

DOI: <https://doi.org/10.56936/18290825-2022.16.4-78>**FEATURES OF ABDOMINAL SURGERY IN
COMBAT INJURIES, OUR EXPERIENCE****MINASYAN A.H.*, MINASYAN H.L., ARAZYAN D.R., ALEKSANYAN A.B.**

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ABSTRACT

The research was carried out in the hospital of the qualified surgical aid stage, where the patients were transferred immediately after receiving first aid from the battlefield. Immediately after admission, all the patients were examined by triage specialists, respiratory and hemodynamic indicators were evaluated according to accepted standards. Most of the injuries were combined polytraumas with severe hemorrhagic shock. All the injured patients were urgently operated. In first group patients who had isolated injuries or combined injuries, but relatively stable hemodynamic parameters, a volume of interventions was performed, which does not require relaparotomy (definitive surgery). Second group patients had combined severe injuries; hemodynamic indicators were unstable. The surgical approach was in accordance with the principle of "damage control".

The organization of work in the mentioned way made it possible to provide qualified medical care without interruption and on time, depending on the flow intensity of patients and the volume of available resources. For the next stages of medical evacuation, the strategy we chose was understandable, due to which it was possible to avoid additional double surgical aggression in case of first group patients, only by applying the "relaparotomy on demand" principle. In case of second group patients, in some cases, it was possible to postpone the "programmed relaparotomy" and to carry it out in more favorable conditions for the patient. In all cases, when providing qualified surgical care, it should always be taken into account that the intervention performed in this stage should be predictable for the surgeons working at next stage, that is they should understand what principle we have applied, so that they can continue the treatment with the same principle.

KEYWORDS: combat injury, qualified surgical care, polytrauma, damage control, volume of interventions, injury repair, definitive surgery, medical triage.

INTRODUCTION

The last decades have been characterized by a significant increase in armed conflicts and polytraumas worldwide, characterized by high rates of mortality, complications and disability [Aghajanyan V, 2003]. Polytrauma is a complex pathological process caused by the injury of several

anatomical regions, a pronounced manifestation of the syndrome of mutual aggravation, which includes the development of several pathological processes at the same time and proceeds with deep metabolic disorders in all systems of the body. In addition to the syndrome of mutual ag-

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gravation, it is characterized by numerous complications that are difficult to diagnose, and multidisciplinary therapeutic measures are indicated. The most complications arise in the resuscitation-diagnostic stage, because the physician is dealing with a patient in shock, time is very limited, the patient's compensation is unstable and the condition can become critical at any time [Musalatov X et al., 1998]. The combination of acidosis, hypothermia, and coagulopathy (the triad of mortality) may preclude definitive surgical repair of all injuries in one stage. The treatment of these cases has changed significantly in the last decade with the emergence of a new paradigm termed damage control (DC). Its use is associated with dramatically increased survival of the most seriously injured patients [Rotondo M et al., 1993].

Damage control surgery was originally described by Rotondo M. and co-authors in 1993 as a three-phase technique. This was later modified by Johnson J. and colleagues [Johnson J et al., 2001] to include a fourth, pre-theatre phase: part zero emphasizes injury pattern recognition for potential DC beneficiaries and manifests in truncated scene times for the emergency services by the trauma team. Part one occurs once the patient has arrived in operative theatre and consists of immediate exploratory laparotomy with rapid control of bleeding and contamination, abdominal packing, and temporary wound closure. Part two is the intensive care unit resuscitative phase where physiological and biochemic stabilization is achieved and a thorough tertiary examination is performed to identify all injuries. Part three occurs once physiology has normalized and consists of re-exploration in operative theatre to perform definitive repair of all injuries. This may require several separate visits to operative theatre if multiple systems are injured and require surgical treatment. Appropriate patient selection for DC is critical. Attempts at primary definitive surgical management in patients with severe physiological compromise will almost inevitably lead to poor outcome or unplanned abbreviation of the procedure. In contrast, excessively liberal use of DC may deny patients with adequate physiological

