V.N. Balin, H.K. Karshiyev, A.K.Iordanishvili, M.I. Muzykin

STUDYING OF MORPHOLOGICAL CHANGES OF SOFT TISSUES AT EXPERIMENTAL SUPERFICIAL PHLEGMON

ABSTRACT

Results of a preclinical trial on studying of influence of the standard complex therapy and complex therapy with use of a local irrigation of a wound sodium hypochlorite on the course of superficial experimental phlegmons are presented in article. During the research assessment of a morphological picture of a postoperative wound for 3, 7 and 10 days is made. At a combination of complex therapy to a local irrigation of a postoperative wound sodium hypochlorite solution pathomorphologic signs of an acute purulent inflammation became less expressed, with formation of a proliferative infiltrate in an interstition of a hypodermic musculation and faster retrogress of inflammatory process.

Keywords: pyoinflammatory diseases, perimaxillary phlegmon, superficial phlegmon, dontogenous infection, sodium hypochlorite, experimental phlegmon.

INTRODUCTION

The problem of treatment of pyoinflammatory diseases belongs to number of leaders in maxillofacial surgery [6,8,12]. The reason of development of a purulent infection and its generalization in a wound still remain completely obscure that in turn, indicates relevance of research of new methodical approaches to treatment and agents for local impact on pyoinflammatory processes, including a dontogenous parentage [4,7,9,11].

Essential disadvantage of many works on a problem of clinical use of various antiseptics is rather narrow circle of the studied indicators that doesn't allow to present distinctly features of complex reaction of soft tissues in zones with pyoinflammatory diseases [3,5,10].

The research objective consisted in studying of morphological changes of soft tissues at experimental superficial phlegmon.

MATERIAL AND METHODS

The preclinical trial is conducted on 12 rabbits males of breed the Chinchilla weighing 2,5-3,0 kg. which contained in standard conditions of a vivarium, ate equally that met the standard rules and standards of the contents of experimental animals in Russia. Surgical actions were carried out in two steps under local and an intravenous anesthesia with keeping of the rules and requirements imposed to the equipment, tools, an asepsis and antiseptics according to current "Rules of performing works with use of experimental animals" (the order of the Ministry of Health No. 755 of August 12, 1977).

At the first stage of an experiment under a local anesthesia modeling of widespread perimaxillary phlegmon at laboratory animals by the standard technique was made [1,3]. After increase of clinical signs of a disease, that is at the second stage under intravenous anesthesia carried out opening and drainage of perimaxillary phlegmon with performing the standard complex therapy [2,3,9].

Depending on the carried-out treatment of animals divided into 2 groups. the 1st control group was made by 6 animals receiving complex therapy. the 2nd experienced group - 6 animals, combined complex therapy with a wound irrigation solution of sodium hypochlorite ($NaClO_3$). Solution of sodium hypochlorite was received by means of the device "Espero-1" (Russia).

For a histological research which was conducted on for 3, 7, 10 days took fragments of tissues in the field of edges of the experimental wound formed after opening of phlegmon, in each observation investigated 4 fragments of tissues which surely contained the zones of actually purulent wound surrounding it sites of the intact skin, hypodermic fat and a muscle. On the bio products deleted the hair remains of an animal, and then fixed them in solution of neutral Formalinum within 48 hours. The subsequent conducting of macrodrugs was carried out by the standard technique [1,9] and then filled in them in paraffin. On a microtome made sections 5-8 microns thick of paraffinic blocks, prepared drugs which painted a hematoxylin eosine. Applied a staining according to Van-Gizona to a research of collagenic fibers, and applied Chic reaction to assessment of neutral mucopolysaccharide. Statistical processing was made with use of a software package of Statistica for Windows v. 7.0.

Results and discussion

Results of a morphological research of soft tissues at animals of control group in a zone of formation of phlegmon and adjacent to the fusion center for the 3rd days after performing complex therapy of superficial phlegmon showed that in a false skin, a derma and a hypodermic hypoderma the pathomorphologic changes characteristic of purulent inflammatory and destructive process remained. In a false skin taped hyperkeratosis signs, and also an edema of acanthceous of cells of a layer and an proliferation of basal cells. In own connective tissue plate and around appendages of a skin the edematous, destructive and inflammatory phenomena remained: vacuolation and leukocytic infiltration of intercellular substance. Fibrous structures were in a condition of disorganization in the form of homogenization, a mucoid and fibrinoid swelling. In deep layers of a derma of a skin the diffuse leukocytic infiltration, an edema and a destruction of structural elements of a connecting tissue (Pic. 1) was taped. For the 7th days of observation in a hypoderma hypodermic and masseters the plethora of vessels, an edema and a loosening an interstition, conservation of a diffuse intermuscular leukocytic infiltration with the centers of vacuolation and a necrosis of tissues (Pic. 2) became perceptible.

