Comparison of Postanesthetic Complaints after General and Spinal Anesthesia in Patients Undergoing Lower Limb Surgery

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Background: The choice of anesthesia is one of the most important decisions made by anesthesiologists after preoperative visits with orthopedic patients. No published study has yet quantified the incidence of postanesthetic complaints for either technique. The present study was designed to compare the incidences of postanesthetic complaints after the application of the standardized techniques of spinal anesthesia, using a 27-gauge needle, and two forms of general anesthesia in patients undergoing lower limb surgery.

Material and Method: In a prospective, randomized, observer blind trial, 260 orthopedic patients who underwent lower limb surgery were randomized into 3 groups; 1) spinal anesthesia (SA), 2) general anesthesia via facemask (GA-M), 3) general anesthesia via endotracheal intubation (GA-T). On postoperative days 1 and 3, patients were interviewed specifically about postanesthetic complaints.

Results: The present study indicated that the incidence of backache was significantly higher in SA (p = 0.01), while nausea/vomiting (p = 0.00) and headache (p = 0.02) were more frequent in GA-M and GA-T on the first postoperative day. In the 3-day period of observation in the ward, the incidence of postoperative complaints did not significantly differ among the three groups.

Conclusion: Spinal anesthesia using a 27-gauge Quincke needle is associated with a lower incidence of postanesthetic complaints compared with general anesthesia. This technique may be recommended for patients undergoing lower limb surgery.

Keywords: Orthopedic, Anesthesia, General, Spinal, Postanesthetic complaints


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Postdural puncture headache (PDPH) is a known and most distressing complication of spinal anesthesia. Estimates of prevalence vary from 1.2% to 14.5%[5-8]. Reports have been demonstrated to depend on age, sex, needle size and technique[9]. A prospective study showed that patients may also suffer from headache following general anesthesia[9]. Additionally, general anesthesia, many factors, e.g. administration of opioids or volatile anesthetics can induce nausea and vomiting[10]. It, thus, seems plausible to speculate that general anesthesia may be associated with an increased risk of nausea and vomiting, and additional medical treatment may prolong the postoperative period and increase the costs of general anesthesia[11]. However, little is known about postanesthetic complaints after general anesthesia in each technique in lower limb surgery. No study has yet reported the incidence of postanesthetic complaints for either technique of anesthesia in lower limb surgery. Most studies have demonstrated PDPH and complication spinal versus general anesthesia via endotracheal intubation. Other prospective studies do not extend beyond general anesthesia via facemask for this common procedure. The authors aimed to elucidate the incidences of postanesthetic complaints after the application of the standardized techniques of spinal anesthesia and two forms of general anesthesia in lower limb surgery.
Material and Method

Following the approval of the Ethical committee and informed patients’ consent, the authors studied 260 ASA physical status I-II orthopedic patients, aged 18-65, undergoing elective lower limb surgery. On the day of surgery, the patients were randomly allocated, using computer generated randomization, into one of three groups. Group 1 patients received spinal anesthesia (SA); Group 2 patients received general anesthesia via facemask (GA-M); and Group 3 patients received general anesthesia via endotracheal intubation (GA-T). Each anesthetic technique was applied according to the standard procedures in Chaiyaphum Hospital at the time of the study. Patients in whom “mask anesthesia” would be considered inappropriate (obesity, difficult ventilation, gastric reflux) and multiple trauma were excluded from the study.

Before the induction of anesthesia, all patients received intravenous hydration with 500 ml of Ringer’s solution, continued at a rate of 500 ml/h. The patients were monitored by ECG, non-invasive measurement of blood pressure and pulse oximetry. No premedication was given (midazolam or NSAIDS).

In group 1 (SA), the lumbar puncture was performed between L2 and L5 in the sitting or lateral position. Using the midline approach, a 27-gauge Quincke needle (Spinocan, B. Braun, Melsungen AG) was inserted through a 20-gauge introducer needle into the subarachnoid space, with the needle bevel parallel to the dural fibres. When free flow of cerebrospinal fluid was obtained, 2.5-3.0 ml of 0.5% hyperbaric bupivacaine (Marcain, AstraZeneca) were injected to reach a minimal analgesic level of T12. Difficulties with the dural puncture (more than two attempts) were recorded. Bradycardia (< 50 beats/min) was treated by IV application of atropine 0.3-0.6 mg, and hypotension (mean arterial blood pressure 30% below baseline) was treated by IV injection of ephedrine.

