

**The development of optimal systems of treatment for surgical infection****S.Jaiani, O.Kutidze, B.Tsutskiridze, T.Jorjoladze, D.Chakhunashvili, G.Chakhunashvili.****Georgian Critical Care Medicine Institute. Tbilisi, Georgia.**

Diagnosis and treatment of purulent-septic disease is an unsettled and difficult task. 488 cases of surgical infections were studied. From this in 179 (36.6%) there was peritonitis, in 63.4% (309 cases) purulent disease of soft tissues, lethality was 20.6% (101 cases). Presented are complex program of diagnosis and treatment of patients. It includes treatment with both traditional and new methods (plasma therapy, laser therapy, planned relaparatomy using “zipper” sorption method and cryosurgical device). Usage of optimized complex treatment in patients with purulent-septic disease made possible to decrease lethality to 20.6%.

**Key words: Infection, Surgery, Treatment****Actuality of the problem:**

Diagnosing and treating purulent-septic diseases is one of the hardest and non-solved problems of surgery. Actuality of these problems is related to the prevalence of purulent complications, which are supervened to the steep increase of cumbered capacities of surgical interferences, resistance of micro flora to the antibiotics and contravention of immuno biological reactions of patients.

On the worldwide congress of surgeons, it was mentioned, that during the last decade the density of purulent-septic diseases has significantly increased. In some regions, the frequency has been increased by 2, 4 or even more times compared to the previous years.

According to some authors, about 30-40% of patients who were hospitalized because of surgical pathologies have purulent-septic diseases.

The results of treating purulent-septic diseases are unsatisfying and lethality stays at high rates, which is 60-70% of the patients with sepsis.

Surgical purulent-septic diseases require long-lasting and expensive treatment. The treatment of patients with purulent diseases cost ten times more than in surgical patients who do not have purulent complications.

The references in literature about diagnostics and clinical development of some purulent-septic diseases are quite contradicted and many important statements did not get required solvements.

From practical point of view the difficulties of early diagnosing of purulent infections stay at the same rate. The purulent process supervenes on the background of the main disease, which in most

cases is after hyphenated surgical interference and for a practical doctor it is hard to determine the beginning of the above mentioned complication.

Studying different aspects of the development of purulent-septic diseases in surgical patients is one of the actual problems of the modern surgery.

The statement, about the quantity of the surgical interference at the different locations of the purulent process and fortiori when suspecting sepsis, stays unsolved.

Even the early evidence and bacteriological acknowledgement of the etiology of the process does not the fully remove the threat of the patients life.

Studying the mechanism of the blight and development of the purulent-septic complications are very important goals to be achieved in clinical surgery, which also require future specifications.

The principles of choosing the methods of conservative treatments, quantity of surgical involvements and post-surgical flow require significant improvements, especially at anaerobic and mixed etiology of this disease.

#### **Materials and methods of the research:**

We have investigated 2875 cases of patients with different surgical pathologies, who were treating in the department of the surgical infections at Acad. V.Bochorishvili Anti-Sepsis Centre. 16,9% (488 patients) of them had surgical sepsis. These patients formed the basis for our researches. 40% (197 patients) of them were male, and 60% (309 patients) - female.

By the type of pathology, the patients were divided into 2 groups: the one in which there were patients with peritonitis (179 patients) and the second one where there were patients with the purulent disease of soft tissues (309 patients).

There were 71 male patients (39,7%) and 106 females (60,3%) in the group where there were patients with widespread peritonitis. It is necessary to note that widespread peritonitis occurred in 86 patients, males and females in this group were almost even (45 male, 41 female). Yet in another group, where were the patients with limited peritonitis (93 patients), the picture was different – 27,9% of the patients were male and 72,1% were female. This can be explained as follows: the patients with limited peritonitis, in the most of cases, had purulent blight of the abdominal cavity which had gynecologic origins.

At purulent pathologies of soft tissues, from 309 patients 40,8% (126 patients) were male and 59,2% (183 patients) were female.

