

## Laser-based Management of Perianal Fistulae

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**Received:** April 13, 2020; **Published:** September 10, 2020

### Abstract

**Introduction:** Successful results were obtained with regard to using laser-based techniques for managing perianal fistulae.

**Study Aims:** To evaluate the effectiveness of using laser-based techniques to treat perianal fistulae.

**Materials and Methods:** The study covered 11 patients with transsphincteric and perianal fistulae. The novel character of the method lies in the use of a laser-based technique to manage this abnormality. The surgical procedure was done under spinal anesthesia and involved fistula revision and lavage with Volkmann's spoon. After the closure of the internal fistula opening, laser-based destruction of the fistula was performed through the distal end. For the first time, combined approach was utilized to treat patients with extrasphincteric perianal fistulae with purulent leakages. It involved revision, lavage of the fistula opening, closure and laser-based destruction of the internal fistula opening.

**Study Results:** The surgical procedure lasted  $10 \pm 4.1$  minutes ( $M \pm \sigma$ ) on average. Laser-based destruction of perianal fistulae enabled to reduce the duration of the surgical procedure by 15 - 20 minutes on average and the hospital stay length by  $4.8 \pm 0.9$  days on average. Narcotic anodynes were not used.

**Conclusion:** As a treatment method for perianal fistulae, laser-based destruction is one of the most promising. When it is used, patients experience less pain, faster health improvement, the surgical procedure and hospital stay duration reduces. Moreover, no complications are observed during the early postoperative period.

**Keywords:** *Fistula; Perianal Fistula; Laser-Based Destruction*

### Introduction

According to foreign and domestic literary sources, about 95% of patients with rectal fistulae relate the beginning of the disease to prior acute anal abscess. 30 - 50% of patients develop rectal fistula (perianal fistula) after acute anal abscess. Routine incision and drainage of an abscess without eradicating the infection atrium predisposes to the formation of a rectal fistula. Ongoing infection of perianal tissues occurs from the bowel lumen through the area of an abscessed crypt or infection atrium of another origin (trauma). Then a fistula is gradually formed. Along the fistula, infiltrates and purulent leakages may form when drainage is not sufficiently good [8,15].

According to domestic and foreign authors, 2 perianal fistulae occur per 10,000 people a year [10,14,15]. The frequency of the disease is 9 cases per 100,000 [14,15]. Most often, this disease develops in patients aged between 30 and 50 years which determines its social relevance. Males suffer slightly more often than females [7,10,15].

Over the last 20 years, both foreign and domestic authors have been regularly reviewing diagnostic and management recommendations in line with developing modern technologies including data retrieved from PubMed, MEDLINE, Cochrane Collaboration, the Standards Practice Task Force of the American Society of Colon and Rectal Surgeons, and Oxford Center for Evidence-based Medicine - Levels of Evidence [11,13,15].

The following classification of rectal fistulae is used worldwide: the anal and rectal fistula can be described as complete (both internal and external fistula openings are present), incomplete internal (there's no external opening, only the internal one); depending on the location of the internal opening either in the anal canal or in the rectum: posterior, anterior, and lateral [3,15]. Depending on the location of the fistula tract in relation to the external anal sphincter, the fistula can be described as intrasphincteric, transsphincteric and extrasphincteric.

Based on their complexity, extrasphincteric fistulae have 4 degrees [3,15]. The first degree of complexity of the extrasphincteric fistula has the following characteristics: the internal opening is narrow, with no cicatrices around, there are no abscesses and infiltrates in the tissue, the tract is fairly straight; the second degree of complexity: cicatrices are present in the internal opening area, with no inflammatory changes in the tissue; the third degree of complexity: the internal opening is narrow, with no cicatrix process around, but with the proinflammatory process in the tissue; the fourth degree of complexity: the internal opening is wide, surrounded by cicatrices, there are inflammatory infiltrates or pus cavities in the paraproctium. High level rectal fistulae are specifically identified. They are characterized by the location of the fistula opening above the dentate line in the rectal lower ampulla.

