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# EFFECTIVENESS OF MINIMALLY INVASIVE TECHNOLOGIES IN PATIENTS WITH POSTOPERATIVE GASTROINTESTINAL ARTERIAL BLEEDING

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Alexander Akinchits 

Volgograd State Medical University, Volgograd, Russia

✉ [aakochetova@volgmed.ru](mailto:aakochetova@volgmed.ru)

**ABSTRACT** — When it comes to treatment of patients with intraluminal bleeding, endovideosurgical methods are the methods of choice. Our hemostasis strategies encompass use of clipping, electrocoagulation, and bleeding vessels tamponing. At the same time, the available literature has offered no information concerning the effectiveness of minimally invasive procedures when treating patients with postoperative gastrointestinal bleeding. Thus, the purpose of this study was to find out the most effective minimally invasive surgery. Our study involved 73 patients with arterial bleeding divided into 3 groups. 23 patients with bleeding from duodenal ulcers (Group 1), 19 patients with bleeding from stomach ulcers (Group 2), while another 31 patients with gastric and duodenum bleeding (Group 3). The study was carried out in accordance with the ethic criteria and a written informed consent obtained from all the patients. The analysis of the effectiveness of the procedures demonstrated the benefit of clipping with the effectiveness of 90.1%. Argon-plasma coagulation proved effective in 80.0% of the cases, combined procedures to achieve homeostasis was effective in 79.2 % of the cases, whereas 66.7% was given to electrocoagulation. Clipping is an effective method to stop suture line bleeding and bleeding resulted from traumatic rupture of mucous membrane. The main indications for using clipping include acute ulceration, with a diameter not exceeding or slightly exceeding the clip size.

**KEYWORDS** — minimally invasive procedures, postoperative abdominal bleeding.

## INTRODUCTION

The quality of medical care, highly competent professionals, advanced innovation-based diagnostics and treatment technologies, high-tech equipment and availability of medical services are the components of healthcare systems in various countries, which positively influence the quality of life [10, 18]. Digital technologies have penetrated all spheres of human life, including medicine. Their potential use in dentistry through all stages includes keeping medical records, diagnostics (radiovisiographs, computer tomographs, virtual articulators, digital cameras), modeling and simulation of clinical situations as well as treatment.

Methods for obtaining and orienting computer 3D models of teeth and dental arches, measuring the height of fissures, tubercles, the shape of their slopes, along with methods for controlling odontopreparation are being developed [11–17].

Minimally invasive technologies have currently found wide implementation in clinical abdominal surgery, which improves significantly the effectiveness of treatment. These technologies are widely used in abdominal surgery managing complications, for comprehensive prevention and treatment [3, 4, 5, 6, 8].

Improving methods and volumes of repeated surgical intervention is an important factor that will be decisive for the outcomes of eliminating the pathological process leading to complications, where special gastrointestinal bleeding is viewed as specifically important [2, 7].

Endovideosurgical methods are used to treat patients with intraluminal bleeding. Researchers believe that endoscopic methods are recommended in case of bleeding, with no reduction in the hemodynamics major indicators. It has been noted that clipping, electrocoagulation, and tamponing of bleeding vessels are used to achieve hemostasis [1].

Experts, in turn, point at the fact that surgical treatment of gastrointestinal bleeding, especially in the postoperative period, is associated with a high mortality rate, and is recommended for cases of unsuccessful endoscopic interventions. It is noted that a differentiated management approach requires improved methods to stop bleeding, including injection, endoclips of various designs, diathermocoagulation, and argonoplasmic coagulation [9]. A combination of these modalities is also possible.

At the same time, the available literature has not contained data on the effectiveness of minimally invasive techniques to manage postoperative gastrointestinal bleeding, which becomes the aim of our study.

*Aim:*

to improve minimally invasive techniques in the treatment of patients with postoperative gastrointestinal bleeding, as well as identifying the effectiveness of such methods.

## MATERIALS AND METHODS

The study involved 73 patients with arterial bleeding. 23 of the patients were diagnosed with bleeding from duodenal ulcers (Group 1), 19 had bleeding from stomach ulcers (Group 2), and another 31 patients had bleeding from the gastric and duodenum suture line (Group 3). The study was performed in accordance with current ethic requirements and with a written informed consent obtained from all the patients.

The treatment relied on the epinephrine injection method, which was applied along the bleeding source perimeter. Fluoroplastic injector was used, which was introduced through the endoscope channel. Patients with a loose red blood clot, had combined treatment with Caproferr (Fig. 1).



*Fig. 1. Vessel bleeding in a patient with a flat duodenal ulcer (a) and the method of infiltration of epinephrine solution (b)*

The method of clipping was used to stop bleeding from the suture line and the mucosa traumatic ruptures. Indications for administering this method also included acute ulcers with a diameter not exceeding the size of the clip, which allowed clipping in the projection of the bleeding vessel within viable tissues (Fig. 2).

If clipping is not possible, as the most optimal procedure we consider argonoplasmic coagulation combined with paravascular injection, especially in cases where the bleeding source was to be found near large intramural vessels (Fig. 3)

## RESULTS AND DISCUSSION

The choice of the method for endoscopic management of bleeding was mostly influenced by the severity, nature and localization of the source of hemorrhage.

