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COMPARATIVE ANALYSIS OF PATHOGENS OF POST-TRAUMATIC AND HEMATOGENOUS OSTEOMYELITIS

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✓ ***Resume***

As a result of the study in this article, the etiological agents found in the materials obtained during the microbiological examination of patients of different ages, acute and chronic post-traumatic and hematogenous osteomyelitis, as well as all age characteristics, causes, etc. were studied and analyzed in detail.

Key words: sick children, adult patients, hematogenous osteomyelitis, post-traumatic osteomyelitis, pathogenesis, strain, monoculture, material, identification, etiological agent.

СРАВНИТЕЛЬНЫЙ АНАЛИЗ ВОЗБУДИТЕЛЕЙ ПОСТТРАВМАТИЧЕСКОГО И ГЕМАТОГЕННОГО ОСТЕОМИЕЛИТА

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✓ ***Резюме***

В результате исследования в данной статье были изучены и детально проанализированы этиологические агенты, встречающиеся в материалах, полученных при микробиологическом обследовании пациентов разного возраста, острого и хронического посттравматического и гематогенного остеомиелита, а также все возрастные особенности, причины и т.д.

Ключевые слова: больные дети, взрослые пациенты, гематогенный остеомиелит, посттравматический остеомиелит, патогенез, штамм, монокультура, материал, идентификация, этиологический агент.

ПОСТРАВМАТИК ВА ГЕМАТОГЕН ОСТЕОМИЕЛИТЛАРИДА КАСАЛЛИК ҚЎЗҒАТУВЧИЛАРНИНГ ҚИЁСИЙ ТАҲЛИЛИ

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✓ ***Резюме***

Ушбу мақолада олиб борилган тадқиқотлар натижасида турли ёшдаги беморларда, ўткир ва сурункали кўринишдаги постравматик ҳамда гемотоген остеомиелитларда микробиологик текшириш учун олинган материаллардан аниқланган этиологик агентлар учраш кўрсаткичи, ёшга боғлиқ барча хусусиятлар, сабаблар атрофлича ўрганилди ва таҳлил қилинди.

Калит сўзлар: бемор болалар, катта ёшдаги беморлар, гемотоген остеомиелит, постравматик остеомиелит, патогенез, штамм, монокультура, материал, идентификация, этиологик агент.

Relevance

To date, several studies have been carried out on the incidence of osteomyelitis, the specific course of the disease, prevention and prevention. The degree of occurrence of etiological agents in various forms of hematogenous and post-traumatic osteomyelitis, microbiological research and aspects of the age of patients are not fully understood [3]. In the formation and development of post-traumatic osteomyelitis, the main mechanism is the entry

of etiological agents into open or closed lesions mainly along exogenous pathways. In this case, long tubular bones (thighs, shoulders, legs, wrists) are often observed with damage to the epiphysis and metaphysis. Damage to bone tissue under the influence of exogenous factors plays an important role in the pathogenesis of the disease [10]. The fact that microorganisms enter the bone and cause pathological processes occurs along endogenous and exogenous pathways, long-term abscesses and hidden persistent foci of infection at the site of chronic osteomyelitis are described in detail in the literature [5, 6].

The formation and development of hematogenous osteomyelitis is the main mechanism by which pathogens in the pathological focus enter the bloodstream. This occurs with the formation of caries [2], sinusitis, tonsillitis, intestinal obstruction and other endogenous pathological foci. Gradually developing allergic reactions also predispose to the development of hematogenous osteomyelitis [4]. In experiments with acute and chronic osteomyelitis, changes in the dynamics of indicators of the immune system of animals were revealed [8]. Acute hematogenous osteomyelitis is one of the most frequent purulent-septic diseases of infants, since bacteriological examination of biological material (pus) obtained from sick children (p-39) causes disease in 66.7 ± 7.5% of post-traumatic cases. and 33.7 ± 7.5 hematogenous osteomyelitis was reported in% of cases [7,11].

Purpose of the study: to study and analyze in detail the etiological agents found in the materials obtained during the microbiological examination of patients of different ages, acute and chronic post-traumatic and hematogenous osteomyelitis, and also to study all age characteristics, causes.