The pathologies of soft and gland tissue occurred in 63,3% of the patients, peritonitis occurred in 36,7% of patients. Among our 488 patients, the widespread peritonitis occurred in 17,6%, limited peritonitis – in 19,1%. Purulent diseases of the lower limbs occurred in 17,4% of the patients, whereas when the process was at this location - anaerobic blight occurred in 26 cases (30,5% of the patients with the lower limb pathologies). The abscess of the buttocks area occurred in 14,7% of the patients, from which the anaerobic blight had 12 patients (16,9% of the patients with purulent diseases of buttocks area). The frequency of the anaerobic blight of the soft tissues was 7,8% of 488 patients.

The main contingent of the patients with surgical sepsis were young people at the age of 20-39 (64,7%), the patients who were older (60 or more years of age) formed a small group which was represented only with 5,7%, yet with the heaviness of the process this group was on the 1<sup>st</sup> place. 4% of the patients with the lethal outcome were patients of the older age.

The reasons of forming purulent-septic diseases were primary-purulent wounds (22,3%), post-surgical wounds (41,4%) and post-traumatic purulent wounds (36,3%).

In the correspondence to the pathologies, surgical operations were executed on each and every single patient.

For achieving objective information about condition of the systems and organs, dynamics of purulent process and the excellence of the treatment of the patients, and also finding out the most effective methods of treating the patients with surgical sepsis, we have accomplished the complex of diagnostics and clinical-laboratory researches.

While assembling anamnesis, we were using specially elaborated map, which significantly simplifies the works on the primary documentations. We paid special attention to the length of the duration of fever, to the previously used method of treatment and dynamics of the purulent process.

Ascertaining of the blood measurements (general blood analysis, biochemical, immunologic, coagulologic) was used on every patient, the changes of the leukocyte index of intoxication and neutrophil-lymphatic index were studied, and also osmolarity of blood was measured.

Bacteriologic examination of blood, exudates from the purulent areas was studied in all of the patients.

After the routine physical explorations, all of the patients were examined to specify the degree of purulent blight, if necessary the primary surgical manipulations were executed on the wounds, and some of the patients needed surgical involvements due to requirements (often – life saving).

101 patients out of 488 died. Average lethality was 20,6%. In the patients with peritonitis, the lethality was 18% (32 patients out of 179), and in the patients with purulent blight of soft tissues – lethality was 22,4% (69 patients out of 309).

At 1<sup>st</sup> sight, the fact that lethality in the patients with purulent blight of soft tissues was higher than in patients with peritonitis did not seem comprehensible. Yet, this becomes quite conceivable if we note that when the blight of soft tissues occur, there is a high possibility for anaerobic non-clostridial phlegmonas to develop, the cases of decompensate diabetes were the most often and when this pathology occurs the disease flows more heavily and gives high possibility of lethal outcome. It is notable that in the cases in which all of the patients had lethal outcome – the diabetes was diagnosed, therefore the infection was generalized. During the process of the research, alongside with normal surgical methods of treatment, the original methods of treating the local wounds were used (Table №1).

Table №1: New methods of treatment that were used in the research.

Method	General Amount of Patients	Peritonitis	Purulent Diseases of Soft Tissues
Plasma scalpel	118	6	112
Laser scalpel	69	-	69
Planned relaparatomy (“zipper”)	14	14	-
Cryo destructor	5	-	5
Merging tissues	63	11	52
Suspension of magnesium	9	9	-
Total	278	40	238

Treating the patients with purulent-septic diseases was various, which was caused by the variety of the factors. Sudden worsening of the condition of the patient, which leads to an irreversible process, requires urgent treating manipulations. As the clinical practice has shown, the result of the treatment depends on the timely beginning of treatment.

It was considered important to create the program of treating manipulations for a practical doctor, which is essential for a perfect etiopathogenic treatment of patients with surgical sepsis.

