

# Improvement of a Comprehensive Approach to the Treatment of Acute Appendicitis Complicated by Appendicular Infiltrate

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**Abstract** The authors analyze that the use of laser technologies in the complex treatment of appendicular infiltrate due to the combination of systemic and local effects helps to accelerate the regression of inflammatory reactions, improve the processes of regeneration and reparation in the area of the pathological focus, accelerate its resorption and thereby reduce the patient's recovery time.

**Keywords** Appendicular infiltrate, Laser, Regeneration, Repair, Laser irradiation

## 1. Introduction

In modern abdominal surgery, acute appendicitis remains the most common urgent pathology [8,9]. Timely diagnosis and adequate treatment tactics allow us to successfully resolve this problem [1,2]. Against this background, the choice of treatment tactics for complicated forms of acute appendicitis remains a problematic issue. "The most controversial issue is the treatment of appendicular infiltrate (AI). The frequency of its development in acute appendicitis is 2-6%". In recent years, there has been a tendency to more frequent use of conservative treatment (antibiotics and drainage in case of abscess development) before subsequent delayed appendectomy. However, about 10-50% of such patients ultimately require surgery due to recurrence of symptoms or ineffectiveness of conservative treatment [3,4]. "The frequency of complications in conservative treatment of AI can reach 20-30%, while early appendectomy is associated with fewer complications." On the other hand, "an attempt to perform an early operation against the background of AI is inferior to the results of interval appendectomy in terms of the complexity of the intervention and the risk of developing postoperative complications." Accordingly, the choice of optimal tactics for AI remains an urgent problem, while one of the main directions in an attempt to improve treatment results is to improve approaches to conservative treatment of this complication to reduce the risk of developing abscessing forms and increase the likelihood of a relapse-free course and performing interval surgery [5,6,7,10].

**Objective:** To improve the results of treatment of

appendicular infiltrate by using laser technology.

## 2. Materials and Methods

The encouraging results obtained in the experimental study allowed us to improve the tactical aspects of using modern laser technologies in the treatment of AI. The main disadvantages of modern approaches to the treatment of AI include the following: long treatment periods, which do not always lead to the resorption of the infiltrate; high probability of abscess formation, risk of relapse of OA. The task is to improve microcirculation in the area of AI, normalize the immune response and improve the processes of regeneration and repair in the area of the pathological focus, accelerate its resorption and thereby reduce the patient's recovery time, reduce the risk of abscess formation, increase the likelihood of successful conservative resolution, reduce the period suitable for appendectomy after complex treatment, facilitate the technical aspects of appendectomy after the resorption of AI.

The task set is solved by the fact that in the method of treating AI, which includes gentle bed rest, a gentle diet, parenteral administration of broad-spectrum antibiotics in therapeutic doses, Additionally, starting from the 1st day of treatment, intravenous laser blood irradiation (ILBI) is performed in the ultraviolet (UV) spectrum, and also from the 1st day, local transcutaneous irradiation of the AI zone in the infrared spectrum. Then, after 6-7 days of treatment and dynamic improvement of the patient's condition, ILBI is performed in the red spectrum, and transcutaneous irradiation of the AI zone is changed to exposure to the Sogdiana device with a wavelength of 890 nm.

The main stages of the method of treating appendicular infiltrate:

- When verifying AI using ultrasound and/or MSCT data, as well as in cases of intraoperative detection of this complication in patients with clinical features of acute appendicitis and completion of the operation without appendectomy, patients undergo a course of conservative therapy (immediately upon verification of the complication), are prescribed parenteral broad-spectrum antibiotics (cephalosporins), bed rest and an appropriate diet;
- From the first day of therapy, the treatment complex includes VLOC using the laser therapeutic device «LASMİK» (or «MATRIX») with a continuous radiation laser head KL-VLOC with a wavelength of 365 nm (UV spectrum), a radiation power of 2 mW in continuous mode through a sterile disposable light guide KIVL-01 inserted into any accessible vein of the patient, the duration of the irradiation session is 3-5 minutes, irradiation is carried out every other day for 5-6 days (3 times per course);
- Also, from the first day of treatment of AI, local transcutaneous irradiation of the infiltrate zone is carried out with the same «LAZMIK» device using a pulsed radiation laser head LO-904-20 in the spectrum of 904 nm (infrared spectrum), with a power of 10-15 W, a frequency of 80-150 Hz with an exposure of 2 minutes, contact, daily for 5-6 days;
- The next stage, after 5-6 days of treatment and verification of the improvement of the patient's condition in dynamics (absence of signs of abscess formation, reduction in the size of the infiltrate), the tactics of conducting VLOC with the LAZMIK device changes to the use of a continuous-wave laser head KL-VLOC with a wavelength of 635 nm (red spectrum) through a sterile disposable light guide KIVL-01 inserted into any accessible vein of the patient, with a radiation power of 2 mW with an exposure of 15-20 minutes, daily for 6-8 days;
- In parallel with the second stage of VLOC (5-6 days after the start of treatment), transcutaneous irradiation of the infiltrate zone is carried out using the Sogdiana device with a wavelength of 890 nm, a power of 5 W per pulse, a frequency of 1500 Hz, daily, 2 times a day for 5 minutes for 6-8 days.
- The use of laser exposure in the red spectrum (635 nm), starting from 6-7 days after the start of treatment, helps to normalize the immune response and improves the processes of regeneration and repair in the area of AI;
- Additional transcutaneous laser exposure to the AI area in a pulsed mode in the near infrared range, starting from 5-6 days after the start of treatment, promotes accelerated resorption of the AI and thereby reduces the patient's recovery time;
- The proposed method allows to reduce the risk of developing such a complication of AI as abscess formation and thus the need for emergency palliative surgical intervention;
- The probability of successful conservative resolution of this complication of acute appendicitis increases;
- The period for possible appendectomy after complex treatment of AI using various laser technologies (intravascular and transcutaneous exposure) is reduced.
- The specific features of laser action on the regression of the inflammatory process and the enhancement of regeneration make it possible to facilitate the technical aspects of performing appendectomy after the resorption of AI.

### 3. Conclusions

Taking into account the stated objective of the study, the objective of this stage was to improve the method of treating AI, which will be aimed at accelerating the processes of regression of the pathological focus, reducing the risk of its abscess formation and, in general, improving complex approaches to the treatment of this complication of acute appendicitis.

For this purpose, the AI treatment complex includes the use of a combined version of laser exposure - intravascular and transcutaneous irradiation. At the first stage, the effect is aimed at regressing inflammatory processes in the area of the pathological focus, and the second stage provides stimulation of local regenerative activity and acceleration of infiltrate resorption.

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A sign of the effectiveness of treatment of AI is a clear tendency towards regression of its size followed by complete resorption, accordingly the next step is the removal of the appendix approximately in 2 months.

The proposed method is characterized by the following advantages of application:

- During the first 5-6 days, enhanced stimulation of non-specific immunity is carried out using a VLOC laser with radiation in the UV spectrum (365 nm);
- Local treatment with infrared (IR) laser in continuous mode helps improve microcirculation in the infiltrate area;

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