Both foreign and domestic authors identify the following fistula types: intrasphincteric fistulae which are simple fistulae constituting about 25 - 30% of all rectal fistulae. These fistulae are also referred to as subcutaneous, marginal. As a rule, the fistula tract is straight, the cicatrix process is not evident, and the disease duration is usually not long. The external fistula opening is most often located near the anus, and the external one can be found in any anal crypt. This type of fistulae is quite easily diagnosed: palpation of the perianal area allows identifying the fistula tract in the submucous and subcutaneous layer; a probe inserted into the external fistula opening, as a rule, easily moves into the bowel lumen through the internal opening or approaches it in the submucous layer. A dye test (with methylene blue) is typically positive in patients with such fistulae. The function of the sphincter is preserved. Fistulography and other additional diagnostic methods are usually not required [6,15]. Transsphincteric fistulae occur most frequently and make up 40 - 45% of cases. It should be noted that the relation of the fistula tract to the external clamp may be different - the tract may go through the subcutaneous, superficial or even higher - through the deep portion. Extrasphincteric fistulae occur in 15 - 20% of cases. The fistula tract is located high as if bypassing the external sphincter; however, the internal opening is located in the area of crypts, i.e. lower. As a rule, such fistulae develop due to acute pelviorectal and retrorectal paraproctitis. They are characterized by a long convoluted tract, and purulent leakages and cicatrices are often found along the fistula. Yet another exacerbation of the inflammatory process quite often leads to new fistula openings. Sometimes, the inflammatory process moves from the tissue area on one side to the other side and a horseshoe fistula appears. A horseshoe fistula can be posterior and anterior. A dye test in this category of patients is not always positive, probing shows a deep fistula tract, most frequently parallel to the rectum. As a rule, the end of the probe doesn't reach the area of the internal fistula opening.

Patients with transsphincteric and extrasphincteric rectal fistulae should be additionally examined using fistulography, endorectal ultrasonography, MR imaging in order to identify sphincter portions the fistula passes through, locate the internal fistula opening, evaluate the location of pus cavities, and perform differential diagnostics for other diseases that may lead to the formation of a fistula tract and opening [4].

A number of surgical management options are available worldwide. The first one is anal fistulotomy. Method: using the probe, the fistula tract is dissected into the bowel lumen or excised from the adjacent tissues. The wound isn't sutured; alternately, the wound edges are anchored to the wound bed. To date, it is still inconclusive what volume of muscle structures can be dissected when performing a procedure for the anal or rectal fistula. The effectiveness of anal fistulotomy is fairly high and varies between 92 and 97% [4]. Cases of incontinence after anal fistulotomy vary between 0 and 45% [4]. The wide variation in the percentage of patients developing incontinence may be related to different approaches to its evaluation and different post-operative monitoring periods [4].

For managing perianal fistulae, many authors excise them pulling through the rectal flap. Method: a pull-through procedure is sphincter-conserving, during this procedure the fistula tract is excised, the rectal flap is mobilized (the flap may consist of the mucous coat, mucous and submucous layer or a part of the rectal wall), with its length being sufficient for covering the internal fistula opening. By pulling through the flap and anchoring its edge to the skin of the perianal area the internal fistula opening is closed. According to literary sources, this method is efficient in 44-87% of cases. Factors that increase the risk of fistula recurrence after this procedure are as follows: prior radiation treatment, Crohn's disease in the exacerbation phase, proctitis in the exacerbation phase, fistula development in the setting of a malignant process, and prior surgeries in the anorectal area [15]. Although a pull-through procedure has no direct damaging effect on the anal sphincter, in 7 - 38% of cases, minor or moderate anal incontinence is observed, which is supported by anorectal manometry data in the postoperative period (lower pressure in the anal canal at rest and during voluntary contraction) [15].