In this research, we considered necessary and purposeful to divide the manipulations, which are executed on our patients, in groups:

1. Local treatment of purulent and metastatic sources:
  - a) traditional methods of surgical treatment (primary surgical manipulations on the wound, undressing, debridement, drainage of the purulent area etc);
  - b) non-traditional methods:
    - using plasma and laser scalpels;
    - planning relaparotomy (“zipper”) at peritonitis;
    - using sorbent tissues;
    - using cryo-surgical installations.
2. General treatment of the patients with purulent-septic diseases:
  - a) antibacterial therapy;
  - b) immune-correcting therapy;
  - c) anti-coagulation therapy;
  - d) anti-ferment therapy;
  - e) extra coronal detoxification.

As seen from the represented data, treating program, offered by us, includes all existed modern methods of treating the patients with surgical sepsis into the treating arsenal, which leads to the improvement of the treatment results and decrease of lethality in patients of the above mentioned profile.

On the table №2 the types of surgical operations are shown, which were used on the patients with purulent-septic diseases.

Most of the patients had several (2 to 5) surgical operations before they were hospitalized in our centre because of primary and secondary (metastatic) sources.

In many cases we were forced to execute surgical manipulations in order to remove the defects which occurred on the previous phase of treatment.

Table №2: Types of surgical operations which were used on patients.

Surgical Operations	Number of Patients
Relaparotomy and drainage of the stomach cavity	179
Undressing and drainage of purulent soft tissues	246
Amputation of the phalanges of the finger (at paronychia)	4
Amputation of the segments of the lower limbs	59
Total	488

The revision of the sources of purulent infections has shown that the defects in 2/3 of cases are practically the same: small dissection; cavity, which contained high quantity of pus because of lack of drainage; walls of the purulent cavity, which had necrotic tissues; necrotic bottom of the purulent sphere; variance of the so-called inflammations (“pockets”) of the content of the purulent sphere. In 361 cases (73,9%) the patients were hospitalized with the tampons in their wounds, because of their long lasting existence, there were created natural difficulties for draining the pus from the cavity. Most of the times the rubber tubes were added to the tampons in order to improve the drainage from the cavity of the purulent sphere. The results were not chosen, they are the typical defects in the most surgical hospitals of the general profile. They show once more that it is necessary to treat the patients with purulent pathologies in the specialized hospitals, in which they have skills and experience of treating this kind of pathologies, and yet we notice that using only one or two methods currently is not always successful for removing purulent infections.

Currently, we can achieve the good results while liquidating the primary purulent source (with traditional methods) only by following these principles: the radical surgical manipulation should be used as soon as possible on the wound on which the devitalized tissues must be removed. Surgical operation must be executed under the narcosis so that the factor of active participation of the patient can be foreclosed (the patients balk because of the pain reaction), general anesthesia alongside with the primary interference also gave the possibility to execute the surgical operation on the metastatic sources.

Afterwards, after the surgical operation on the purulent wound it is necessary to ensure that the drainage of the wound is enough. The dot type of drainage of the wound was used on the 157

patients who had the purulent wounds of the soft tissues and we had good clinical results. The system of washing the wound with a dot-running type is quite simple and effective. The method of washing the wound with the dot-running method it is possible to clamp the wound after the surgical operation.

If there were some reasons when the dot-running method of washing the wounds could not be used, in this case the tamponing of the wounds and clamping with the water soluble unguent base was used. Yet in some cases, especially when there is an anaerobic infection, this method (surgical operation of the wound and drainage) is not always perfect, because the anaerobic excitement requires a bit different action. These difficulties led us to the new idea of elaborating the new methods of treatment, more concretely - to using ozone and UV haze of the plasma stream, which is offered and created with our involvement from the plasma scalpel.

At this time, surgical operations were executed on 118 patients.

The plasma scalpel was used on 6 patients with peritonitis and on 112 patients with purulent blight of the soft tissues.

We were using the special feature of the plasma stream, which is emitting high concentration of the ozone, which comes out of the tube under pressure; also when plasma is created it also generates solid UV wisp. On the patients with peritonitis we were using the irradiation of the stomach cavity with ozone and UV wisp of plasma on 6 patients during surgical operations, and in 4 cases – during the planned relaparatomies (using “zipper”). Bacteriological control of the peritoneal content gave us the following results: using plasma streams led to the steep decrease of concentration of micro organism in 1 ml of the exudates. If the amount of microbes was  $10^7$ - $10^8$  before using plasma streams, then after the procedure it was  $10^3$ - $10^4$  and in rescoring on 1 gram of tissue, and it is notable that this decrease occurred after the single irradiation.