reserve the benefits of effective early management and condemn them to unnecessary extra procedures with attendant morbidity and potential for mortality [Miller R et al., 2005; Sutton E et al., 2006; Brenner M et al., 2011]. Selection criteria for applying damage control include mechanism of injury and degree of physiological impairment. Once the abdominal cavity is entered, the first step is haemorrhage control. Adequate packing should provide a good degree of haemorrhage control for most venous or solid organ bleeding. The second priority in a DC laparotomy is to control the spillage of intestinal contents or urine from hollow viscus injuries. Simple bowel perforations, limited in size and number, may be primarily repaired using a single-layer continuous suture. To save time, reconstruction, stoma creation, and feeding tube placement are avoided at this stage and the intestine is left in discontinuity. Bowel viability is always re-assessed during part three of DC. Abdominal closure is the final step before transfer to the ICU. In all DC cases, fascial closure is not recommended at the initial laparotomy. Reperfusion injury and on-going capillary leakage during resuscitation will cause intestinal and abdominal wall oedema to develop and potentially cause intra-abdominal hypertension and abdominal compartment syndrome. In this situation, a number of different methods of temporary abdominal closure have been described [Lamb C et al., 2014].

The aim of the work is to analyze the structure and surgical approach of abdominal injuries treatment.

MATERIAL AND METHODS

The research was carried out in the hospital of the qualified surgical aid stage, where the patients were transferred immediately after receiving first aid from the battlefield. A total of 74 gunshot

*To overcome it
is possible, due to the
uniting the knowledge and
will of all doctors in the world*



(explosive and bullet) patients with abdominal injuries were examined, which made up 10.7% of the total patients. The closed injuries were 7, and 10 patients also had burns of various degrees. The flow intensity of patients was highly variable. The hospital's resources corresponded to the scope of providing qualified surgical care. The combined injuries were 62, the isolated injuries were 12. The following injuries were observed: spleen injury – 12 (16%), liver – 18 (24%), stomach – 14 (19%), intestinal – 48 (65%), diaphragmatic – 10 (13%), urinary bladder – 4 (5%) and pancreatic injuries – 8 (11%).

Immediately after admission, all the patients were examined by triage specialists (intensive care and surgeon), respiratory and hemodynamic indicators were evaluated according to accepted standards. Most of the injuries were combined polytraumas with severe hemorrhagic shock. The provision of surgical assistance was organized. All the injured were urgently operated. We were guided by the following surgical approaches. The patients were conventionally divided into 2 groups.

In the first group (12 patients – 34%), who had isolated injuries or combined injuries, but relatively stable hemodynamic parameters, a volume of interventions was performed, which does not require relaparotomy (definitive surgery) in all cases. The following interventions were performed in this group: splenectomy – 3, liver repair (suturing and tamponade) – 6, stomach repair – 4, intestinal injury repair – 8, intestinal resection with anastomosis formation – 4. The principle of “relaparotomy on demand” was applied in the next stage of medical evacuation for 20% of these patients, mainly due to early adhesive obstruction.

The second group patients had combined severe injuries; hemodynamic indicators were unstable. Those with this type of injuries made up 62 patients (66%). The surgical approach was in accordance with the principle of “damage control”. During the first phase of DC, immediately after medial laparotomy, tampons were placed in all areas of the abdominal cavity. After evacuation of accumulated content in the abdominal cavity (blood, intestinal contents, etc.), the injuries were discovered.

Stopping of bleeding from parenchymatous organs were performed as a priority. In 9 patients were performed splenectomy, regardless of the degree of spleen injury, and 12 patients underwent suturing of liver injuries. In 7 of this patients pacing of the suprahepatic and subhepatic spaces was also performed due to deep parenchyma rupture and crush. In 2 patients, nephrectomies were performed due to kidney parenchyma disruption. Retroperitoneal pacing was performed in 7 patients. After pacing the abdominal cavity, the tips of the tampons are almost always brought out on the skin, which makes it possible to remove them without relaparotomy.

After performing hemostasis in the abdominal cavity, a thorough revision of all sections was performed. As a result, 8 patients were found to have diaphragmatic rupture, of which 2 were in the right dome, 6 in the left. The integrities of diaphragms were repaired by stitches; no mesh was needed (Fig. 1) There were 10 stomach injuries. Transec-