Material and methods

For this study, 390 adults and 68 children with osteomyelitis were examined. Study patients: OOM (p-53), HOM (p-395). Biological substances (blood, pus) obtained in osteomyelitis of the reticular type and form observed in children and adults were processed by statistical variation methods.

Result and discussion

In our study, we carried out a comparative analysis of pathogens of pathogens obtained from biological agents obtained from post-traumatic hematogenous osteomyelitis observed in children (Table 1).

It was found that in posttraumatic osteomyelitis in gram-positive cocci (35.9 ± 5.4%, respectively, 10.3 ± 3.4% versus n = 28, n = 8), the probability of germination is 3.5 times higher than in hematogenous osteomyelitis, respectively. bacteria, we observed the opposite, i.e. they were detected 1.6 times more often in hematogenous osteomyelitis (23.0 ± 4.8%, 14.1 ± 3.9% versus n = 18, n = 11), but due to the lack of observation units, there were no results, which is statistically convincing (R> 0.05).

In post-traumatic osteomyelitis, Enterobacter spp was not identified as the causative agent, and in hematogenous osteomyelitis S. saprophyticus and Candida spp. As a result, it turned out that they are associated with the stable appearance of the organism in its own biotope.

Etiological agents of osteomyelitis (S. aureus, S. epidermidis, E. coli, Proteus spp, P. aeruginosa) for unknown reasons (the reason is not specified by the parents) are mainly causative agents of post-traumatic and hematogenous osteomyelitis. Thus, we would like to acknowledge that the term "osteomyelitis of unknown etiology" was misused in this case. An in-depth study of the history of the formation of the disease (pathological history) would show that these pathogens enter the pathological lesion by exogenous (various lesions) or endogenous (from foci of chronic infection) pathways.

Table 1

Distribution of etiological agents from children with osteomyelitis by disease manifestations

Causative agent	Post-traumatic, n=28		Hematogenous, n=29		The reasons are unknown n=11	
	Absolut	%	Absolut	%	Absolut	%
S.aureus	16	20,5±4,6	5	6,4±2,8* ↓	4	5,1±2,5

S.epidermidis	9	11,5±3,6	2	2,6±1,8* ↓	1	1,3±1,2
S.saprophyticus	2	2,6±1,8	0	0	0	0
Enterococcus spp	1	1,3±1,2	1	1,3±1,2↔	0	0
Gram-positive cocci, total	28	35,9±5,4	8	10,3±3,4* ↓	5	6,4±2,8
E.coli	2	2,6±1,8	7	9,0±3,2* ↑	2	2,6±1,8
Proteus spp	2	2,6±1,8	3	3,8±2,2↔	1	1,3±1,2
Klebsiella spp	1	1,3±1,2	4	5,1±2,5* ↑	0	0
Enterobacter spp	0	0	2	2,6±1,8* ↑	0	0
P.aeruginosa	6	7,7±3,0	2	2,6±1,8* ↓	3	3,8±4,7
Gram negative bacteria, total	11	14,1±3,9	18	23,0±4,8* ↑	6	7,7±3,0
Candida spp	2	2,6±1,8	0	0	0	0
Total strains	41	52,6±5,7	26	33,3±5,3* ↓	11	14,1±3,9
No growth	1		3		0	

Note: *Abs - in absolute numbers; ↔ - no reason, ↑, ↓ - significantly increased or decreased relative to post-traumatic; all percentages were calculated based on the total number of strains (n = 78).*

Thus, while in posttraumatic osteomyelitis the probability of germination of gram-positive cocci is 3.5 times higher than in hematogenous osteomyelitis, we observed the opposite in gram-negative bacteria, etc. In posttraumatic osteomyelitis, Enterobacter spp was not identified as a causative agent, but in hematogenous osteomyelitis, S. saprophyticus and Candida spp were not identified due to the presence of these microorganisms in the body's own biotope. Gram-positive cocci (S. aureus and S. epidermidis) took a leading position in the association of microorganisms in the studied children; according to the literature, associations of microorganisms in children with chronic hematogenous osteomyelitis were as follows: S. aureus + E. coli.

