



Antibacterial therapy in a complex treatment and prophylaxis of infections complications in burn disease

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Abstract

Intrahospital infections are one of the main causes of morbidity and mortality of hospitalized patient. This problem is of particular actuality in burn in-patient departments where the mechanism of trauma predisposes some courses of antibacterial therapy. 127 patients with thermic injuries from 8% to 45% of the body surface and with depth of II-III degree, aged 1-67 years, treated in burn department of Samarkand branch of Centre of Emergency Medical Care Research Centre from 2015-2018 were under our observation. Development of infections complications of burn disease is on absolute indication for carrying out immediate and intensive antibacterial therapy. Rational use of antibacterial therapy in a complex treatment of patients with burns makes it possible to decrease frequency and severity of infectious complications of burn disease. That is why constant improvement of preventive methods and treatment of infections remains one of priority tasks in burn department.

Keywords: antibacterial therapy, prophylaxis, infections, complications, burn disease

Introduction

Intra hospital infections are one of the main causes of the main causes of morbidity and mortality of hospitalized patients at present that results in direct or indirect sharp cost of treatment [1]. This problem is of particular actuality in burn in-patient departments where the mechanism of trauma predisposes some courses of antibacterial therapy to be carried out although they are not always effective [2].

Nowadays burns frequency achieves 1:1000 of population yearly in the developed countries and lethal outcome from burns vibrates from 1, 5 to 5, 9% [3-6].

Along with this the most frequent case of death from burns is the infection which makes 76, 3% [7] in the lethality structure of burn victims according to the data of some authors.

In addition to direct danger for patients lie long existence of infection results in delay of burn injuries healing process and promotes excessive scarring that takes place as a result of chronic stimulation of inflammatory cells [8].

Side of entrance for hospital infection in patients with burns appear to be burn surface, catheterized magistral vessels, respiratory tract, alimentary tract, urinary tract. It is associated not only with invasive therapy but with loss of natural protective properties of skin and mucous membranes in severe trauma due to developing immunosuppression.

Material and Methods

127 patients with thermic injuries from 8% to 45% of the body surface and with depth of II-III degree, aged 1-67 years, treated in burn department of Samarkand branch of Centre of Emergency Medical Care Research Centre from 2015-2018 were under our observation.

Polyresistant hospital strains, sometimes in various associations were as a rule separated from burn surfaces (Table 1).

The fact of growing of causative agents aggression during patient,s stay at the in patient department is evident. Within the hospital burn department with patients suffering from the most severe somatic and surgical pathology becomes «selector» of hospital strains. The second alarming signal was high degree of the hospital strains of staphylococcus aureus and Pseudomonas aeruginosa separated in burn department. The indications to antibiotic prophylaxis were the following facts:

- Presence of burdening factors (age younger than 3 years, immune deficient condition);
- More than 7 hours before hospitalization;
- The burn area more than 5% of the body surface;
- Presence of thermo inhalation trauma.

For starting (empirical, escalating) therapy the following medicines were used:

- Amoxicilline / calvulant амоксициллин/клавуланат;
- Lincomycine / alternative

The indications for changing of antibacterial preparations were the following:

- Absence of positive dynamics, presence or increase of symptoms of systemic inflammatory reaction in 48-72 hours;
- Absence of sensitive of isolated flora to the used preparation.

The second course of antibacterial therapy (Table 2) was directed to clinical picture because bacteriological data were not more often obtained to that treatment.

The indications for empiric therapy were the following:

- Threat of generalization of infection;
- The area of injury more that 30%, rejection of early operative treatment;

- Thermo inhalation trauma;
- Severe shock, not stopping during 24-48 hours (Table 3).

As the criteria of antibiotic therapy efficacy were considered the following facts:

- Regression of polyorgan insufficiency syndrome;
- Absence of suppuration in the injury (sterile inoculation on 3-7 day);
- Absence of generalization of infection and secondary foci.

Along with this in the majority of cases the injuries remained sterile by 3-7 day. The range of isolated causative agent correlated with efficacy of therapy: in positive result single colonies with low resistance level were revealed in ineffective therapy *Pseudomonas aeruginosa* sometimes in combination with *Staphylococcus aureus* dominated.

Frequency of development of local purulent complications (wound infection of more than 10^5 microorganisms to a gram of tissue), septic complications (according to clinical laboratory criteria), terms of treatment at the in-patient department were estimated.

The results of the protocol use were compared with similar causes of thermic trauma having difference only in treatment by approaches to empiric therapy. Thus, the first results of treatment included:

- Rotation of antibacterial means;
- dilation of spectrum of hospital strains sensitivity;
- Decrease of local purulent complications frequency 1,5-2 times;
- Decrease septic complications 2,5-3 times;
- Decrease of hospitalization time to 10-15%.

Thus, to provide effective antibiotic therapy express-diagnostic of hospital strains sensitivity is necessary.

