosal ligament, the white in colour internal sphincter was revealed and swept away with a gauze in order to remain intact during the procedure. Then, the borders of the incision's wound were elevated so that remnants of hemorrhoidal tissue could be dissected and suture closure of the rectal mucosa without tension could be achieved. The pedicle is suture-ligated with absorbable suture and then, the same suture is used for closure of the mucosa, the anoderm and the skin respectively. When surgeons encounter more than one hemorrhoid, each hemorrhoidal group is progressively treated in the same fashion.

### 3.3. Postoperative care

All patients were discharged with instructions the 2nd or 3rd postoperative day. In fact, apart from the essential hygiene, the patients were advised by the clinicians to use a stool softener, since it reduces pain of the first defecation and prevents probable postoperative constipation. They were also fostered to increase their intake of dietary fiber, water and fluids and decrease their intake of fat.

## 4. Results

From this total of 200 patients, 96 patients underwent Ferguson's (48%) and 104 patients (52%) underwent Milligan-Morgan's hemorrhoidectomy. The mucosal ligament of Parks was identified to all patients and hemorrhoidectomy was successfully performed. In particular, surgeons used the Parks' ligament as the lateral border of dissection, since the internal sphincter muscle is located just above it.

All the patients reported first defecation between the first and second postoperative day and none complained of fecal incontinence or urinary retention.

Nevertheless, in two patients who underwent Milligan-Morgan hemorrhoidectomy, hemorrhage occurred the first postoperative day. Compression was sufficient to control both these incidents. Additionally, one patient who underwent the same procedure presented fever the first postoperative day. The infection was wed out with the administration of metronidazole and ceftriaxone.

Patients were also examined at 2 weeks after surgery, and none of them presented any complication. At 6 months thereafter only 143 patients proceeded for anoscopic inspection and had no any post-operative complication, such as prolapse, bleeding, anal stenosis or defecation pain.

## 5. Discussion

The armamentarium for hemorrhoidal disease includes several treatments such as Doppler-guided hemorrhoidal artery ligation [2,6] plication and stapled hemorrhoidopexy [4]. Nevertheless, for patients with grades III and IV hemorrhoids, surgery is the most common choice of treatment and it is considered as the gold standard among procedures [3,6].

Surgery should be proposed to symptomatic patients after receiving an accurate history, performing clinical examination and colonoscopy or anoscopy for verification of the diagnosis of hemorrhoidal disease.

Although efficient, conventional hemorrhoidectomy is closely related to complications that can be present early or late postoperatively. Indeed, urinary retention, postoperative pain, anal incontinence, anal stenosis, bleeding and infection have been reported [1,7]. Such complications can be prevented by emphasizing to the identification of the Parks' ligament (Trietz's muscle) as performed in the presented manuscript.

The ligament of Parks is consisted by muscular fibroplastic tissue that is located around the glands of the anus [8] and supports the hemorrhoidal plexus of the anal canal [2]. When the hemorrhoid cushions get enlarged and prolapsed, this mucosal ligament stretches and becomes irreversibly separated into pieces. Indeed, it seems to present the most important anatomic structure in the formation of hemorrhoid cushions [9].

This ligament tethers the dentate line of the anal canal with the internal sphincter muscle. It divides the anatomical space between the anal epithelium and the internal sphincter in two separate parts. Above the ligament, the submucous space is identified, containing the terminal part of the hemorrhoidal vessels. Below the ligament, lies the peri-anal space [10]. The mucosal ligament is cushion tissue in the anus, overwhelmed with blood vessels, that could be a synonym of hemorrhoid tissue [9].

Either surgeons perform Milligan-Morgan [8] or Ferguson's operation [11] as performed in the present manuscript, while dissecting the submucosal tissue, below the level of the dentate line, they should identify the ligament of Parks. After dividing the mucosal ligament, surgeons acquire direct exposure of the internal sphincter. Subsequently, they can sweep away the muscular fibers so that they are able to dissect the hemorrhoids without damaging the muscle. Hence, the risk of anal incontinence can be minimized. Moreover, by emphasizing to the identification of Parks' ligament, excessive removal of the rectal mucosa and of the anoderm can be eliminated. Such strained excision of the anoderm and the rectal mucosa, may lead to avoidance of anal strictures.

Providing the ample sample of this study, the findings reveal that the Parks' ligament may guide surgeons during the operation, so that accidental damages and subsequent postoperative complications can be eliminated. Therefore, surgeons should be fostered to pay particular attention to the identification of this key anatomical structure. Unfortunately, the limitation of the study is the absence of follow-up of 57 patients at six months, who did not proceed.

In conclusion, hemorrhoidectomy is an efficient and common therapeutic procedure for grades III and IV hemorrhoids but it is associated with many postoperative complications. Nevertheless, the ligament of Parks, which is a constantly identifiable key anatomical structure, may guide surgeons simply and reliably through the excision of hemorrhoids and guarantee better outcomes to the patient.

### Ethical approval

Ethical approval has been given by the patients for the publication of the present manuscript and accompanying images.

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### Author contribution

Mariolis-Sapsakos, Zoulamoglou and Flessas conceived of the study. Kaklamanos was senior consultant and participated in the manuscript's coordination. All authors contributed to the acquisition of clinical data. Barla and Stathopoulou contributed to its analysis and interpretation and to the preparation of images. Zarokosta, Bonatsos and Theodoropoulos carried out the literature review. Zarokosta, Piperis and Zoulamoglou contributed to the preparation of the manuscript. Mariolis-Sapsakos, Kaklamanos and Flessas contributed to the refinement of the manuscript. All authors have approved the final article.

### Conflicts of interest

All authors declare that there are not any competing interests.

### Research registration unique identifying number (UIN)

**This is not a first in man study.** Nevertheless, at first, the present manuscript has been also registered in ResearchRegistry.com (UIN:2327).

### Guarantor

The Guarantor who is responsible for the present manuscript is Theodoros Mariolis-Sapsakos. He coordinated the preparation of the study and revised it critically for important intellectual content.

### Consent

Written consent was provided from the patients for the publication of the case series and accompanying images.

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