In group 2 (GA-M), the patients received intravenous administration of 1-2 mcg/kg fentanyl and 5 mg/kg thiopentone, maintained with 70% nitrous oxide and 1.5-2% sevoflurane in oxygen. Treatment of hemodynamic reactions and volume replacement were similar to those for the spinal anesthesia group.

In group 3 (GA-T), the patients received IV administration of 1-2 mcg/kg fentanyl, 5 mg/kg thiopentone and 0.5 mg/kg atracurium prior to endotracheal intubation. Difficulties with intubation (more than two attempts) were recorded. Mechanical ventilation was performed with 50% nitrous oxide and 1-1.5% sevoflurane in oxygen. Treatment of hemodynamic reactions and volume replacement were similar to those for the spinal anesthesia group.

In all groups, the patients received intravenous Ringer’s solution 20 ml/kg/hr as fluid replacement for blood loss. The times of the operations were recorded. Postoperatively, all patients were transferred to the recovery room. Postoperative pain relief was performed by IV administration of 1-2 mcg/kg fentanyl if required.

On days 1 (next day of surgery) and 3 postoperatively, the patients were asked specifically about postanesthetic complaints. One of the nurse anesthetists, who was not informed about the anesthetic treatments, interviewed the patients by direct questioning using a standardized questionnaire. The patients were asked about the onset and duration of headaches (especially posture dependent headaches), backache, urinary dysfunction, dizziness, nausea/vomiting, sore throats and awareness. Three days after their operations, patients were asked if they would choose the same anesthetic technique again in the event of a future lower limb surgery.

The present study was designed to test the preferability of spinal anesthesia over general anesthesia for the avoidance of post-anesthetic complaints. Previous studies found that 9% of patients suffered from headaches following general anesthesia(9). Spinal anesthesia using a 27-gauge Quincke needle should reduce the incidence of headaches to only 0.1%. The authors set $\alpha = 0.05$ with a power $(1-\beta)$ of 80%. It was calculated that 84 patients per group would be required.

Analyses of variance were used in the comparisons between the three groups of all continuous variables. The Chi-square test was used for the analysis of categorical demographic data. The differences in the incidences of postanesthetic complaints between the groups were evaluated using the Chi-square tests or Fisher’s exact test where appropriate. A p-value of less than 0.05 was considered to be statistically significant.

Results

There were no significant differences among the three groups with respect to demographic data, type of surgery or anesthetic data (Table 1).

In group 1 (SA), all patients achieved sufficient analgesia for the operation. Eleven percent of
the patients had a difficult lumbar puncture. In group 3 (GA-T) no patient had a difficult intubation.

On the first postoperative day, the incidences of nausea/vomiting, headaches and backache were significantly different, comparing the group 1 (SA) vs group 2 (GA-M), and group 1 (SA) vs group 3 (GA-T) (Table 2). The incidences of backache were higher in group 1 (SA), while nausea/vomiting and headache were more frequent in group 2 (GA-M) and group 3 (GA-T).

The difference in the incidences of postanesthetic complaints on the third postoperative day between the groups was not statistically significant.

The incidences of dizziness, urinary dysfunction, sore throat and awareness were not significantly different among the three groups.

The proportion of patients who would like to have the same anesthetic technique if they needed lower limb surgery again was significantly different. Ninety five percent of the patients in the SA group responded and mentioned, that they would seek spinal anesthesia again. Only seventy percent of the patients in the general anesthesia groups would choose to repeat the technique that they had received.

### Discussion

The choice of anesthesia is one of the most important decisions made by anesthesiologists after preoperative visits with orthopedic patients. The decision depends on the condition of the patient, nature of the operation, expectations of the patient, and expertise of the surgeon and anesthesiologist. There have been no studies to confirm the incidences of postanesthetic complaints for either of the techniques examined in the presented paper. The present study intended to evaluate the advantages of the respective techniques with regard to the postoperative period.

Using a 27-gauge spinal needle in orthopedic patients, there was no incidence of PDPH in the present study, which was lower than reported in the previous studies (1-4). The absence of any PDPH after dural puncture with the 27-gauge Quinche needle may be explained by the technique of the dural puncture, which has been shown to significantly reduce the incidence of PDPH (12).