Indications of etiological agents corresponding to the causes of the disease in adult patients with osteomyelitis, n = 380

Causative agent	Post-traumatic, n=252		Hematogenous, n=95		No reason, n=30; thermal n=3	
	Абс	%	Абс	%	Абс	%
E.coli	45	11,2±1,6	12	3,0±0,9* ↓	5	1,3±0,6
Proteus spp	4	1,0±0,5	8	2,0±0,7 ↔	3	0,8±0,4
Klebsiella spp	13	3,3±0,9	5	1,3±0,6* ↓	4	1,0±0,5
Enterobacter spp	0	0	11	2,8±0,8* ↑	0	0
P.aeruginosa	37	9,3±1,5	10	2,5±0,8* ↓	9	2,3±0,3
Gram negative bacteria, total	99	24,8±2,2	46	11,6±1,6* ↓	21	5,4±1,1
S.aureus	92	23,1±2,1	21	5,3±1,1* ↓	3	0,8±0,4
S.epidermidis	54	13,5±1,7	6	1,5±0,6* ↓	1	0,3±0,2

S.saprophyticus	13	3,3±0,9	0	0	0	0
E.faecalis	0	0	8	2,0±0,7* ↑	1	0,3±0,2
S.hemolyticus	6	1,5±0,6	0	0	0	0
S.pyogenes	7	1,8±0,7	0	0	0	0
Gram-positive cocci, total	172	43,2±2,5	35	8,8±1,4* ↓	5	1,3±0,6
Bacteroides spp	6	1,5±0,6	4	1,0±0,5 ↔	1	0,3±0,2
Candida spp	10	2,5±0,8	0	0	0	0
Total strains	287	71,9±2,3	85	21,3±2,0* ↓	27	6,8±1,3
No growth	8		10		6	

***Note: Abs** - in absolute numbers; ↔ - no reason, ↑, ↓ - significantly increased or decreased relative to post-traumatic; all percentages were calculated based on the total number of strains (n = 399).*

It is noteworthy that the spectrum of pathogens of hematogenous osteomyelitis was narrower than in posttraumatic osteomyelitis (11 strains versus 9 strains), and most of the detection rates were convincingly lower than in posttraumatic osteomyelitis (R <0.05 - R <0.001).).

It is noteworthy that with hematogenous osteomyelitis S. hemolyticus, S. pyogenes, S. saprophyticus and Candida spp. were not detected in both age groups. There were no convincing age-related differences between sick children and adults for the reasons for the formation of osteomyelitis.

Thus, in post-traumatic osteomyelitis, pathogens were isolated more often than hematogenous S. hemolyticus, S. pyogenes, Enterobacter spp and Bacteroides spp were not identified in children with post-traumatic osteomyelitis, while E. faecalis and Enterobacter spp were not identified in adult patients. With hematogenous osteomyelitis S. hemolyticus, S. pyogenes, S. saprophyticus and Candida spp. were not found in any of the age groups. The spectrum of germinating pathogens in hematogenous osteomyelitis is narrow, and the frequency of their detection is convincingly lower than in post-traumatic osteomyelitis. There were no convincing age-related differences between sick children and adults for the reasons for the formation of osteomyelitis. It is noteworthy that the spectrum of pathogens of hematogenous osteomyelitis was narrower than in posttraumatic osteomyelitis (11 strains versus 9 strains), and most of the detection rates were convincingly lower than in posttraumatic osteomyelitis (R <0.05 - R <0.001).

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Conclusions

- in children with post-traumatic osteomyelitis, gram-positive cocci were 3.5 times more reliable than hematogenous osteomyelitis, and gram-negative bacteria were detected 1.6 times more often in hematogenous osteomyelitis;

- Unlike children, gram-positive cocci in adults were convincingly isolated from gram-negative bacteria as monocultures. In children, the leader in the form of a monoculture was S.aureus and P.aeruginosa, while in adults this sequence took on a different character: S.aureus, S.epidermidis, E.coli, P.aeruginosa;

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