Table 1: Structure of causative agent discharged from a burn surface

Causative agents	Number of patients	in %
St. aureos	39	30,71
St. aeruginosa	33	25,98
St. epidermitis	11	8,66
St. enterecoce	9	7,09
St. acinotobacter	9	7,09
St. enterobacter	6	4,72
Saprophytes	6	4,72
Candida	5	3,94
Others	9	7,09

Table 2: Course of antibacterial therapy

Gram (+)	Gram (-)	Reserve preparations
Ceftriaxon+amicacin Cefotaxim+amicacin Cefoperazon /sulbactam Ciprofloxacin	Ceftazidim Cefoperazon Cefepim Ciprofloxacin	Cilostatin

Table 3: Course of empiric therapy

Starting (empiric)	Alternative preparations
Imipenem/cilostatin i/v+amikacin i/v, i/m Meropenem+amikacin i/v, i/m	Ceftrazidim i/v + netilmicin i/v Netilmicin i/v + metronidazole i/v Ciprofloxacin i/v using drop by drop administration

Discussion

Extensive burn damage is accompanied by the development of the whole complex of changes in the body of victims having received the diagnosis of a burn disease^[8]. Infection is the leading factor in the pathogenesis of a burn disease. Along with this the process of infection having started in a burn wound tends to generalization and often results in severe complication like sepsis and these are infections complications that are main cause of death in patients with burns^[9,10].

Growth of resistance of hospital strains of microorganism remains an acute problem in burn centres^[11,12]. Lethality of patients with inadequate antibacterial therapy is twice high than with an adequate one. It makes necessary to look for reasonable approaches to optimization of antibiotic therapy and antibiotic prophylaxis schemes in patients with thermic trauma^[13].

Indications to administration of systemic antibacterial therapy in patients with extensive deep burns depend on both trauma severity and the period of burn disease.

The patients with deep burns area of more than 10% of the body surface as a rule undergo systemic antibacterial therapy being strictly individual depended on semination of burn injury, intoxication degree and indices of immunological reactivity of the body. It should be emphasized that in patients with burns covering of 10-20% of the body surface treatment may be limited by oral preparations or their intramuscular introduction using intravenous infusion only in severe course of infections process^[14].

With enlargement of deep damage area, the risk of development of generalized infections complications of burn disease considerably increases. In this regard the victims with extensive deep burns of more than 20% of the body surface undergo antibacterial therapy for prophylaxis and then treatment of burn disease complications as well is included into a complex therapy immediately after bringing the patient out of burn shock. All antibacterial preparations are introduced to these patients intravenously.

Development of infections complications of burn disease is on absolute indication for carrying out immediate and intensive antibacterial therapy. It should be noted that in most causes it is inadvisable to administer systemic antibacterial preparations to patients with burns of II-III A degree as well as to those with limited deep burns covering of no more than 10% of the body surface. The exception is presented by elderly and aged people suffering from diabetes mellitus, chronic infections as well as those who were hospitalized at late term after getting trauma with clearly marked general and local signs of infection when local antibacterial preparations are ineffective. The rest of the patients need local antibacterial therapy: bandages with 1% iodovidone, betadine, ointments on hydro soluble basis. Combination of solve dressing of levomicol with gentamycin powder in gram-negative flora is of good recommendation. Application of synthetic covering containing antibacterial preparations is prospective. In means that not only medical preparations should be used but treatment in the condition of abacterial environment using "Klinitron" beds or abacterial isolators as well as physical methods of treatment: lasertherapy, azonotherapy, etc. Application of indicated methods of general or local treatment of patients with severe burns appeals to provide performing necrectomy and plastic skin coverings restoration on the whole. Antibacterial therapy is carried out according to two directions for this purpose:

local use of antibacterial preparations and systemic antibacterial therapy.

Conclusion

Rational use of antibacterial therapy in a complex treatment of patients with burns makes it possible to decrease frequency and severity of infectious complications of burn disease. That is why constant improvement of preventive methods and treatment of infections remains one of priority tasks in burn department.

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References

1. Hendon DN. Total burn care // 5 edition, W.B. Saunders, 2017, 860.
2. Atiyeh S *et al.* Effect of silver on burn wound infection control and healing: review of the literature // Burns,2007:33(2):139-148.
3. Alekseev AA, Krutikov MG, Yakovlev VP. Antibacterial therapy in a complex treatment and prophylaxis of infections complications in burns // RMJ, 1997, 5(24).
4. Kienzle N, Muller M, Pegg S. Aeronomas wound infection in burns. Burns,2000:26:478-488.
5. Dokukina LN, Aminev VA, Hrapunkova GG. Formula of antimicrobe means for children's burn department //Actual problems of thermic trauma, 2002, 343-345.
6. Alekseev AA. // "Burns sepsis: diagnosis, prophylaxis, treatment" Authors thesis doctor medical sciences. Moscow, 1993, 205.
7. Beloborodov VB. Actual aspects of antimicrobe therapy of surgical infections. // Surgery,2002:2:56-60.
8. Barret JP. Total Burn Care 9 (fifth edition), 2018, 640-647
9. Grushitskaya EV, Kondratenco NV, Galeeva EV. Antibiotic prophylaxis and antibacterial therapy in patients with deep burns. // Actual problems of thermic trauma, 2002, 133-135.
10. Krutikov MG, Bobrovnikov AE. Antibiotic prophylaxis in combustiology // Combustiology,2004:4:24-25.
11. Krilow KM, Filipov OV, Shlik IV. The role of wound infection in development of systemic inflammatory response in victims with severe thermic trauma. // Journal Medical aid, Moscow,2006:3:61-62.
12. Matveenko AV, Petrachkov SA. Possible was of decrease of infections morbidity and lethality. // Journal Medical aid, Moscow,2006:3:70-71.
13. Kienzle N, Muller M, Pegg S. Aeronomas wound infection in burns. Burns,2000:26:478-488.
14. Schittek B. Behavioral changes in burned adults' patients during their stay in hospital. Burns,2001:8:369-371.