Catheter Related Infections in Pediatric Patients

by

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Abstract

During a 9-month prospective study, from August, 1988 to April, 1989, a total number of 4328 hospitalized pediatric patients at the Department of Child Health, Padjadjaran University, Hasan Sadikin General Hospital Bandung, were observed to identify skin and soft tissue nosocomial infections (not included postoperative), especially catheter related infections.

The gastrointestinal tract was the most frequent site of nosocomial infections (44.3%), then subsequently followed by skin infection (22.6%), bacteremia (16.3%) and urinary tract infection (14.1%).

The most frequent cause of nosocomial skin infections like phlebitis was IVFD occurring in 82 out of 93 patients (88.2%). The overall phlebitis attack rate was 4.2%.

When the duration of infusion is divided into 3 groups of 0-36 hours, 37-72 hours and >73 hours, then it becomes clear that the longer the duration of infusion, the higher the attack rate (x²=8.07, p<0.05).

Klebsiella pneumoniae seemed to be the pathogen most frequently associated with nosocomial skin infections (26.7%), followed by Enterobacter aerogenes (20.0%), and then E. coli, Ps. aeruginosa and S. aureus 13.3% each.

It could be concluded that the risk of contracting phlebitis for or IVFD with a duration of > 73 hours was 1.9 times higher than that of less than 72 hours.
Figure 1. Relative frequency of nosocomial infection according to body site of infection, during August 1988 - April 1989 in the Department of Child Health, Hasan Sadikin General Hospital, Bandung.
As far as their body site was concerned, IVFD infections were mostly at the left side of the head, subsequently followed by the forehead and then the right side of the head, showing percentages of 8.0%, 5.4%, and 5.1%, respectively.

The phlebitis attack rates after infusion of various duration can be seen in Table III and Figure 2. The overall phlebitis attack rate was 4.2% and it was observed that this infection started after various duration after intravenous administration. When the duration of infusion is divided into 3 groups of 0-36 hours, 37-72 hours and >73 hours, then it becomes clear that the longer the duration of administration, the higher the attack rate ($x^2 = 8.07$, $p<0.05$). These grouping of duration was based on previous studies and experiences, and the opinion that nosocomial skin infection almost never occurred within 24 hours after infusion.

Table III. Phlebitis attack rates after infusion of various duration during August 1988-April 1989 in pediatric patients at the Department of Child Health, Hasan Sadikin General Hospital, Bandung

<table>
<thead>
<tr>
<th>Duration of infusion (hour)</th>
<th>Phlebitis</th>
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<tbody>
<tr>
<td>0-36 (n=1097)</td>
<td>pr. Ab</td>
</tr>
<tr>
<td>37-72 (n=684)</td>
<td>Pr. Ab.</td>
</tr>
<tr>
<td>&gt;73 (n=178)</td>
<td>Pr. Ab.</td>
</tr>
<tr>
<td>All times (n=1959)</td>
<td>Pr. Ab.</td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>Attack rate (%)</th>
<th>Pr. = Present</th>
<th>Ab. = Absent</th>
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<tbody>
<tr>
<td>35 1062</td>
<td>3.2</td>
<td>4.2</td>
</tr>
<tr>
<td>34 650</td>
<td>5.0</td>
<td>7.3</td>
</tr>
<tr>
<td>13 165</td>
<td>2.0</td>
<td>4.2</td>
</tr>
<tr>
<td>82 1877</td>
<td>4.2</td>
<td>4.2</td>
</tr>
</tbody>
</table>

The risk of contracting phlebitis for a duration of 73 hours or longer was almost 2 times higher than that of less than 72 hours. In this study the maximum duration of infusion was 98 hours.

Discussion

The majority of patients with nosocomial skin infections in this study presented only redness of the skin, and the most frequent cause of infections was IVFD (more than 80%).

The presence of intravenous catheter is strongly associated with the prevalence of skin infections. During the study period, 1959 children had IVFD, yielding 82 nosocomial phlebitis, giving phlebitis attack rate of 4.2%. The main risk factor for phlebitis is the duration of use of the same infusion site (duration of catheter placement) [7].

It was shown in this study that the longer the duration, the higher the phlebitis attack rate, as demonstrated also by several studies.

Efforts toward reducing phlebitis rates probably must be directed to shortening the duration of use of any infusion site. Catheters were withdrawn if medically indicated, i.e., when intravenous therapy was no longer needed.

It has already been accepted as recommended also by Centers for Disease Control.
Control (CDC) that peripheral catheters should remain in place only for 72 hours.

Also in this study gram-negative microorganisms were the most frequent cause of nosocomial skin infections as compared with gram-positive microorganisms (6.5 : 1), with Klebsiella pneumoniae - Enterobacter aerogenes as the leading pathogens.

**Conclusion**

The skin was the second most frequent site of nosocomial infection, after the gastrointestinal tract, followed by bacteremia and urinary tract.

The duration of intravenous catheter of more than 72 hours was the risk factor for nosocomial skin infections (phlebitis).

The gram-negative microorganisms were the most frequent cause of nosocomial skin infections, with Klebsiella pneumoniae - Enterobacter aerogenes as the leading pathogens.

**Acknowledgement**

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It is appropriate to acknowledge the invaluable contribution of the Nosocomial Infection Working Group members of School of Medicine, Padjadjaran University, Hasan Sadikin General Hospital, Bandung, and Prof. S. Lauwers from the Department of Microbiology Academisch Ziekenhuis - Vrije Universiteit Brussel, Belgium.

**REFERENCES**

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**CASE REPORT**

**Conjunctival Diphtheria**

by

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(From the Department of Child Health, School of Medicine, University of North Sumatera / Dr. Pirngadi Hospital, Medan)

**Abstract**

Three cases of conjunctival diphtheria in 3 siblings of one family with the ages of 7 months, 6 and 8 years had been reported. These children had never obtained complete DTP immunization, one of them had been once immunized with DTP.

General signs encountered were conjunctival hyperemia, ocular secretion and palpebral edema.

A relationship between length of ailment with appearance of clinical symptom and severity of the disease was noted.

Myocarditis as a complication was found in one case. Treatment in this series consisted of intravenous anti diphtheria serum (ADS) and intramuscular procain penicillin.