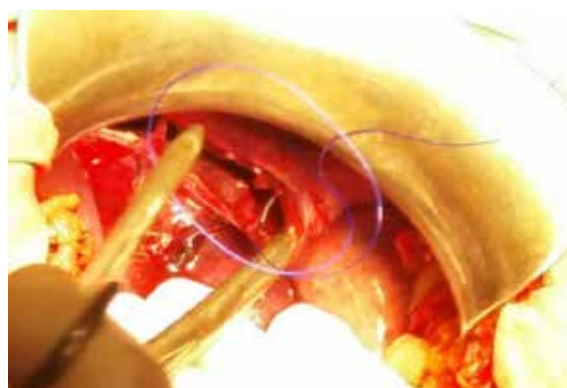


FIGURE 1. Diaphragmatic left dome repair from abdominal cavity



FIGURE 2. Small bowel multiple injuries repair

tion of the gastrointestinal ligament, examination of the posterior wall of the stomach was performed. In 4 patients were both anterior and posterior wall injury. In 44 patients there were different types of intestinal injuries, of which 18 were small intestinal, 10 were large intestinal, and 16 were combined – small and large intestinal. There were 25 cases in which the injuries were located on different parts of the intestinal tract and the defects diameter were less than half of the circumference of the intestine without an obvious violation of the viability of the intestinal wall. In this patients the surgical solution was two-layer suturing of the injuries (Fig. 2). In the case of single injury larger than the circumference of small bowel, or in the case of several close injuries on a segment 20 cm long, bowel resection was performed. In 5 cases the location of the injury was in the proximal or middle part of the small intestine, anastomosis was formed once after resection. In 3 cases they were in the distal part, ileostomy was applied after resection. In 7 cases of large colonic defects loop colostomy were applied. In 4 cases colon resection with end colostomy were applied. Thus, in all cases, the integrity of the gastrointestinal tract was not left interrupted. It is retracted, forming an entero/colostomy or anastomosis (Fig. 3).

Urinary bladder rupture was found in 3 of the patients, wall repairing and epicystostomy formation were performed.

At the end of the operations drainage tubes were placed in different parts of the abdominal cavity.

The temporary closing of abdominal cavity was done by suturing the laparotomic wound. Only the skin edges were approximated. The musculoaponeurotic layer was not sutured. The advantage of closing the wound in this way is that less time is spent, and by not suturing the muscle-aponeurotic layer, it significantly prevents the development of intra-abdominal hypertension [Milanov N et al., 2009]. There was no need to use local negative pressure device.

The part of mentioned actions is not included in the scope of “damage control”, because they increase the time of the surgery, in particular, the



FIGURE 3. After application of ileostomy and temporary closing of abdominal cavity by skin stitches

formation of anastomoses and intestinal stomas. However, from our experience, the average duration of the surgery increases by 20 minutes.

We used this approach also for the reason that in some cases the accompanying documents are missing during the stages of medical evacuation, and at the next stage the medical data of patient is not clear. In addition, it made it possible to delay the “programmed relaparotomy” of the next stage until the time that the patient would recover as much as possible, and in some cases the duration of the surgery during the relaparotomy was shorter and the volume was smaller. In this group, 15% of patients underwent relaparotomy later (within 3-7 days).

DISCUSSION

Thus, the volume of surgery at the qualified stage was determined during triage, when in one case it was decided to provide definitive surgical care, and in the other case, were performed reduced staged surgical care in accordance with the principles of the damage control strategy.

The organization of work in the mentioned way made it possible to provide qualified medical care without interruption and on time, depending on the flow intensity of patients and the volume of available resources. For the next stages of medical evacuation, the strategy we chose was understandable, thanks to which it was possible to avoid additional double surgical aggression in case of first

group patients, only by applying the “relaparotomy on demand” principle. In case of second group patients, in some cases, it was possible to postpone the “programmed relaparotomy” and to carry it out in more favorable conditions for the patient.

CONCLUSION

Helping the injured patients of combat actions should be guided by universally accepted principles. Great importance should be given to the medical triage, because practically the “fate” of the injured person depends on the decision made there.

The same principle of treatment cannot be applied to all types of injuries. The damage control strategy should be carried out according to the instructions, taking into account that it will continue in the next stages. In all cases, when providing qualified surgical care, it should always be taken into account that the intervention performed in this stage should be predictable for the surgeons working at the next stage, that is, they should understand what principle we have applied, so that they can continue the treatment with the same principle.

