



Prediction Of Puronto-Inflammatory Complications In Open Fractures Of Long Tubular Bones

J. T. Tukhtaev

ASMI, Department of Traumatology, Orthopedics, neurosurgery, CVH and disaster medicine

ABSTRACT

The course of many inflammatory and purulent diseases, including those with open fractures of long tubular bones, has changed significantly and acquired a hidden nature, which poses significant difficulties both in diagnosis and in treatment. Numerous factors that determine the characteristics of the outcome in open fractures complicated by the development of wound infection include the state of the immune and antioxidant status of the macroorganism. The most important of them are: studying the state of the immune system, "LPO antioxidants" at different stages of the development of surgical infection, determining the role of changes in peroxide status in the formation of the immune response, as well as the development of criteria for early prediction of infectious complications.

Keywords:

purulent-inflammatory complications, prognosis, open fractures, method.

Introduction

A comprehensive clinical and immunological examination of 92 patients with open fractures of long bones who were treated as inpatients was carried out. Group 1 consisted of 30 patients with uncomplicated open fractures of long tubular bones (wound healing by primary intention). Group 2 (n=30) - with purulent-inflammatory complications

(suppuration in the fracture line, complicated by periostitis, phlegmon and abscesses of the periosteal soft tissues). Group 3 (n=32) - to assess the clinical effectiveness of the prognostic coefficient. The control group consisted of 30 practically healthy people. The patients were comparable in age, nosological forms and extent of the pathological process (Table 1).

Table 1

Distribution of patients by location and nature of open fractures (according to A.V. Kaplan's classification [4])

Fracture location	Fracture type									Total
	1st group			2nd group			3rd group			
	IIB	IIV	IIIV	IIB	IIV	IIIV	IIB	IIV	IIIV	
Hip	2	—	2	2	1	1	1	1	1	11
Shin	21	—	2	20	—	3	24	1	3	74
Shoulder	1	—	—	1	—	—	—	—	—	2
Forearm	1	1	—	1	—	1	—	1	—	5
Total	25	1	4	24	1	5	25	3	4	92

Materials And Methods

All patients, against the background of traditional therapy (antibacterial agents, antiplatelet agents, local drug treatment, etc.), underwent primary surgical treatment of

wounds, adequate drainage and immobilization of bone fragments using various methods [external fixation devices (AFD), submersible metal osteosynthesis (SMO) and others] (Table 2).

Table 2

Distribution of patients according to the method of fixation of fragments

Fracture location	Fracture type												Total
	1st group				2nd group				3rd group				
	Gypsum	Skeletal	AED	Submersi	Gypsum	Skeletal	AED	Submersi	Gypsum	Skeletal	AED	Submersi	
Hip	—	—	4	—	—	—	4	—	—	—	3	—	11
Shin	2	6	11	4	1	7	13	2	1	6	18	3	74
Shoulder	—	—	—	1	—	—	1	—	—	—	—	—	2
Forearm	1	—	—	1	1	—	—	1	1	—	—	—	5
Total	3	6	15	6	2	7	18	3	2	6	21	3	92

Results And Discussion

Determination of the level of interleukins (IL) - IL-1α, IL-4 in the blood serum of patients was carried out using solid-phase ELISA according to the standard method using Pro-Con test systems. Diene conjugates (DC) were measured according to the method proposed by I.A. Volchegorsky et al. [3]. The study of total antioxidant activity (AOA) was carried out according to the method of M.Sh. Promyslov. The studies were carried out on patients upon admission to the hospital, subsequently on the 2nd, 5th, 10th day of observation and upon discharge. The significance of the differences was assessed using the Student's t test. Differences were considered significant at p<0.05.

It was established that in patients of group 1 the concentration of the studied cytokines increased in the first days of injury - IL-1α by 3.3 times, IL-4 by 4 times, and in the group with purulent complications by 4.4 and 4 times. 3 times, respectively (p<0.001), which is consistent with the literature data and indicates the tension of the body's defenses aimed at stopping the pathological process [2, 11]. A decrease in the studied parameters was noted in group 1 on the 5th and subsequent days, while in group 2 a decrease was recorded on the 10th (IL-1α) and upon discharge from the hospital (IL-4) (Table 3). The data obtained are logical, since in any purulent-inflammatory diseases the concentration of proinflammatory cytokines usually increases significantly [2].

Table 3

Contents of some indicators of cytokines and the "LPO-antioxidants" system in patients with purulent-inflammatory complications of open fractures (M±m) (n=30)

Indicators (pg/ml)	Control (n=30)	Research days				
		1st day	2nd day	5th day	10th day	Upon discharge
IL-1α	36±3	145±8	157±11	169±12	110±7	74±6
p1		<0,001	<0,001	<0,001	<0,001	<0,001
p2			>0,05	>0,05	<0,001	<0,001
p3				>0,05	<0,001	<0,001
p4					<0,001	<0,001

p5						<0,001
IL-4	32±2	117±8	139±10	188±13	163±12	71±5
p1		<0,001	<0,001	<0,001	<0,001	<0,001
p2			>0,05	<0,001	<0,001	<0,001
p3				<0,01	>0,05	<0,001
p4					>0,05	<0,001
p5						<0,001
DC (E232/mg lipids)	0,096±0,01	0,2±0,03	0,2±0,02	0,19±0,01	0,17±0,01	0,13±0,01
p1		<0,001	<0,001	<0,001	<0,001	<0,001
p2			>0,05	>0,05	<0,001	<0,001
p3				>0,05	<0,001	<0,001
p4					<0,05	<0,001
p5						<0,001
AOA (%)	30,2±1,3	14,7±0,8	14,8±0,6	15,2±0,7	17,3±0,8	21,7±0,9
p1		<0,001	<0,001	<0,001	<0,001	<0,001
p2			>0,05	>0,05	<0,05	<0,001
p3				>0,05	<0,05	<0,001
p4					<0,05	<0,001
p5						<0,001

In patients with open fractures, there is a significant imbalance in the “LPO-antioxidants” system. We found that the level of DC increased by 2 times in relation to the control parameters, and from the side of antioxidant protection, it was revealed that in the inflammation phase, AOA indicators are below normal values and amount to 50% of the control values (see Table 3). The data obtained confirm that disruption in the “LPO-antioxidants” system is one of the components of pathogenesis in the occurrence of purulent-inflammatory diseases [6].

As a result of the data obtained, we created a prognostic integrated system based on the interaction of some indicators of the “LPO-antioxidants” system (AOA, DC) and mediators of the immune system (IL-1 β , IL-4), since they reliably reflect the functional state resistance systems and, as a consequence, the development and course of the wound process [2].

Conclusion

1. The study of the content of IL-1 α , TNF α , DC and AOA with the calculation of the coefficient in patients with open fractures of long tubular bones allows us to predict the development of purulent-inflammatory complications at the stage of preclinical manifestations.

2. The use of the coefficient can make it possible to timely make the necessary adjustments in the treatment of this group of patients.

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