DETECTION OF RESISTANCE TO ANTIBIOTICS THE BACTERIA ISOLATED FROM CHILDREN WITH PURULENT-INFLAMMATORY DISEASES

N. S. Gafurova  
*Tashkent Pediatrics Medical Institute*

M.A. Mirzaeva  
*Tashkent Pediatrics Medical Institute*

D. R. Atakhodjaeva  
*Tashkent Pediatrics Medical Institute*

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DETECTION OF RESISTANCE TO ANTIBIOTICS THE BACTERIA ISOLATED FROM CHILDREN WITH PURULENT-INFLAMMATORY DISEASES

Gafurova N. S., Mirzaeva M. A., Atakhodjaeva D. R.

Tashkent Pediatric Medical Institute

Resume

During the study of the culture of isolated from pathological material taken from children with acute hematogenic osteomyelitis and soft tissue infections, it was found that along with the considered main etiological factor of S. aureus, opportunistic enterobacteria and pseudomonas were also isolated (19.1% and 14.1% respectively). Of the isolated staphylococci, 66.5% were susceptible to the used antibiotics, conversely 61.3% of enterobacteria and 93.8% of proteas showed high resistance.

Modern national and foreign literature indicates that significant changes occur in the etiology of purulent-inflammatory diseases, particularly, an increase in the proportion of opportunistic bacteria with the involvement of an increasingly wide range of microorganisms in the number of pathogens [2,4,8]. Therefore, tracking the species composition and determining the dominant species of microorganisms in the structure of purulent - inflammatory human diseases is still prevailing health problem [3,6,8].

Key words: purulent-inflammatory, opportunistic, beta lactam, surgical, cephalosporins.
Резюме

Данные современной отечественной и зарубежной литературы свидетельствуют о том, что в этиологии гнойно-воспалительных заболеваний происходят существенные изменения, в частности возрастание удельного веса условно-патогенных бактерий с вовлечением в число возбудителей всё более широкого круга микроорганизмов [2,4,8]. Поэтому, слежение за видовым составом и установление доминирующих видов микроорганизмов в структуре гнойно-воспалительных заболеваний человека продолжает оставаться актуальной проблемой здравоохранения [3,6,8].

Ключевые слова: гнойно-воспалительные, условно-патогенные, беталактамные, хирургические, цефалоспорины.

БОЛАЛАР ЙИРИНГЛИ ЯЛЛИГЛАНИШ ЎЧОҚЛАРИДАН АЖРАТИЛГАН БАКТЕРИЯЛАР АНТИБИОТИҚЛАРГА РЕЗИСТЕНТЛИГИНИ АНИҚЛАШ УСУЛЛАРИНИНГ ТАҲЛИЛИ

Гафурова Н.С., Мирзаева М.А., Атаходжаева Д.Р.

Тошкент Педиатрия Тиббиёт Институти

Резюме

Остеомиелит ва юмшоқ тўқималар инфекцияси билан оғриган болалардан этиологик факторни аниклаш мажсадида ажратиб олиган кулътураларни ўрганиш натижасида, асосий этиологик бактерия бўлиб келган S.aureus дан таққари, шартили патоген энтеробактериялар ва пневмонадалар хам ажратиб олинди (19.1% ва 14,1% мос ҳолда). Ажратилган стафилококкларнинг 66.5% ишлатилган антибиотикларга сезгир эканлиги ва аксинчи 61.3% энтеробактериалар ва 93.8% протейларнинг юкори чидамлиликка эга эканлиги аникланди.
Калит сўзлар: йирингли - яллигланувчи, шартили-патогенлик, баталактамли, хирургик, цефалоспоринлар.

Relevance
The most important aspect of this problem is the pronounced resistance of pathogens to antimicrobial drugs, including the latest beta lactam and other antibiotics [1, 2, 5, 7, 9, 10, 11].

The aim of research is to identify the etiological status of pathogens of acute surgical infection (SI) in children and determine their antibiotic resistance to the cephalosporins (β-lactam antibiotics).

Method of research

Disco-diffuse method was used to determine antibiotic resistance. [5].

