ORIGINAL RESEARCH ARTICLE

Outcome of laser therapy in patients with anal fissure

Shahin H Fateh,[1] Sedigheh Darvish-Shafighi,[1] Afsaneh Norouzi[2] and Massoumeh Kalantari[1]

[1]Department of Surgery, and [2]Department of Anesthesia, Valiasr Hospital, Arak University of Medical Sciences, Arak, Iran

Abstract

In the past decade, several studies have investigated the effect of laser therapy on haemorrhoids, anal fistulas and tumours but few have explored its use in acute anal fissure. Therefore, the present study aimed to evaluate the efficiency of laser therapy in treating acute anal fissure. This clinical trial was conducted on all the patients referred to Valiasr Hospital, Arak, Iran, with acute anal fissure. Patients who were unresponsive to medical treatment and in whom surgery was indicated were divided into two equal-sized groups. Age, medical treatment duration, healing time, pain relief, relapse and indication for reoperation were recorded in all patients. The mean age of the patients and the mean medical treatment duration were significantly different in the two groups. Although there were no significant differences in the mean healing time and response to pain in the first and third months after surgery and laser therapy, by month 6 the mean response to pain was significantly different in the two groups. Frequency of relapse and need for further surgery were not significantly different between the groups. Laser therapy of acute anal fissure is a simple, non-invasive and painless surgical procedure with a low rate of complications. It can be viewed as an effective treatment for patients with anal fissure. However, this procedure has some limitations.

Introduction

An anal fissure is a disruption in the anoderm distal to the dentate line, which leads to internal anal sphincter spasm, more pain and tearing, as well as reduced perfusion to the anoderm. It is one of the most common benign anorectal conditions arising from high anal pressure. Its specific presentation is tearing pain accompanying a bowel movement and rectal bleeding. Patients may complain of severe rectal pain and spasms that persist for several hours after a bowel movement.

Correspondence: Massoumeh Kalantari, Vice Chancellor of Research, Arak University of Medical Sciences, Arak, Iran. E-mail: kalantari-m@arakmu.ac.ir

Treatment focuses on pain relief and resolution of spasm and ischaemia. Fibre therapy to keep the stool soft and formed and a warm sitz bath following bowel movements, to relax the sphincter, are the first-line treatment for reducing trauma to the anus. Application of 2% lidocaine gel, or any other analgesic ointment, provides a more symptomatic resolution. Healing may be further facilitated by application of 2% topical nitroglycerine ointment, which increases local blood flow and reduces pressure in the internal anal sphincter, but headache can be a major side-effect of topical nitroglycerine. Diltiazem (oral and topical) has fewer side-effects. Newer drugs, such as arginine (a nitric oxide release) and local bethanechol (a muscarinic antagonist; Myotonine®, Glenwood, Munich, Germany), have also been used. Medical treatment is effective for most acute fissures and 50–60% of chronic fissures.[1]

Botulinum toxin prevents the release of acetylcholine from presynaptic nerve terminals and, in turn, results in temporary muscle paralysis. Botulinum injection as an alternative to surgery in the treatment of chronic fissure has also been suggested. Although few studies have used this method, it seems to yield better results and fewer complications than other medical treatments. Nevertheless, in comparison with sphincterotomy, recovery is slower and relapse may be more frequent.[1–5]

Surgical methods are recommended for treatment of chronic fissure not responding to medical treatment. In such cases, lateral internal sphincterotomy is the treatment of choice. The purpose of this procedure is to reduce internal sphincter spasm by cutting a portion of the muscle. Almost 30% of the internal sphincter fibres are cut laterally with either open or closed methods.

