NOVATEUR PUBLICATIONS
JournalNX- A Multidisciplinary Peer Reviewed Journal
ISSN No: 2581 - 4230
VOLUME 8, ISSUE 11, Nov. -2022

IMPROVEMENT OF LASER TECHNOLOGY IN TREATMENT OF LATE ANASTOMOSITIS IN SURGERY OF GASTRIC AND DUDENAL ULCER

(Experimental Research)

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ANNOTATION

The authors analyze that for the treatment of late anastomosis after surgical interventions on the stomach and duodenum, it is recommended to include the laser action of the anastomosis zone with two types of low-energy lasers in the complex program.

The authors take into account that when anastomoses are made with the stomach, interrupted sutures with nodules in the lumen of the organ should be formed. In this case, the possibility of early visualization of the ligature is created and the process of its removal with the capture of the tendrils of the ligature with biopsy forceps of the endoscopic instrument is facilitated.

Keywords: Resection, anastomosis's, laser therapy, ligature, suturing, stomach, duodenum.

RELEVANCE

In surgery of peptic ulcer of the stomach and duodenum (duodenal ulcer), the condition of patients in the long-term after surgery is of great importance. First of all, the absence of recurrence and symptoms of peptic ulcer (PU) and the functional results of the operation [1,3,4].

If the second problem is mainly solved by the choice of a functionally sound operation, then in the first case, the technical aspects of the operation, as well as the suture material used, are important. Technical errors of operations on the stomach are more often manifested in the form of anastomoses of varying severity [2].

Rough suture, reactive suture material, tissue ischemia in the fistula zone, multi-row sutures, infection, reflux - this is an incomplete list of the causes of early anastomositis. Late anastomoses, which cause a clinic similar to duodenal ulcer, are no less a problem. One of the reasons is an insufficient decrease in the acidity of gastric juice, the second is pronounced bile reflux, taking NSAIDs. The surgeon often has to deal with a persistent PU clinic, in which the intake of drugs that reduce acid production, as well as having an enveloping effect, does not give the expected effect [5,6]. Often such patients undergo repeated interventions even against the background of reduced acid production. The reason for such conditions is the presence of ligatures that persist for a long time in the anastomosis zone [10]. In the optimal variant, against the background of edematous mucosa in the anastomosis zone, the tendrils of previously formed sutures protrude. In such cases, after several sessions of therapeutic endoscopy, it is possible to cut the suture and achieve a clinical improvement

in the patient's condition. However, the removed ligature may not be the last one and one has to wait a long time for it to “come out” to the mucosal surface [1,8].

Often, ligature anastomosis is manifested by redness and swelling in the anastomosis area. Even a ligature that has appeared in the lumen of the stomach can again become covered with epithelium against the background of scar tissue and “wait” for the next exacerbation of inflammation. As mentioned earlier, clinical manifestations in the form of ulcerative pain, as a rule, are poorly stopped by taking antiulcer drugs [1,7,9].

TARGET

To improve the effectiveness of the treatment of late anastomoses by developing a technique for using low-energy lasers and endoscopic technologies, an experimental study was initially conducted.

MATERIALS AND RESEARCH METHODS

Improving the method of laser treatment of late anastomosis after surgical interventions on the stomach and duodenum was initially based on an experimental assessment of the effect of laser exposure on the area of inflammation.

A method for treating late anastomosis consists in laser irradiation of the anastomosis zone with two types of low-energy lasers: endoscopic irradiation of the anastomosis mucosa using light fiber optics with a diameter of 400-500 μm, radiation in the spectrum of 337 nm, a power of 3 mW, a duration of 1-2 minutes per 1 cm2 of the mucosal area. In total, 3 sessions of irradiation were carried out every other day (for example, 1 session on Monday, 2 sessions on Wednesday, 3 sessions on Friday), as well as combined exposure to radiation in the 890 nm spectrum, a frequency of 80 Hz, a pulsed power of 5-7 W for 3-4 minutes percutaneously in the projection of the anastomosis daily for 4-7 days.

Explanation of dosages: Radiation in the spectrum of 337 nm has a bactericidal and anti-inflammatory effect. The bactericidal effect is manifested starting from 45 seconds, increasing the dose with exposure to more than 2 minutes enhances the damaging effect on the mucosa of the gastrointestinal tract.

Radiation in the spectrum of 890 nm in a pulsed mode (pulse power 5-7 W, frequency 80 Hz) penetrates the tissues to a depth of 7 cm, has an analgesic effect, improves tissue microcirculation and promotes the resorption of scar tissue. This prevents the development of rigidity and stenosis, improves the functional results of surgery.

Used lasers:

Nitrogen medical laser "Shifo-nur" production Uzbekistan. Radiation in the spectrum of 337 nm, pulsed mode with a pulse power of 10 kW, an average power of 3 mW, a pulse duration of 10 ns, a frequency of 100 Hz.

Semiconductor medical laser "Sogdiana", production Uzbekistan. Emission in the spectrum of 890 nm. The radiation mode is pulsed with a frequency of 80 to 3000 Hz, pulsed power 5-7 W.

METHODICAL APPROACH

The experiments were carried out on outbred male laboratory rats weighing 210-260 grams, which were kept in a vivarium. In total, the experiment was carried out on 40 animals.Описание эксперимента.