### Table 1. Demographic characteristics, type and time of anesthesia in each group. Data are mean (SD) or number

<table>
<thead>
<tr>
<th>Characteristics</th>
<th>Spinal n = 86</th>
<th>GA-M n = 85</th>
<th>GA-T n = 89</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sex (n)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Male</td>
<td>45</td>
<td>47</td>
<td>51</td>
</tr>
<tr>
<td>Female</td>
<td>41</td>
<td>38</td>
<td>38</td>
</tr>
<tr>
<td>Age (yrs)</td>
<td>41 (20)</td>
<td>38 (17)</td>
<td>35 (17)</td>
</tr>
<tr>
<td>Weight (kg)</td>
<td>58 (13)</td>
<td>56 (8)</td>
<td>57 (9)</td>
</tr>
<tr>
<td>Height (cm)</td>
<td>161 (8)</td>
<td>168 (7)</td>
<td>160 (18)</td>
</tr>
<tr>
<td>ASA physical status (n)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>I</td>
<td>66</td>
<td>68</td>
<td>68</td>
</tr>
<tr>
<td>II</td>
<td>20</td>
<td>17</td>
<td>21</td>
</tr>
<tr>
<td>Type of operation</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hip/upper leg</td>
<td>43</td>
<td>36</td>
<td>43</td>
</tr>
<tr>
<td>Knee</td>
<td>26</td>
<td>28</td>
<td>27</td>
</tr>
<tr>
<td>Below knee</td>
<td>17</td>
<td>21</td>
<td>19</td>
</tr>
<tr>
<td>Anesthetic time (min)</td>
<td>86 (52)</td>
<td>71 (15)</td>
<td>73 (41)</td>
</tr>
</tbody>
</table>

The incidences of dizziness, urinary dysfunction, sore throat and awareness were not significantly different among the three groups.

The proportion of patients who would like to have the same anesthetic technique if they needed lower limb surgery again was significantly different. Ninety five percent of the patients in the SA group responded and mentioned, that they would seek spinal anesthesia again. Only seventy percent of the patients in the general anesthesia groups would choose to repeat the technique that they had received.

### Table 2. Incidence of complaints on the first and third postoperative day after spinal (SA), general anesthesia via facemask (GA-M) or general anesthesia via endotracheal intubation (GA-T). Data are number (%)

<table>
<thead>
<tr>
<th></th>
<th>Headache</th>
<th>Dizziness</th>
<th>Backache</th>
<th>Urinary retention</th>
<th>N/V</th>
<th>Sore throat</th>
<th>Awareness</th>
</tr>
</thead>
<tbody>
<tr>
<td>On the first Postoperative day</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Spinal</td>
<td>0</td>
<td>2 (2.3%)</td>
<td>6 (7.0%)</td>
<td>2 (2.3%)</td>
<td>0</td>
<td>0</td>
<td>-</td>
</tr>
<tr>
<td>GA-M</td>
<td>6 (7.7%)</td>
<td>4 (4.7%)</td>
<td>0</td>
<td>2 (2.4%)</td>
<td>12</td>
<td>14.1%</td>
<td>0</td>
</tr>
<tr>
<td>GA-T</td>
<td>8 (9.0%)</td>
<td>3 (3.4%)</td>
<td>1 (1.1%)</td>
<td>0</td>
<td>12</td>
<td>13.5%</td>
<td>1</td>
</tr>
<tr>
<td>On the third Postoperative day</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Spinal</td>
<td>0</td>
<td>1 (1.2%)</td>
<td>2 (2.5%)</td>
<td>2 (2.5%)</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>GA-M</td>
<td>2 (3.4%)</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>GA-T</td>
<td>4 (4.7%)</td>
<td>5 (5.8%)</td>
<td>0</td>
<td>0</td>
<td>1</td>
<td>1.2%</td>
<td>0</td>
</tr>
</tbody>
</table>

*p < 0.05; spinal vs general anesthesia via facemask

*p < 0.05; spinal vs general anesthesia via endotracheal intubation
Nausea and/or vomiting is a frequent unfavorable event after general anesthesia, administration of opioids or volatile anesthetics for intraoperative treatment, and the higher postoperative requirement of opioids in patients following general anesthesia, may increase the incidences of nausea and vomiting. The costs of the prolonged postoperative surveillance and additional medical treatment required should be evaluated.

Postoperative backache is a common complaint after spinal anesthesia. Factors involved in the pathogenesis of postoperative back pain include the type and duration of surgery, duration of immobilization, and the position of the patient during spinal puncture. Several authors reported the incidence of back pain on the third postoperative day, ranging from 5.91% to 22%. In the present study, the incidence of back pain on the third postoperative day was in the lower range of those reported in the literature. This may be, in part, because of the short duration of immobilization in the presented patients.