Immediate pain relief and healing can be achieved in over 95% of cases. Following surgery, less than 10% of patients will develop recurrence while 5–15% will suffer from incontinence (usually gas).[1,2]

Considering the surgical complications, such as pain, bleeding, oedema, infection, urinary retention, stenosis and recurrence, choosing a suitable method with favourable clinical outcomes in reducing pain and discomfort of the patient has always been the focus of most surgeons.[3]

Perianal skin is thin and sensitive; hence, laser therapy is an innovative treatment for these lesions. Laser is a non-contact method for treatment of perianal lesions that typically results in less bleeding, pain and discomfort for the patient. Thus, for the treatment of perianal and rectal tumours, anal fistula, haemorrhoids and anal fissure, it is considered a suitable option.[4,5]

In the past decade, several studies have been carried out on the use of laser for the treatment of haemorrhoids, anal fistulas and tumours;[6–10] however, there is a scarcity of studies on laser treatment of acute anal fissure. Thus, the present study was performed to determine the effect of laser therapy on the treatment of acute anal fissure.

Materials and methods

This clinical case–control study was carried out in Valiasr Hospital, Arak, Iran. A total of 300 patients with acute anal fissure, who were unresponsive to medical therapy and had an indication for surgery, were divided into case and control groups. Following the Pukak principle in a one-step clinical trial, 150 patients were allocated to each group.

The control group comprised patients in whom surgery was indicated and who consented to surgery. The case group comprised patients who did not want to undergo surgery despite having indications for surgical treatment. Laser therapy was carried out using a Daiod laser (Heltschl, Niederndorf, Austria).

Medical treatment in the case group consisted of 10–20 sessions of laser therapy depending on disease severity and response to treatment. Each treatment session lasted 5–10 minutes. During laser treatment sessions, the patients did not receive any other medical treatment. Patients in both groups were re-examined 6 months after the end of the treatment and followed up regarding response to treatment, healing time, intervention effects, relapses, as well as the need for surgical intervention. Response to treatment, based on wound healing, pain relief and rectal bleeding, was assessed, and the information from each patient was recorded in a specific checklist.

In order to eliminate confounding related to surgical techniques and administration of laser therapy, all patients in the control group were operated on by a second surgeon and laser treatment in the case group was conducted by the first surgeon. Re-examination and follow-up of treatment outcome, 6 months after the interventional therapy in both case and control groups, were carried out by a third surgeon. In addition, to have the same conditions in both groups, the participants were assigned to their groups based on their age, severity of symptoms and complications of the disease.

All patients unwilling to participate in the study, and those with concurrent anorectal conditions associated with fissures, were excluded from the study. Information was collected on patients' age, sex, medical treatment duration, healing time (days), response to pain management, laser therapy sessions, relapse and indication for further surgery. Descriptive statistical analysis as well as a chi-squared test, an independent *t*-test, a logistic regression test and a generalized linear model were performed using SPSS (Statistical Product and Service Solutions) version 16 (SPSS Inc., Chicago, IL, USA).

Ethical considerations

This study was conducted in accordance with the ethical principles of the Helsinki Convention. Patients were free to participate in this study and a written consent form was completed prior to the start of study. Moreover, the surgical procedure was chosen by the patients.

Results

As shown in Table 1, the sex distribution in the two groups was not the same (demonstrated by chi-squared test; $P<0.001$). The mean age of the

TABLE 1 Sex distribution in case and control groups

Sex	Case group	Control group
Female	94.7%	78%
Male	5.3%	22%

patients was 41.2±9.23 years in the study group and 33.3±9.23 years in the control group. An independent *t*-test showed that the mean age of the two groups was significantly different ($P<0.001$). Mean duration of medical treatment was also significantly different ($P<0.001$), being 2.9±3.41 months in the case group compared with 10.7±12.24 months in the control group.

Mean healing time was 14.03±10.5 days in the case group and 16.31±12.8 days in the control group. An independent *t*-test showed that mean healing time scores were not significantly different in the two groups ($P=0.23$).

Response to pain was graded from 1 to 10. The mean pain response scores in the two groups for the first, third and sixth months after surgery and laser therapy are shown in Table 2.

Mean improvement in pain at months 1 and 3 after surgery or laser therapy did not differ significantly between the groups, but in month 6 was significantly higher in the control group (Table 2).