Both foreign and domestic authors apply the classic method involving excision of the fistula and application of a seton. Method: the seton method for surgical management of perianal and rectal fistulae has two basic versions. In the setting of an acute or chronic proinflammatory process in the fistula area, a seton may function as drainage with subsequent formation of a straight fistula tract with clearly delineated walls (a "draining" seton is most commonly inserted for the period of 6 - 8 weeks). This seton technique is the first stage preceding curative surgery [14,15]. The second variant is a seton technique (using silk or latex thread) for gradual dissection of the fistula tract and sphincter fibres through intermittent tightening of the seton. Slow dissection of muscle fibres of the sphincter prevents them from coming apart which is aimed at preventing anal incompetence in the postoperative period. According to literary sources, when the seton technique is used, anal incontinence varies between 0 and 54% and most frequently occurs in case of an "overlapping" seton. In this setting, patients most often have passing gas, rather than leaking liquid and formed stool [14,15]. The seton method is efficient and may be used for management of transsphincteric fistulae that spread over 50% of the external sphincter and extrasphincteric rectal fistulae, particularly, when other methods don't allow achieving good results [14,15]. Another treatment procedure is the ligation of the intersphincteric tract (LIFT). Method: it involves ligation and transection of the part of the fistula tract that passes through the intersphincteric space. For adequate drainage, the distal part of the fistula tract in the area of the external fistula opening is excised or the external fistula opening is dilated. As a rule, the procedure is performed 6 - 8 weeks after the placement of a draining latex seton into the fistula tract which facilitates the formation of a "straight" fistula with fibrous walls and considerably reduces the risk of pus cavities remaining along the fistula. The positive feature of this procedure is the absence of any damaging effect on muscle structures of the anal sphincter which is a measure to prevent anal incontinence. According to research data with regard to the effectiveness of this procedure, the fistula is healed in 57 - 94% of cases, with the average follow-up period ranging from 3 to 8 months. The recurrence rate of the disease is 6 - 18%. Due to the small number of studies related to this surgical management of anal and rectal fistulae, it is not feasible to evaluate the level of evidence of the provided data [1].

### Study Aims

To evaluate the effectiveness of using laser-based destruction to treat perianal fistulae.

### Materials and Methods

A prospective study was performed. It covered 11 patients aged 28 - 71 (the mean age was  $52 \pm 18$  years ( $M \pm \sigma$ ): 7 males and 4 females. The surgical procedure was done under spinal anesthesia and involved fistula revision and lavage with Volkmann's spoon. Then closure of the internal fistula opening was performed. A radial discernible light guide was inserted into the distal end and laser-based destruction of the fistula with the wavelength of 1,560 nm and the power capacity of 10 W was performed. In case of extrasphincteric perianal fistulae with purulent leakages combined approach was utilized. It involved revision, lavage of the fistula using Volkmann's spoon, and closure of the internal fistula opening. Then we excised the distal part of the fistula (Figure 1).



**Figure 1:** Excised distal part of the extrasphincteric perianal fistula.

The light guide was inserted into the proximal part (Figure 2).



**Figure 2:** Laser-based destruction of the proximal part of the extrasphincteric perianal fistula.

Laser-based destruction of the fistula was performed (with the wavelength of 1,560 nm and the power capacity of 10W). On average, hospital stay lasted  $5.81 \pm 2.91$  days. All patients received the planned amount of interference. The following criteria were analyzed: duration of the surgical procedure, duration and intensity of pain sensation, length of hospital stay. The statistical analysis of data was performed using PSPP software.

### Study Results

On average, the surgical procedure lasted  $10 \pm 4.1$  minutes ( $M \pm \sigma$ ). Laser-based destruction of transsphincteric and extrasphincteric perianal fistulae enabled to reach the average reduction in the duration of the surgical procedure by 15 - 20 minutes and the hospital stay length by  $4.8 \pm 0.9$  days. Narcotic anodynes were not used. In one patient, it took 40 days for the postoperative wound to heal. Early postoperative period proceeded without complications in all patients.

### Conclusion

As a treatment method for perianal fistulae, laser-based destruction is one of the most promising. When it is used, patients experience less pain, faster health improvement, the surgical procedure and hospital stay duration reduces. Moreover, no complications are observed during the early postoperative period.

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**Volume 7 Issue 10 October 2020**

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