The Muller-Hinton medium (HIMEDIA, India) was used as a nutrient medium, 5% of blood was added for microorganisms requiring cultivation. The following groups commercial disks with antibiotics (HIMEDIA, India and Russia) were used: cephalosporins-1 generation-cefazolin, II generation - cefuroxime, III generation - ceftazidim, cefotaxime, ceftriaxone, cefoperazone and IV generation - cefepim.

Results and discussion

The sensitivity to cephalosporins of bacteria isolated from pathological material taken from 120 children with acute hematogenous osteomyelitis and soft tissue infections who were treated in hospital was studied. 220 strains of microorganisms were isolated from blood, pus, bone punctures and intraoperative material. Among the etiological agents, gram-positive cocci prevailed-147 strains: coagulase-positive staphylococci (CoPS) and coagulase-negative staphylococci (CoNS), which was 66.8%. Opportunistic enterobacteria and Pseudomonas aeruginosa are 19.1% (42 strains) and 14.1% (31 strains), respectively.

The sensitivity of isolated cultures to antibiotics was determined by the disco-diffuse method on agar, according to The Clinical & Laboratory Standards Institute (CLSI, formerly NCCLS). The size of growth retardation zones was interpreted in accordance with CLSI, in accordance with the performance standards for antimicrobial susceptibility testing of disks, CLSI (2007).

In analyzing the distribution of strains by sensitivity to cephalosporin antibiotics, the tested drugs were divided into 5 groups: with a very high frequency of sensitive or resistant strains (more than 80%), high (61-80%), medium (41-60%), moderate (21-40%) and low (up to 20%).
The results of determining the sensitivity to cephalosporins of S. aureus strains isolated from children with surgical infection indicate a very high frequency of detection of antibiotic-resistant variants (table 1).

Table 1  Sensitivity to cephalosporins of S. aureus strains isolated from children with surgical infection

<table>
<thead>
<tr>
<th>Antibiotics</th>
<th>Strains distribution by resistance level (%)</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Sensitive</td>
<td>Intermediate</td>
</tr>
<tr>
<td>cefazolin</td>
<td>80,3±3,3</td>
<td>0,7±0,7</td>
</tr>
<tr>
<td>cefoperazone</td>
<td>66,0±3,9</td>
<td>19,0±3,2</td>
</tr>
<tr>
<td>cefuroxime</td>
<td>60,5±4,1</td>
<td>17,7±3,1</td>
</tr>
<tr>
<td>cefotaxime</td>
<td>61,9±4,0</td>
<td>17,0±3,1</td>
</tr>
<tr>
<td>cefoxitine</td>
<td>68,0±4,7</td>
<td>1,0±0,9</td>
</tr>
<tr>
<td>ceftriaxone</td>
<td>67,0±4,7</td>
<td>0</td>
</tr>
<tr>
<td>ceftazidime</td>
<td>65,0±4,8</td>
<td>7,0±2,6</td>
</tr>
<tr>
<td>cefepime</td>
<td>64,0±4,8</td>
<td>3,0±1,7</td>
</tr>
</tbody>
</table>

The detection frequency of bacteria resistant variants to cefuroxime is characterized by moderate values. In contrast, sensitive variants of staphylococci were identified with very high frequency to Cefazolin and high frequency to cefoperazone, cefotaxime, cefoxitin, ceftriaxone, ceftazidime and cefepime. These drugs should be considered as the drugs of choice for empirical antibacterial therapy of purulent surgical infection in children with staphylococcal etiology.

Analysis of the distribution of opportunistic enterobacteria strains by antibiotic sensitivity levels showed that resistant variants were isolated with a very high or high frequency (table 2).