Significant differences in the mean response to pain for the three periods of assessment in the groups were evaluated using repeated measures analysis and a generalized linear model and a significant interaction was observed ($P<0.001$).

The mean number of laser sessions in the case group was 10.47±5.08.

The frequency of relapses in the case group was 1.8%, which was lower than in the control group (7.5%). A chi-squared test indicated that the frequency of relapse in the two groups was neither equal nor homogeneous ($P=0.039$), but logistic regression showed that frequency of relapse was not significantly different in the two groups ($P=0.219$).

The frequency of indication for reoperation was 3.8% in the case group and 13.8% in the control group. According to a the chi-squared test, distribution of the indication for reoperation was not equal ($P=0.008$). Logistic regression demonstrated that the risk of reoperation in the control group was 4.08 times greater than in the case group.

TABLE 2 The mean pain responses of patients in the case and control groups after surgery and laser therapy

Pain response	Month 1	Month 3	Month 6
Case group	8.36±1.26	4.33±2.48	1.74±1.3
Control group	8.07±1.63	4.46±1.83	3.56±3.18
P-value	0.130	0.663	0.001

Discussion

Despite current advanced knowledge about anal fissure management, a lack of information is still a weakness in this field of surgery. Each of the available routine therapies has some limitations, and they are often associated with a high recurrence rate.

As mentioned in the results section, the mean age and the sex distribution of patients differed significantly between the groups; thus, it seems that matching the case and control groups was not performed accurately. This was probably because of the importance placed on inclusion criteria, including indications for surgery and the willingness of patients to undergo laser therapy.

The mean duration of treatment was significantly higher in the control group. This is partly because patients with anal fissure who agree to surgery often do so because no medical treatment is available to them. These findings suggest that the case group suffered more from their anal fissure and, therefore, were more accepting of laser therapy.

Various studies and references show that fissure complicated by any of these factors is unlikely to heal spontaneously and the response to conservative therapy would be short term and non-satisfactory. Various treatment options have been advocated in such cases, including non-operative procedures, such as injection of botulin toxin, nitroglycerine ointment, endoscopic dilatation, direct current probing, cryotherapy, anal stretching, etc., and surgical procedures, such as fissurectomy, fissurotomy and sphincterotomy. Many of these methods are good enough to provide relief of symptoms of fissure *in ano*. Nevertheless, for the associated pathologies mentioned above, these procedures do not provide a satisfactory answer.[11–15]

Mean healing time and medical pain response in the first and third months were not significantly different following surgery or laser therapy.

However, there were significant differences between the two groups in terms of response to pain in the sixth month. Therefore, it appears that the results of laser therapy and fissure surgery are not significantly different in the short term, but that in the long term laser therapy produces more satisfactory results than surgery. In other words, complications of laser therapy are fewer than those associated with surgery.

Furthermore, the distribution of relapse was not significantly different between groups, but in the control group it was significantly higher than in the case group. Moreover, the risk of reoperation was 4.80 times higher in the control group than in the case group. These results confirm the superiority of laser therapy over the conventional surgical methods in patients with anal fissure.

Previous research has demonstrated that laser exposure is able to initiate the regeneration of different tissues because of the stimulation of fibroblast formation, greater epidermal growth, promotion of collagen formation, vascular structure growth and complete healing. It also increases tensile strength during wound healing. Laser therapy is applied to stimulate healing and relieve pain, and it is effective in the treatment of open wounds. There is usually no sensation or side-effects.[4,14,16–20]

Conclusion

This new surgical method was found to be a successful, easy and quick way of treating anal fissure. The technique also increased blood supply and decreased pain. The benefits of laser therapy include effective resolution of all clinical symptoms, decreased recovery time and minimal risks and side-effects. The technique is painless and patients are more likely to accept and be satisfied with treatment; however, there are some limitations to this procedure. Surgical techniques and biostimulation effects and the methods of employing the hand pieces should be taught to surgeons. Safety is also important when working with the laser.

Acknowledgements

The authors would like to thank the patients, as well as experts at the Department of Surgery in Valiasr Hospital, for their cooperation.

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