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CONTENTS

6. **MURADYAN A.A., ZILFYAN A.V., AVAGYAN S.A.**
REGIONAL MELATONIN AND SOMATOSTATIN DEPENDENT MECHANISMS IN PANCREATIC INCRETORY ACTIVITY AND IN INTESTINAL BACTERIAL HOMEOSTASIS
14. **KHUDAVERDYAN D.N., HASRATYAN H.A., MELKUMYAN K.V., GHAMBARYAN H.K., ABOVYAN L.A.**
THE ROLE OF CALCIUM AND CALCIUM REGULATING HORMONAL SYSTEM IN THE MECHANISMS OF COVID-19 CONTAGIOUSNESS AND SEVERITY
23. **KESOYAN A.A., ARAKELYAN N. L., ALOYAN D.A., KARAPETYAN A.A., MANVELYAN H.M.**
CIGARETTE SMOKING, NICOTINE AND PARKINSON'S DISEASE: CONTROVERSIES IN CLINICAL TRIALS DATA AND MEDICAL PRACTICE
31. **HOVHANNISYAN A.H., ASOYAN V.A., SHMAVONYAN M.V., HARUTYUNYAN L.A., TOROSYAN M.H., AYVAZYAN T.V., GHAZARYAN A.A., BARSEGHYAN E.S., MURADYAN A.A.**
ACHIEVEMENTS AND CHALLENGES OF MANAGEMENT OF COVID-19 PATIENTS AT MIKAELYAN UNIVERSITY HOSPITAL
36. **STEPANYAN N.A., BADALYAN S.H., ALEKSANYAN V.A., NAZINYAN R.A., ZAQARYAN A.V., KALASHYAN M.V., FANARIYAN R.V.**
MICRODISCECTOMY: AN OBSERVATIONAL STUDY
41. **AVAGYAN S.A., ZILFYAN A.V., MURADYAN A.A., GAZARYAN H.V.**
POTENTIAL SIGNIFICANCE OF ALIPHATIC POLYAMINES, α -SYNUCLEINS AND HELICOBACTER PYLORI IN DIAGNOSTICS AND PROGNOSIS OF SOME MALIGNANT TUMORS
54. **HARUTYUNYAN K.R., MELKUMYAN K.V., ABRAHAMYAN H.T., ADAMYAN S.H., KHUDAVERDYAN D.N., TER-MARKOSYAN A.S.**
CALCIUM-REGULATING HORMONAL SYSTEM IN CARDIAC FUNCTIONAL ACTIVITY
64. **STEPANYAN S.A., HAKOBYAN V.M., PETROSYAN A.A., YEGHIAZARYAN H.H., PAPAZYAN K.T., BATIKYAN H.Kh., ALEKSANYAN A.Yu., SAFARYAN H.H., SHMAVONYAN H.H., BABAYAN A.M.**
COMPLETE VERSUS NON-COMPLETE FUNDOPLICATION IN SURGICAL TREATMENT OF GASTROESOPHAGEAL REFLUX DISEASE
74. **MINASYAN A.H., MINASYAN H.L., ARAZYAN D.R., ALEKSANYAN A.B., HARUTUNYAN E.A.**
FEATURES OF ABDOMINAL SURGERY IN COMBAT INJURIES, OUR EXPERIENCE
79. **AZATYAN V.Yu., YESSAYAN L.K., SHMAVONYAN M.V., PORKSHEYAN K.A.**
THE CHARACTERISTICS OF MICROBIAL LANDSCAPE OF THE ORAL CAVITY IN PATIENTS WITH VIRAL HEPATITIS B, VIRAL HEPATITIS C AND HIV INFECTION
89. **ADAMYAN N.H., SHAMILYAN Q.M., ZHAMHARYAN A.G., TOPCHYAN H.V., BALASANYAN M.G.**
INVESTIGATION OF CEREBROVASCULAR ACTIVITY OF NEW GABA-DERIVED SHORT PEPTIDES
96. **GHAZARYAN N.L., KHACHATRYAN A.H., ADAMYAN M.Yu., HOVAKIMYAN T.B.**
CARDIAC IMPLANTABLE ELECTRONIC DEVICE INFECTION: PREVALENCE AND RISK FACTORS (A single center experience)
102. **SAHAKYAN G.G., ORDUYAN M.H., BABAYAN A.G., MANVELYAN H.M.**
CLINICAL OUTCOMES OF REPERFUSION THERAPIES IN ELDERLY PATIENTS WITH ACUTE ISCHEMIC STROKE
107. **AZNAURYAN A.V., NAVASARDYAN G.A., AVAGIMYAN A.A.**
PERIVASCULAR ADIPOSE TISSUE – ORCHESTRATOR OF CARDIOVASCULAR DISTURBANCES SEQUEL



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