Table 2  Sensitivity to cephalosporins strains of Enterobacteriaceae spp., isolated from children with surgical infection

<table>
<thead>
<tr>
<th>Antibiotics</th>
<th>Strains distribution by resistance level (%)</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Sensitive -S</td>
<td>Intermediate -I</td>
</tr>
<tr>
<td>cefazoline</td>
<td>21.4±6.3</td>
<td>0</td>
</tr>
<tr>
<td>cefoperazone</td>
<td>35.7±1.4</td>
<td>11.9±5.0</td>
</tr>
<tr>
<td>cefuroxime</td>
<td>19.0±6.0</td>
<td>0</td>
</tr>
</tbody>
</table>
Thus, a very high detection frequency of resistant variants of enterobacteria was established for cefuroxime, a high detection frequency for cefazolin, cefotaxime and cefoxitin was established. These drugs should not be used in the empirical antibacterial therapy of acute surgical infection in children caused by enterobacteria. Sensitive variants of enterobacteria with high frequency were isolated only to cefepime and ceftriaxone. These are the drugs of choice for empirically prescribing antibiotics for surgical infection of enterobacteriacal etiology in children. Other drugs choice should be based on the results of laboratory determination of enterobacteria sensitivity to antibiotics.

Pseudomonas aegidiposae strains isolated from children with acute surgical infection were characterized by more higher rates of antibiotic resistance (table 3).

<table>
<thead>
<tr>
<th>Antibiotics</th>
<th>Sensitive-S</th>
<th>Intermediate-I</th>
<th>Resistant-R</th>
</tr>
</thead>
<tbody>
<tr>
<td>cefazolin</td>
<td>0</td>
<td>0</td>
<td>100,0</td>
</tr>
<tr>
<td>cefoperazone</td>
<td>6,5±4,4</td>
<td>3,2±3,2</td>
<td>90,3±5,3</td>
</tr>
<tr>
<td>cefuroxime</td>
<td>3,2±3,2</td>
<td>0</td>
<td>96,8±3,2</td>
</tr>
<tr>
<td>cefotaxime</td>
<td>3,2±3,2</td>
<td>0</td>
<td>96,8±3,2</td>
</tr>
<tr>
<td>cefoxitin</td>
<td>0</td>
<td>0</td>
<td>100,0</td>
</tr>
<tr>
<td>ceftriaxone</td>
<td>0</td>
<td>0</td>
<td>100,0</td>
</tr>
<tr>
<td>ceftazidime</td>
<td>16,7±5,0</td>
<td>0</td>
<td>83,3±5,0</td>
</tr>
<tr>
<td>cefepim</td>
<td>16,7±5,0</td>
<td>0</td>
<td>83,3±5,0</td>
</tr>
</tbody>
</table>
Various types of microorganisms sensitive to cephalosporins.

All the studied cephalosporins (cefazolin, cefoperazone, cefuroxime, cefotaxime, cefoxitin, ceftiraxone, ceftazidim, cefepim) were found to have a very high frequency of isolation of resistant Pseudomonas strains.

For prescribing other drugs, it is necessary to conduct a preliminary determination of the sensitivity to antibiotics of Pseudomonas aeruginosa strains isolated from children with surgical infections.

**Conclusions:**

1. It has been found that the indicators of sensitivity to antibiotics of the cephalosporin series of surgical infection pathogens in children depend on the bacteria’s type and the type of antibiotic.
2. It has been established that strains of enterobacteria and Pseudomonas aeruginosa isolated from children with surgical infections were characterized by a very high (more than 80%) and high (61-80%) frequency of resistance to cefuroxime, cefazolin, cefotaxime; however, Pseudomonas aeruginosa has a high frequency of resistance to cefoperazone also. These drugs should not be used in empirical prescription of antibiotics to children with surgical infections.
3. It has been proved that sensitive bacterial variants are isolated with very high or high frequency of staphylococci to cefazolin, cefoperazone, cefuraxim, cefoxitin, ceftiraxone, ceftazidim and cefepim. The administration of other drugs should be based on the results of laboratory determination of the pathogens sensitivity to antibiotics.

Thus, in isolated strains from children with osteomyelitis and soft tissue infections on average, S. aigeis showed sensitivity(S) in 67% of cases, moderate sensitivity (I) -
in 8%, resistance(R) - in 25%, while among opportunistic enterobacteria, 35% were sensitive(S) and 61%- resistant(R) to the used antibiotics. All strains of P. aeruginosae were the most resistant (94%) to all used antibiotics (Picture 1).

LIST OF REFERENCES:


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