The study revealed a positive outcome in 19 out of 23 patients with duodenal ulcer. In this case, clip-

ping was performed in 9 patients, while 3 patients had argonoplasmic coagulation, and in 7 more cases the combination of injection with argon-plasma coagulation was employed. Emergency relaparotomy was performed in 3 patients due to inefficiency of minimally invasive technologies. During the postoperative period, one patient died due to cerebral circulation failure.

Postoperative arterial bleeding from stomach ulcers was identified in 19 patients. The effectiveness of hemostatic manipulations was observed in 16 people. Electrocoagulation was employed in 4 patients, argonoplasmic coagulation – in 5 cases, whereas combined minimally invasive methods were used in 7 patients. It is to be noted that three patients had relaparotomy due to inefficiency of endoscopic hemostasis.

26 patients of Group 3 revealed effectiveness of minimally invasive technologies for bleeding from the suture line. In this case, clipping was performed in 19 patients, and electrocoagulation combined with injection — in 7 cases. Emergency relaparotomy was performed in 5 patients, out of 31 people in Group 3. No lethal outcomes were registered in this group.

The effectiveness analysis of the methods revealed that the most effective procedure is clipping, which displayed the effectiveness of 90.1%. The argon-plasma coagulation proved effective in 80.0% of the cases, while combined procedures were effective in 79.2% of the cases, and electrocoagulation accounted for 66.7%.

## CONCLUSIONS

Clipping is an effective treatment option when it comes to stopping bleeding from the suture line and traumatic ruptures of the mucous membrane. At the same time, in order to achieve the best outcome of this procedure, it is necessary to clearly determine the

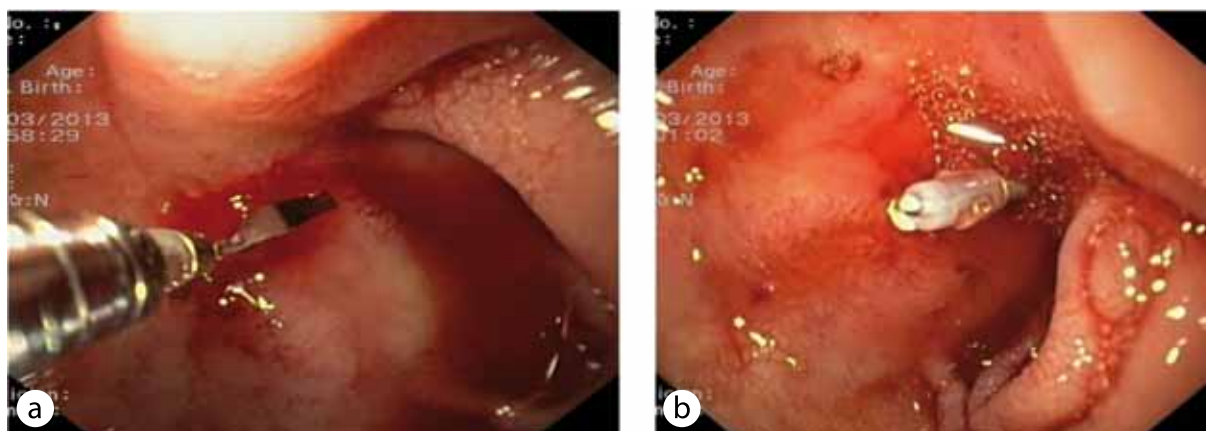


Fig. 2. Attaching the endoclips to the bleeding vessel (a) and the method of applying the clip to the ulcer bottom vessels (b)

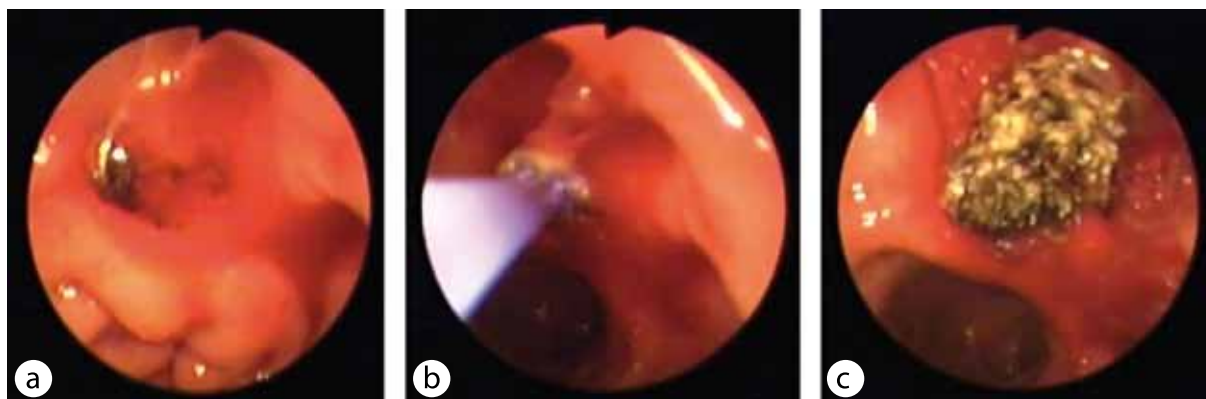


Fig. 3. Duodenal bulb ulcer with a fixed clot and continuous bleeding (a); method of argon-plasma coagulation of the ulcer (b); scab formation after the ulcer coagulation (c)

indications for its use. The main indications, as we see them, also include acute ulceration, with a diameter not exceeding or slightly exceeding the size of the clip, provided it is possible to perform clipping in the projection of the bleeding vessel as well as within the minimally altered viable tissues.

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