The present results demonstrate some advantages of spinal anesthesia over general anesthesia. Nevertheless, anesthesiologists have to consider the patients' wishes and concerns with regard to the postanesthetic outcome in the selection of anesthetic technique.

In conclusion, spinal anesthesia using a 27-gauge Quincke needle is highly effective and has a small incidence of postanesthetic complaints in orthopedic patients. Therefore, this technique may be recommended for patients undergoing elective lower limb surgery.

References
การเปรียบเทียบภาวะไม่พึงประสงค์หลังการให้ยาระงับความรู้สึกในผู้ป่วยที่เข้ารับการผ่าตัด lower limb ภายใต้การให้ยาระงับความรู้สึกทั่วไปและแบบเฉพาะส่วน

บรรจุ ครอบบาน, สุจริต คำแก้ว, ณัฐา ภักดีศิริวงศ์, ศิริวรรณ ดิเรกโภค

ที่มา: การเลือกชนิดของการให้ยาระงับความรู้สึก เป็นหนึ่งในการตัดสินใจของผู้ให้ยาให้ยาระงับความรู้สึก หลังจากยึดมั่นประเมินผู้ป่วยอย่างรอบคอบ ยังไม่พบการศึกษาที่ศึกษาถึงอุปกรณ์การมีการไม่พึงประสงค์หลังการให้ยา ระงับความรู้สึกในยาง หัวข้อที่นักเรียนไม่จำกัด

วัตถุประสงค์: เพื่อศึกษาการเปรียบเทียบ อุปกรณ์การมีการไม่พึงประสงค์หลังการให้ยา ระงับความรู้สึกตามมาตรฐานการให้ยา ระงับความรู้สึกเฉพาะส่วน โดยใช้เข็ม spinal เบอร์ 27 และการให้ยา ระงับความรู้สึกทั่วไป ทั้งสองรูปแบบ (ใส่ท่อช่วยหายใจ และครอบหน้ากาก) ในผู้ป่วยที่เข้ารับการผ่าตัด lower limb

วัสดุและวิธีการ: เป็นการศึกษาแบบ prospective, randomized, observer blind trial ในผู้ป่วยทางกระดูกและข้อจำนวน 260 ราย ที่เข้ารับการผ่าตัด lower limb ผู้ป่วยได้รับการสุ่มให้ได้รับการให้ยา ระงับความรู้สึกแบบใดแบบหนึ่ง ได้แก่ 1) แบบเฉพาะส่วน (SA) 2) แบบทั่วไปร่วมกับการครอบหน้ากาก (GA-M) และ 3) แบบทั่วไปร่วมกับการใส่ท่อช่วยหายใจ (GA-T) และติดตามประเมินภาวะไม่พึงประสงค์ในวันที่ 1 และวันที่ 3 หลังการให้ยา ระงับความรู้สึกโดยการสัมภาษณ์อย่างเจาะจง

ผลการศึกษา: วันที่ 1 หลังการให้ยา ระงับความรู้สึก ผู้ป่วยที่ได้รับการให้ยา ระงับความรู้สึกแบบเฉพาะส่วนมีความรู้สึกปวดหลังสูงกว่าผู้ป่วยที่ได้รับการให้ยา ระงับความรู้สึกทั่วไปอย่างมีนัยสำคัญทางสถิติ (p < 0.05) ในขณะที่ผู้ป่วยที่ได้รับการให้ยา ระงับความรู้สึกทั่วไปมีภาวะคลื่นไส้ อาเจียน และปวดศีรษะมากกว่าผู้ป่วยที่ได้รับการให้ยา ระงับความรู้สึกแบบเฉพาะส่วนเมื่อมีนัยสำคัญทางสถิติ ภาวะไม่พึงประสงค์หลังการให้ยา ระงับความรู้สึก 72 ชั่วโมงในผู้ป่วยที่ได้รับการให้ยา ระงับความรู้สึกแต่ละกลุ่มพบว่ามีความแตกต่างอย่างมีนัยสำคัญทางสถิติ

สรุป: การให้ยา ระงับความรู้สึกแบบเฉพาะส่วนโดยใช้เข็ม spinal เบอร์ 27 ส่งผลต่อการเกิดภาวะไม่พึงประสงค์หลังการให้ยา ระงับความรู้สึกน้อยกว่าการให้ยา ระงับความรู้สึกทั่วไป ดังนั้น การให้ยา ระงับความรู้สึกชนิดนี้ควรถูกเลือกใช้ในผู้ป่วยที่เข้ารับการผ่าตัด lower limb