Efficacy of Repeated Administration of One-Gram Intravenous Acetaminophen Injection for Pain Management After Total Knee Arthroplasty

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Faculty disclosure

Kazushige Seki, MD

I have no financial conflicts to disclose.
Introduction

Total knee arthroplasty (TKA) is effective procedures for relieving pain and restoring function. However, self-report questionnaire for evaluating patient satisfaction with the outcome of hip and knee arthroplasty have been used, patients undergoing primary TKA were inferior outcomes than primary total hip arthroplasty\(^1\). The chronic postsurgical pain following TKA is mentioned as one of the factors affecting postoperative satisfaction\(^2\).

The reason for chronic postsurgical pain following TKA is multifactorial\(^3\)-\(^4\). And, intensity of early postoperative pain increase the one of the risk of the persistent pain after TKA\(^4\)-\(^5\). Therefore, it is important for surgeons to manage early postoperative pain for reducing chronic postsurgical pain following TKA. Currently, we have treated the early postoperative pain management of TKA with repeated administration of intravenous acetaminophen injection. However, there are little reports of efficacy of repeated administration of intravenous acetaminophen injection in Japanese patients and there are no reports of the impact of repeated administration of intravenous acetaminophen on the satisfaction of patient undergoing primary TKA.
Objectives

The aim of this retrospective study is to assess the efficacy and the influence to patient’s satisfactions of the repeated administration of intravenous acetaminophen injection in Japanese patients undergoing primary TKA.
Patients and Methods

This retrospective study was performed for patients undergoing unilateral primary TKA at our institution by two surgeons between January 2016 and December 2018. A total of 53 patients were received 1 gram of intravenous acetaminophen every 6 hours for 24 hours postoperatively (AAP group). A total of 15 patients who received no intravenous acetaminophen postoperatively was control group.

Preoperative and Intraoperative pain Management
All patients received standardized received single-shot femoral nerve block after general anesthesia. And all patients received intraoperative periarticular local infiltration analgesia before implantation.

Postoperative pain management
In the AAP group, 1000 mg of intravenous acetaminophen (Acelio [100 mL]; Terumo, Tokyo, Japan) was administered total four times at immediately after returning to the hospital room and at every 6 hours on the day of TKA. An intravenous dose of 15 mg/kg acetaminophen was used for patients with body weight<50 kg. All patients received intravenous patient-controlled analgesia (PCA) with fentanyl(0.3〜0.5μg/kg/h) through 24h postsurgery.
Patients and Methods

Outcome Measurements
The primary outcome was the postoperative Numerical Rating Scale (NRS) pain score at rest. The NRS score ranged from 0 (indicating no pain) to 10 (indicating extreme pain). The NRS score was measured just before the time of administration of study drugs: immediately after returning to the hospital room, and at every 6 hours until 24 hours, and 48 hours postoperatively. And we evaluated patient’s satisfaction at 24 and 48 hours postoperatively. Patients were asked to grade their level of satisfaction for each question (i.e. ‘very dissatisfied’, ‘dissatisfied’, ‘neutral’, ‘satisfied’ or ‘very satisfied’).

Statistical Analyses
Comparisons between the study groups were performed with the Wilcoxon sum rank test for continuous variables and the chi-square test for categorical variables. All tests were 2-sided, and $P < .05$ was considered statistically significant. All statistical analyses were performed by an investigator using JMP ver14.0 software.
# Patients background

<table>
<thead>
<tr>
<th></th>
<th>AAP group (N=54) average±SD, %</th>
<th>control group (N=15) average±SD, %</th>
<th>P value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age at operation*</td>
<td>71.1±7.9</td>
<td>75.9±4.5</td>
<td>0.5053</td>
</tr>
<tr>
<td>Female ,%**</td>
<td>75.9</td>
<td>75.3</td>
<td>0.8367</td>
</tr>
<tr>
<td>Diagnosis (osteoarthritis/rheumatoid arthritis),%**</td>
<td>93.3/6.7</td>
<td>81.5/18.5</td>
<td>0.2673</td>
</tr>
<tr>
<td>Body Mass Index (kg/m²)*</td>
<td>24.6±3.9</td>
<td>25.7±4.3</td>
<td>0.3304</td>
</tr>
</tbody>
</table>

*Wilcoxon rank sum test  
**Chi-square test
Result

**NRS pain score at rest**
(average±SE)

- **AAP group**
- **control group**

- **NRS pain score at rest**
  - **AAP group**:
    - 0h: 3.2
    - 6h: 2.2
    - 12h: 2
    - 18h: 2.5
    - 24h: 2.8
    - 48h: 2.6

- **control group**:
  - 0h: 3
  - 6h: 2.7
  - 12h: 4.2
  - 18h: 4.8
  - 24h: 3.8
  - 48h: 3.3

- †: p<0.05
- ††: p<0.01
- Wilcoxon rank sum test
The number of patients who answered ‘satisfied’ or ‘very satisfied’

- **AAP group**
- **control group**

<table>
<thead>
<tr>
<th>24 hours postoperatively</th>
<th>48 hours postoperatively</th>
</tr>
</thead>
<tbody>
<tr>
<td>64%</td>
<td>78.7%</td>
</tr>
<tr>
<td>20%</td>
<td>50%</td>
</tr>
</tbody>
</table>

*Chi-square test*

- $P=0.0027$
- $P=0.0354$
Conclusion

Significant improvements in NRS pain score and patients satisfaction were seen following TKA in patients who had the repeated administration of intravenous acetaminophen injection. Intravenous acetaminophen is effective in postoperative pain management for primary TKA in Japanese patients.

Reference