At planned relaparatomies, irradiation of the stomach cavity alongside with washing it with solutions gave us even more impressive effect. While rating the concentration of micro organisms without using plasma streams, we noticed that the treatment even with good clinical effect was not so effective and the inseeded stomach cavity was  $10^6$ - $10^5$  on 1 gram of tissue.

Using plasma scalpel at purulent diseases of soft tissues was pretty widespread. As seen on the table, most of the patients were operated with the help of plasma scalpel in the group of purulent-septic diseases of the lower limbs (33,9%). It is notable that while operating with plasma stream, using thermal effect on the purulent tissue at phlegmonas of foot, shin and hip, we were able to create

aseptic scab after the 1<sup>st</sup> manipulation, drying the wound and even without using ointments and solutions, treating with the “dry” method. Yet it has to be noted that the manipulation has to be held 2-3 times per day. We used this “dry” method on 36 patients with the pathologies of different locations and none of them had unsuccessful results. Even after the 1<sup>st</sup> manipulation, the wounds were becoming dry and during 2-3 days – they were cleaned-up.

While using anaerobic blights of the soft tissues, we were using plasma scalpel and specific ally its ozone and UV components.

We were manipulation on the centre of the wound after its dissection on 14 patients with non-clostridial anaerobic infection. All of the patients had phasciitis with the coexistence of cellulite. The damage was located in the buttocks-hip area in all patients. Depending on patients’ urgency, wide surgical cuts on buttocks and hip were made with the total dissections of the damaged tissues, on all patients. On the surgical table, the primary irradiation of the wound was made with the help of plasma scalpel. Thereby, the prevalence of ozone and UV was 10-15 centimeters, with elevating of the edges of the wound the irradiation of tissues was possible, which were located quite deeply.

Healing of widely opened and manipulated anaerobic wounds is quite quick, about 1.5 times faster.

While treating with CO<sub>2</sub> laser, after 5-6 sessions of irradiation, the wound was cleaned from necrotic tissues and pus secretion was decreased. In the 71% of cases, at peritonitis and as well as at purulent blight of soft tissues in the wound secrete, the growth of microflora is significantly decreased (from  $10^9$ - $10^8$  to  $10^4$ - $10^3$  on every gram of the tissue).

While treating the wounds with the help of helium-neon laser it was noticed that the granulating of the wound was 1.5 times faster compared to the patients who did not have any irradiations.

Therefore using laser technique while treating patients with surgical sepsis (carbon-acid and helium-neon type of laser) gave us opportunity to significantly widen the abilities of the surgical treatment of the above mentioned pathology and significantly improve its result.

Planned relaparatomy was used on 14 patients with different peritonitis; in 11 patients peritonitis was purulent, in 3 patients – fibrinolytic. The patients were operated after 4-6 days after the 1<sup>st</sup> operation. It has to be noticed that in 5 patients, washing of the stomach cavity was active during 4 days, in 7 patients – during 6 days, in 3 patients – during 8 days.

5 patients were irradiated during planned relaparatomies with ozone and UV components of the plasma scalpel which had the good clinical effects (decrease of the sow surface with microbes on 1 gram of tissue with –  $10^7$ - $10^8$  to  $10^3$ - $10^4$ ).

The planned relaparatomies are needed to be used in the complex of treating the patients with the spilled peritonitis, late hospitalizations, progression of the peritonitis and at several bowel pusses.

In our opinion the method is quite simple, effective, it gives us possibilities to permanently control the stomach cavity without any additional surgical operations, the degree of content of the cavity, and also many other manipulations such as irradiation in order to get bacteriocidal effect.