At the same time, the diffuse leukocytic infiltration extended both towards a connecting tissue of a derma, and towards a hypodermic musculation. Thus is defined that complex therapy rendered antiinflammatory effect only on superficial fabric structures in the field of an experimental wound at superficial phlegmon

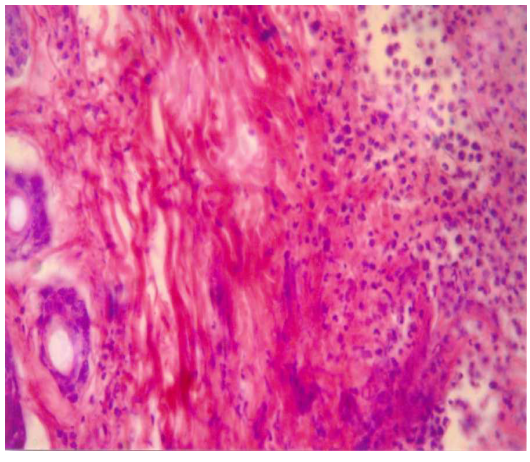
which consist for the 10th days of a research in decrease of activity of inflammatory and destructive changes in the soft tissues adjacent to the center of their fusion.

In deep layers of a derma of a skin, and also in a hypodermic musculation for the 10th days of experience the diffuse inflammatory phenomena (Pic. 3) remained.

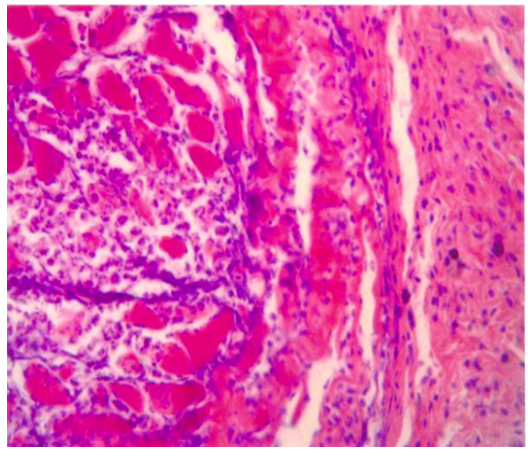
Complex therapy in combination with processing of wounds of $NaClO_3$ at superficial phlegmons of head skin of animals (the main group of a research) showed that, in comparison with control, inflammatory and destructive changes in the tissues adjoining on an experimental wound from initial terms of a research were expressed to a lesser extent. At the same time for the 3rd days of an experiment, in blankets of a false skin the small focal hyperkeratosis, inspissation of inside layers and rising of activity of cells of a basal layer became perceptible. In a basal membrane and in own connective tissue plate of a skin degree of the edematous and destructive phenomena is slightly lower, than in control group. The inflammatory and destructive changes developing around skin appendages were also more reduced, than in control group, and the leukocytic infiltration in tissues was not defined. In deep layers of a derma for the 3rd days (Pic. 4) only the small edema and a loosening of fibrous structures without the expressed inflammatory infiltration became perceptible.

For the 7th days of an experiment of this group in tissues on the course of vessels and an interstition of a hypoderma a moderate proliferation of lympho-histiocytic cells was taped (Pic. 5.), what testified to efficiency of topical administration of solution of sodium hypochlorite, against the background of the standard complex therapy.

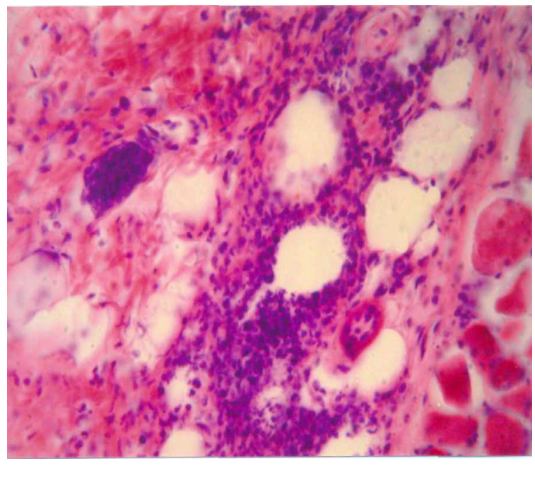
For the 10th day of an experiment in the main group signs of an acute purulent inflammation were less expressed, than in control group of animals, the changes characteristic of the third (proliferative) stage of inflammatory process with formation of a proliferative infiltrate in an interstition of a hypodermic musculation (Pic. 6) became perceptible.