The day before the start of the experiment, the animals were placed in separate cages and were not fed. On the morning of the operation, the animals were taken to the operating room. Anesthesia was

carried out by inhalation vapors of halothane. Introductory anesthesia was carried out under a glass bell. After induction of anesthesia, the rate was fixed on the operating table with the limbs apart in the supine position. Hair was cut out in the projection of the upper median laparotomy. After double treatment of the surgical field with betadine solution, a layered laparotomy was performed. After wrapping the edges of the wound with sterile napkins, the stomach was removed into the wound. On the anterior surface of the stomach in the avascular zone in the transverse direction, the wall of the stomach was cut with a scalpel for 1 cm. Hemostasis was usually not required. The gastric wound was subsequently sutured with a single-row interrupted Etibond 3/0 suture with a distance between the stitches of 2 mm, with a capture of the edges of the stomach wall by 1.5 mm. The wound was sutured with Czerny's dip sutures. Treatment of the operation area with 70% alcohol solution. Layered suturing of the surgical wound.

After the operation, the animals were placed 2 in separate cages. Bedding for 2 days was carried out with a flannel fabric. Subsequently dry sawdust. Anesthesia was performed by adding ipobrufen tablets to drinking water at the rate of 1 tablet per 100 ml of water. Animal nutrition: water intake was carried out from the first day after the operation, dry food on the next day.

2 series of experiments: on the 18th day after the operation - the anastomosis area in the main group was irradiated with nitrogen laser radiation in the mode: average power 3 mW, irradiation through a quartz fiber for 1 minute on the area of the sutured gastrotomy wound. In the control group of animals, only the introduction of the light guide into the stomach with fixation for 1 minute was carried out. The rats were taken out of the experiment 2 days after the manipulation. Subsequently, for 7 days, percutaneous irradiation was performed in the projection of the gastrotomy wound with IR radiation for 2 minutes.

As a material for the study, biopsies of the surgical intervention zone on the stomach were taken along with tissues soldered to the stomach. Histological studies were carried out within 7-14-21-30-45 days after the formation of gastrotomy wound sutures.

RESULTS IN THE CONTROL GROUP

According to the conducted studies, it was found that within 30 days after gastrotomy with suturing the wound with single-row sutures, the process of anastomosis does not tend to subside due to the presence of sutures that are intimately fixed in the edematous wall of the stomach. In the area of the seams, there are areas of an erosive process with a fibrin coating. This picture was manifested already from the beginning of the removal of animals from the experiment, that is, on the 7th day. At all stages of the experiment, the clinic of anastomosis was determined with the development of not only the inflammatory process, but also erosive and ulcerative complications in the area of the gastrotomy wound.

The conducted studies convincingly demonstrated that after suturing the gastrotomy wound with interrupted row sutures, there is a long-term preservation of ligatures in the anastomosis zone, which support the evaporative process not only in the mucosal region, but also outside the stomach with the formation of adhesions of the stomach with surrounding organs. Removal of ligatures, even in the long term after surgery, presents great difficulties due to the pronounced development of connective tissue with lumen deformity and rough scars. The threads are practically implanted into the wall of the stomach and can persist for a long time with exacerbations of the phenomena of anastomosis, which can be clinically manifested by the clinic of a peptic ulcer of the anastomosis.

RESULTS AND DISCUSSIONS

Efficiency of laser irradiation on the course of ligature anastomosis (main experimental group). On the 21st day after suturing the gastrotomy wound, complete healing of the anastomotic area took place. However, when opening the lumen of the stomach, the presence of ligatures in large quantities, which are intimately fused with all layers of the stomach wall, was determined. An attempt to remove ligatures is accompanied by significant trauma and bleeding.

In this case, the animals remain active. They take food in large quantities, drink water. Weight loss is not reliable.

In the experimental group of animals, on the 21st day after suturing the gastrotomy wound, therapy with low-energy lasers was started according to the program developed by us.

Irradiation of the anastomotic zone with laser radiation in the ultraviolet spectrum of 337 nm using a monofilament quartz optical fiber with a diameter of 100 μm. For this, a thin optically transparent catheter with an inner diameter of 500 μm was introduced transorally into the stomach. The catheter was inserted under general anesthesia with halothane vapors. Previously, the animals were not fed for 1 day. Irradiation of the anastomotic zone was performed in the morning, the exposure time was 1 minute at a laser output power of 1.5 mW at a frequency of 100 Hz.

Irradiation with an infrared laser in the range of 890 nm was performed using a semiconductor laser device in the mode - pulsed power 5 W, frequency 80 Hz, duration 1 minute percutaneously in the projection of the stomach area. Irradiation was carried out daily for 7 days.

In the main group of animals, where 21 days after suturing the gastrotomy wound, the therapeutic effect was carried out according to the program developed by us using low-energy lasers in the range of 337nm and 890nm, the following changes were noted:

On the 30th day after suturing the gastrotomy wound and on the 9th day after the start of laser exposure, a macroscopically significant decrease in the number of ligatures in the anastomotic area was noted. The area of the anastomosis is epithelized, the edema is insignificant and completely disappears on the 45th day after the operation. Single ligatures after exposure to the laser lie freely in the area of the anastomosis, and do not present technical difficulties when removed by cutting the knot loop. With a thorough revision of the anastomosis zone, there were no cases of preservation of ligatures, as well as the phenomenon of ligature fistulas in the experimental group of animals.

CONCLUSIONS

The studies made it possible to convincingly demonstrate that the formation of single-row interrupted sutures during suturing the wound of the stomach can be accompanied by prolonged discharge of ligatures and the formation of the phenomenon of ligature anastomosis, deformation of the gastric lumen, and also create a picture of a peptic ulcer of the anastomosis. Conducting sessions of laser irradiation is aimed at an accelerated reduction in the phenomena of inflammation of the mucosa in the anastomosis area (UV radiation in the spectrum of 337 nm), as well as a decrease in the phenomena of cicatricial transformation of the anastomosis zone (IR radiation in the spectrum of 890 nm), which prevents long-term persistence of ligatures in the stomach wall.

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