We were using cryo-surgical apparatus in 4 patients who had the purulent blight of the soft tissues, and most of them (3 patients) of the lower limbs. In the case of the phlegmona of the hip, under the effect of the cold temperature, after cutting it in a usual way, the mostly damaged purulent tissues were being randomly cooled and frozen during 3-5 minutes. This kind of manipulation was embodied during 3 days. It was noted that in the zone of freezing the pathologic tissue, the rejection of the non-viable fragments of the tissues was faster.

Treating 63 patients with purulent-septic diseases were executed with the help of sorbent system (sorbent AUVM). 11 patients had peritonitis, 52 had – purulent diseases of the soft tissue. Using sorbent method (more concretely AUVM tissues) causes the purulent wound to clean up faster. The most expressed clinical effect rinses while using the sorbent in the 1<sup>st</sup> hours after the surgical operation, which would be made in order to remove the primary or secondary metastatic pus source.

### **Conclusions:**

1. None of the laboratory, instrumental and other methods of research can reliably educe the signs of sepsis, which provokes the need of creating the program with the consideration of the modern diagnostic possibilities for revealing the patients in the 1<sup>st</sup> stage of development of the general purulent infection.
2. The final diagnostics of the degree of sepsis in the patients with the purulent infection is based on the complex of clinical-laboratorial data, which gives us the possibility to rate the depth of pathological process where the leading place remains after the picture of the disease.
3. In the program of treating the patients with purulent-septic diseases, alongside with the traditional methods of the surgical treatment, it is necessary to include the new subjects of ascendancy, such as the laser cryo-surgery, sorbent methods, programmed laparotomy, methods of extracorporeal detoxication (plasmapheresis, hemosorbition, xenosplenoperfusion).
4. Using surgical apparatus of the plasma hastens the time of the healing process because of its positive effects such as thermal effect of the plasma stream and also ozone and UV components.

5. The plasma method of surgery makes it possible to hasten the treating effect while treating the patients who have purulent infection with complex methods and to achieve the positive effects even at incomplete treatment on the previous stages.
6. The program of the complex surgical treatment of the patients with purulent-septic diseases using new non-traditional methods gives us opportunity to lower the length of the treatment and lethality by 20,6%.

**ქირურგიული ინფექციების მკურნალობის ოპტიმალური სისტემის შემუშავება**  
**ს.ჯაიანი, ბ.ცუცქირიძე, თ.ჟორჟოლაძე, დ.ჩახუნაშვილი, გ.ჩახუნაშვილი, ო.ქუთიძე.**  
**საქართველოს კრიტიკული მედიცინის ინსტიტუტი. თბილისის, საქართველო.**

ჩირქოვან-სეპტიური დაავადებების დიაგნოსტიკა და მკურნალობა წარმოადგენს გადაუჭრელ და რთულ ამოცანას. შესწავლილია 488 შემთხვევა, როდესაც ადგილი ჰქონდა ქირურგიულ ინფექციას. აქედან 179 (36,6%) შემთხვევაში ადგილი ჰქონდა პერიტონიტს, ხოლო ავადმყოფთა 63,4%-ს (309 შემთხვევა) აღენიშნა რბილი ქსოვილების ჩირქოვანი დაავადებები. ლეტალობამ შეადგინა 20,6% (101 შემთხვევა). მოწოდებულია ავადმყოფთა დიაგნოსტიკისა და მკურნალობის კომპლექსური პროგრამა, რომელიც მოიცავს მკურნალობის როგორც ტრადიციულ, ასევე ახალ მეთოდებს (პლაზმოთერაპია, ლაზერული თერაპია, გეგმიური რელაპარატომია, „ელვა“, სორბციული მეთოდისა და კრიოქირურგიული დანადგარის გამოყენება). ოპტიმიზირებული კომპლექსური მკურნალობის გამოყენებამ, ავადმყოფებში ჩირქოვან-სეპტიური დაავადებებით, შესაძლებელი გახდა ლეტალობა შემცირებულიყო 20,6%-მდე.

**გასაღები სიტყვები: ინფექცია, ქირურგია, მკურნალობა.**