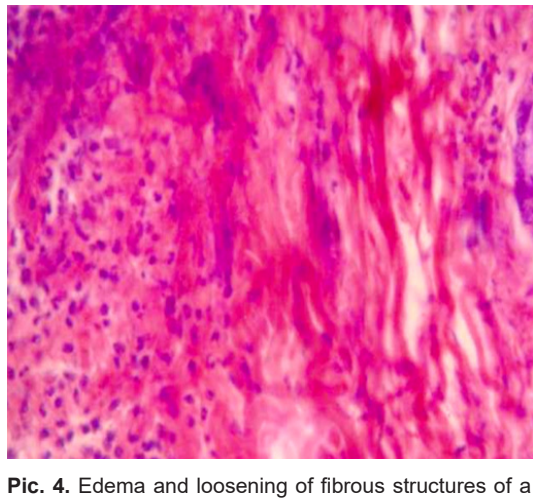
Pic. 1. Inflammatory and destructive changes in a derma and a hypoderma at superficial phlegmon. Control group, 3 day. Hematoxylin-eosine. Ad.: Oc. 10, ob. 40.



Pic. 2. A plethora of vessels, an edema and a loosening an interstition in a hypoderma, hypodermic and masseters. Control group, 7th days. Hematoxylin-eosine. Ad.: Oc. 10, ob. 40.



Pic. 3. A diffuse leukocytic infiltration in a hypoderma and a hypodermic musculation. Control group, 10th days. Hematoxylin-eosine. Ad.: Oc. 10, ob. 40.



Pic. 4. Edema and loosening of fibrous structures of a derma, moderate degree of inflammatory signs. Main group, the 3rd days. Hematoxylin-eosine. Ad.: Oc. 10, ob. 40.

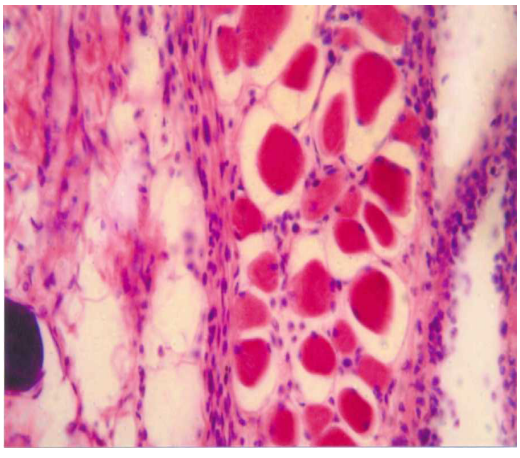
CONCLUSION

The morphological research showed that the standard traditional complex local therapy of purulent diseases of soft tissues, at superficial phlegmon renders insufficient antiinflammatory efficiency and favorably influences only the soft structures located near an experimental wound that is demonstrated by decrease of activity of inflammatory and destructive changes in them. In deep layers of a derma and in a hypodermic musculation to the experience extremity signs of alterative and exudative phases of an inflammation still remain.

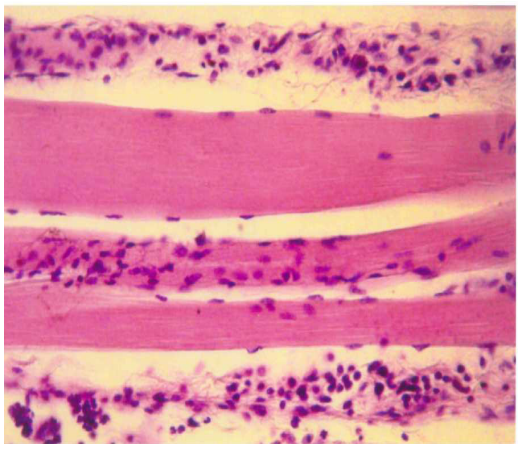
Use of complex local therapy in combination with processing of an experimental purulent wound solution of sodium hypochlorite led to noticeable depression in tissues of the inflammatory and destructive phenomen. When using sodium hypochlorite in a derma and in deep hypodermic tissues against the background of an insignificant diffuse infiltration leucocytes and histiocytic to cells, noted proliferative processes for 7-10 days that testifies to larger efficiency of the carried-out therapy.

