Intramuscular Midazolam for Pediatric Sedation in the Emergency Department: A Short Communication on Clinical Safety and Effectiveness

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ABSTRACT

Background: Procedural sedation in children continues to be a problem in the emergency department (ED). Midazolam is the first water-soluble benzodiazepine and it has been widely used for procedural sedation in pediatric patients.

Objectives: The aim of this study was evaluation of clinical safety and effectiveness of intramuscular Midazolam for pediatric sedation in the ED setting.

Materials and Methods: We performed a self-controlled clinical trial on 30 children who referred to the Baqiyatallah Hospital ED between 2009 and 2010. They received intramuscular Midazolam 0.3 mg/kg for procedural sedation and then they were followed for sedative effectiveness and safety. Vital signs and O2 saturation were also observed. The findings were compared using SPSS ver. 16 software.

Results: The mean age was 5.50 ± 2.70 years, the mean weight was 19.50 ± 6.63 kilograms and 16 patients (53.3%) were females. The most common adverse effect was euphoria (66.66%) and vertigo (6.7%); 27.7% did not show any side effects. There was an overall complication rate of 72.3%. The vital signs including heart rate, respiratory rate, systolic and diastolic blood pressure and O2 saturation decreased significantly during sedation (P value < 0.05).

Conclusions: Midazolam is an effective and relatively safe sedative for pediatric patients in the ED. The patient should be observed closely and monitored for psychological and hemodynamic side effects.

1. Background

Procedural sedation in children continues to be a problem in the emergency department (ED). Midazolam is a benzodiazepine that has been widely used for procedural sedation in adults (1). Various sedatives such as pentobarbital, propofol, fentanyl, ketamine and methohexital have been suggested for pediatric sedation but it seems that the selection of sedative agents was based on pref-
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Intramuscular midazolam was used to provide sedation for imaging in the ED and then evaluated the efficacy and safety of midazolam for sedation and anxiety of children in the ED.

2. Objectives
The aim of this study was evaluation of clinical safety and effectiveness of intramuscular midazolam for pediatric sedation.

3. Materials and Methods
We conducted a before-after clinical trial on a highly selective group of 30 children between 2 and 12 years-old. The children who presented to the ED of the Baqiyatallah Hospital between 2009 and 2010 were enrolled. The patients that met the inclusion criteria received intramuscular midazolam 0.3 mg/kg, before imaging (CT-Scan or magnetic resonance imaging). Midazolam was administered at least 30 minutes before beginning the procedure. Sedation, irritability and cooperation scores were followed every 15 minutes during the first hour after receiving the drug. Five stages for sedation were assessed.

Table 1. Changes in sedation, irritability and cooperation score before, and 5, 15, 30, 45 and 60 minutes after injection.

<table>
<thead>
<tr>
<th>Score</th>
<th>Sedation</th>
<th>Irritability</th>
<th>Cooperation</th>
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<tr>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>5</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>0</td>
<td>60</td>
<td>20</td>
<td>16.6</td>
</tr>
<tr>
<td>5 Min after prescription, %</td>
<td>60</td>
<td>23.3</td>
<td>13.3</td>
</tr>
<tr>
<td>10 Min after prescription, %</td>
<td>40</td>
<td>36.6</td>
<td>20</td>
</tr>
<tr>
<td>15 Min after prescription, %</td>
<td>23.3</td>
<td>33.3</td>
<td>36.6</td>
</tr>
<tr>
<td>30 Min after prescription, %</td>
<td>10</td>
<td>10</td>
<td>30</td>
</tr>
<tr>
<td>45 Min after prescription, %</td>
<td>6.6</td>
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<td>40</td>
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<tr>
<td>60 Min after prescription, %</td>
<td>26.6</td>
<td>20</td>
<td>33.3</td>
</tr>
</tbody>
</table>

P value

<0.001

<0.001

<0.001

Figure 1. Changes in Sedation Score before, 5 minute, 15, 30, 45 and 60 minutes after injection.
epines but euphoria with this high incidence has been reported rarely. One reason for this high incidence might be race (7-9). Previous studies have shown considerable alteration in vital signs as an adverse effect of midazolam; these changes have been temporary (3, 10). On the other hand, insufficient dose may not be able to provide a deep sedation and further doses may increase the risk of serious side-effects (11, 12). Although, mentioned changes was dose dependent, it seems reasonable that the patient under sedation be observe closely. It seems that children who receive intramuscular midazolam may be susceptible to vital signs alterations. Further investigation with a control group and larger sample size and other forms of midazolam administration (such as rectal suppositories) is recommended.

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References