



# Telemedicine for the Surgical Management of Abdominal Trauma in the District Hospitals

Iskandarov E<sup>1\*</sup> and Jalalov M<sup>2</sup>

<sup>1</sup>The Administration of the Regional Medical Divisions, Baku, Azerbaijan

<sup>2</sup>The Emergency and Urgent Medical Service Station Baku, Azerbaijan

**\*Corresponding author:** Emil Iskandarov, Head of the Division of Emergency Medical Services, The Administration of the Regional Medical Divisions, Capital Tower, Baku, Azerbaijan, Tel: +994503354084; Email: eiskandarov@tabib.gov.az

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## Abstract

The outcomes of the 51 patients with blunt abdominal trauma after the car crash treated in the district hospital were analyzed. 25 patients in a basic group, underwent surgery during which the distant specialist consultation was led via Telemedicine. Telemedicine allowed the specialist surgeon clearly evaluate the degree of the spleen injury and give a suggestion to conduct the organ-preserved operation. In a control group, patients with spleen injury underwent the conventional splenectomy. The short- and long-term outcomes in the basic group were better than in the control group. Telemedicine served as a good tool for performing organ-preserved surgeries in the district hospital and improving the outcomes of patients with intra-abdominal hemorrhage.

**Keywords:** Hemorrhage; Surgery; Spleen; Telemedicine and Outcomes

## Introduction

Blunt abdominal trauma is the most common after traffic accidents. Liver and spleen injuries with intra-abdominal hemorrhage are health-threatened condition, which needs emergency medical procedures. There are different surgical and non-surgical management schemes for intra-abdominal hemorrhage [1-5]. But it is relatively difficult for general surgeons to manage parenchymatous bleeding in a district hospital.

Telemedicine around the world is experiencing a boom, due to the increased need for remote patient consultations, as well as for the exchange of knowledge and experience. Surgeons have become more comfortable with the use of digital technologies for the provision of special surgical procedures and are likely to appreciate their time and

resource savings [6-8]. But the use of Telemedicine for the management of intra-abdominal hemorrhage hasn't been well published.

## Materials and Methods

### Study Type: Retrospective Clinical Research

The outcomes of the 51 patients with blunt abdominal trauma after a car crash were analyzed. Only patients with spleen and liver injuries were selected (inclusion criteria). Patients, with injuries to other abdominal organs were excluded from research (exclusion criteria).

The average age of patients was 27,8±5,6 years (M±m). The men/women ratio was 3/1. Patients were transported to the district hospital within 1-3 hours after accidents.

After checking the status of patients, an intra-abdominal hemorrhage bleeding diagnosis was made by using laboratory tests, US, and CT examinations. The hemodynamic condition of most patients was graded as a Class II according to the ATLS Classification of Hemorrhagic Shock. All patients after necessary preoperative stabilization were operated on.

### The Patients were Operated on by the Surgeons

Patients were divided into 2 groups. Telemedicine was used during the surgical procedures for the intra-abdominal hemorrhage in the basic group (n=25). Patients, by whom the surgeries were carried out without distant help, conducted the control group (n=26).

The patient's data were systemized on the Excel sheet. The mean and standard error of the mean ( $M \pm m$ ) were compared between the groups. The difference was statistically significant when  $p < 0,05$ . The primary evaluation criterion was the short-term complication rate. The secondary evaluation criterion was Quality of Life. Quality of Life was calculated 6 months after surgery with the SF-36 survey. The statistical procedure was made by using IBM SPSS – 21.

### Results

A midline laparotomy was led under general anesthesia. Intraoperatively, spleen injury was diagnosed in 20 patients from basic (80%) and in 23 patients (88,5%) from the control group. Bleeding from the liver surface in 5 (20%) basic group patients and 3 (11,5%) patients from control. During the revision, other injuries which could be the reason for the intra-abdominal hemorrhage weren't found.

In a control group, as a conventional procedure splenectomy for the spleen injuries was used. But in 12 patients from the basic group, the organ-preserved operation was suggested by a specialist surgeon from tertiary care hospital using Telemedicine. Resection of the damaged lower edge of the spleen relieves patients from the loss of organs. For the other 8 patients, hemostatic sponges were used for the damaged spleen segment. In these patients after achieving hemodynamic stability and under the distant observation of the specialist surgeon operation was finished. Patients with liver bleeding in control were treated with suturing, however, in the basic group the sponges were used. It was conducted only after distant monitoring by the specialist via Telemedicine.

After surgery, all patients received postoperative care in ICU. The ICU days for basic group patients were shorter than control group patients ( $1,2 \pm 0,2$  days vs.  $2,1 \pm 0,5$  days). Also, blood units used in the basic group were significantly less

than in the control group ( $p < 0,05$ ).

In the control group, 7 cases with a postoperative complication were observed: intrabdominal blood collection in 3 cases (11,5%); lung atelectasis with forthcoming pneumonia in 2 cases (7,7%), and surgical wound complication in 5 cases. Relaparotomy with the peritoneal salvage was led in one patient with intra-abdominal blood collection. Others were treated non-surgically.

However, in the basic group of patients, the major complications were not observed. Delayed wound healing in 2 patients was treated without surgical manipulation.

Specialist surgeons virtually via Telemedicine daily visited patients in the surgical service and gave recommendations. Recovery in the basic was faster compared to the control group. Patients in a basic group were followed up for 1 year. The quality of life of basic group patients was significantly higher in the long term ( $p < 0,05$ ).

### Conclusion

Telemedicine is useful for the surgical treatment of patients with intra-abdominal hemorrhage after traffic accidents. With distant specialist consultation, district surgeons could reliably conduct organ-preserved operations, which have better outcomes. In our experience, Telemedicine showed the best performance in terms of transmission of the new methods to the district medical personnel.

The reorganization of emergency medical services using Telemedicine is promising in terms of further development. With Telemedicine the central hospital of emergency care, located in the capital, is directly connected with regional and district branches and sub-branches. The potential expansion of telemedicine across the country will help conserve resources and facilitate the current system through more efficient, faster, and more affordable communication between healthcare facilities.

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