REFERENCES

Balin V.N. Experimental and clinical justification of complex use of low-frequency ultrasound,



Pic. 5. Conservation of moderate degree of inflammatory signs in a derma and a hypoderma of a skin. Main group, 7th days. Hematoxylin-eosine. Ad.: Oc. 10, ob. 40.



Pic. 6. A small inflammatory infiltration in an interstition of a hypodermic musculation. Main group, 10th days. Hematoxylin eosine.

radiation helium - the neon laser and a hyperbaric oxygenation in purulent surgery of maxillofacial area: avtoref. dis. d-ra med. nauk / V.N. Balin. – SPb. – 1988. – 28 p.

Dubinin Y.A. Complex treatment of a purulent wound Avtoref. dis.… kand. med. nauk – 1999. – №3. – P. 54-57. – Krasnodar.1997. – 22 p.

Dynzhinova T.V. Possibilities of correction of system inflammatory reaction at treatment of sepsis at patients with pyoinflammatory diseases of soft fabrics. Avtoref. dis. … kand. med. nauk – M. – 2007. – 22 p.

Problems and the perspective directions of the korrektsiimediatorny answer at sepsis. / P.I. Mironov, V.A. Rudnov // Anesteziol. i reanimatol. – 1999. – №3. – P. 54 – 57.

Muzykin, M.I. Periostits of jaws and their treatment / M.I. Muzykin, A.K. Iordanishvili, G.A. Ryzhak // SPb.: Chelovek, 2015. – 112 p.

Okovity S.V. Improvement of complex treatment of a sharp odontogenny periostit at people of the senior age groups / S.V. Okovity, M.I. Muzykin, A. K. Iordanishvili // Stomatologiya. – 2012. – T. 91, № 6. – P. 63 – 66.

Robustova T. G. Odontogenous inflammatory processes. – M: Medicina. 2006. – 661 p.

Urazayeva A.E. Diagnostics and complex treatment of phlegmons of maxillofacial area taking into account toxicity of blue blood. Avtoref. dis. … kand. med. nauk. – Alma-Ata. – 2001. – 22 p.

Glass C.A. Transient osmotic absorption of fluid in microvessels exposed to low concentrations of dimethyl sulfoxide / C.A. Glass, R.M. Perrin, T.M. Pocock // Microcirculation. – 2006. – № 13 (1). – P. 29 – 40.

Krautsevich L. Clinical aspects, diagnosis and treatment of the phlegmons of maxillofacial area and deep neck infections / L. Krautsevich, O. Khorow // Otolaryngol. – 2008. – Vol. 62. – P. 545 – 548.

Seppänen L. Analysis of systemic and local odontogenic infection complications requiring hospital care / L. Seppänen [et al.] // J. Infect. – 2008. – № 57. – P. 116 – 122.

The authors

BalinViktor Nikolaevich
Doctor of Medicine, Professor
Head of the Department and Clinic of Maxillofacial, Plastic Surgery and Stomatology, IUV N.I. Pirogov NMHTS.
Address: 105203, Moscow, ul. Niznyaya Pervomaiskaya, 70.
Tel .: +7 (499) 464-44-54
E-mail: www.pirogov-center.ru;

Karshiev Khurram
Candidate of Medical Science, Assistant of the Department of Surgical Dentistry of the Institute for Advanced Training of Doctors, Head of the Department of City Clinical Hospital, Tashkent, Uzbekistan.
Address: 100007, Mirzo Ulugbek street. Tashkent, 51
Phone: + 998 (71) 268-17-44

Muzykin Maxim Igorevich
Candidate of Medical Science, Assistant of the Department of Maxillofacial Surgery and Surgical Dentistry of the CM. Kirov Military Medical Academy
Address: St. Petersburg, Zagorodny Ave 47
Tel .: 8 (921) 8999212
E-mail: muzikinm@gmail.com;

Iordanishvili Andrey Konstantinovich
MD, Professor, Honored Rationalizer of the Russian Federation,
Professor of the Department of Orthopedic Dentistry of the I.I.Mechnikov North-West State Medical University, Professor of the Department of Maxillofacial Surgery and Surgical Dentistry of the Military Medical Academy named after M.Sh. CM. Kirov
Address: St. Petersburg, Zagorodny Ave 47
Tel .: +7 (812) 495-72-98