Small-dose selective spinal anaesthesia for short-duration outpatient gynaecological laparoscopy: recovery characteristics compared with propofol anaesthesia

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A randomized controlled trial compared recovery characteristics after selective spinal anaesthesia (SSA) or propofol general anaesthesia (GA) for short-duration outpatient laparoscopic surgery. Forty women were randomized to receive either SSA (1% lidocaine 10 mg, sufentanil 10 μg and sterile water 1.8 ml) or GA (propofol and nitrous oxide 50% in oxygen). Compared with the GA group, times to leaving the operating room, performing a straight leg raise, performing deep knee-bends and achieving an Aldrete score >9 and the time in Phase II recovery were significantly shorter (P<0.05) in the SSA group.

Keywords: anaesthesia, day-case; anaesthetic techniques, subarachnoid

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Spinal anaesthesia in outpatients is currently struggling to compete with the newer general anaesthetic agents, because of prolonged discharge times.¹⁻⁵ Selective spinal anaesthesia (SSA) has been defined as ‘the practice of employing minimal doses of intrathecal agents so that only the nerve roots supplying a specific area and only the modalities that require to be anaesthetised are affected’.⁴ Dorsal column and motor functions are essentially preserved with SSA, such that patients are able to ambulate at the end of surgery.⁶

This prospective randomized study compared recovery characteristics after SSA with those after propofol general anaesthesia (GA) for outpatient gynaecological laparoscopy.

Methods and results

The study had ethics approval from the University of British Columbia. After written consent, 40 women (ASA I) scheduled for outpatient gynaecological laparoscopic surgery were randomized into two groups (SSA or GA) by means of coded envelopes. An i.v. line was established and paracetamol 975 mg p.o. was administered 30–45 min before surgery. Routine monitors (ECG, automatic blood pressure and pulse oximetry) were applied in the operating room and the patients were anaesthetized.

GA group

General anaesthesia was induced with propofol 2 mg kg⁻¹. Tracheal intubation was facilitated with mivacurium 0.15 mg kg⁻¹, and fentanyl 2 μg kg⁻¹ was administered for intra-operative analgesia. Anaesthesia was maintained with propofol 100 μg kg⁻¹ min⁻¹ and nitrous oxide 50% in oxygen. The propofol infusion was titrated between 100–150 μg kg⁻¹ min⁻¹ to maintain a minimally acceptable depth of anaesthesia (i.e. to maintain haemodynamic variables within 15% of baseline values). The lungs were ventilated to maintain end-tidal carbon dioxide between 32 and 36 mm Hg. Boluses of mivacurium 0.04 mg kg⁻¹ were administered with the aim of maintaining at least one twitch using a train-of-four monitor. Propofol was discontinued when the laparoscope was removed and nitrous oxide after the last suture. No neuromuscular reversal agents were required.

SSA Group

With the patient in the sitting position, a 25 G Whitacre spinal needle was inserted at L3–4 or L4–5. The orifice of the spinal needle was placed cephalad and the spinal solution was injected rapidly. The test solution consisted of 1% lidocaine 10 mg (1 ml; AstraZeneca, Mississauga,
Table 1 Post-operative outcomes. Values are mean (SD). *P<0.002; **P<0.05

<table>
<thead>
<tr>
<th></th>
<th>GA</th>
<th>SSA</th>
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<tbody>
<tr>
<td>Recovery time (min)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Time to awaken</td>
<td>11 (8.3)</td>
<td>0</td>
</tr>
<tr>
<td>Exubation</td>
<td>11.2 (8.6)</td>
<td>0</td>
</tr>
<tr>
<td>Orientation</td>
<td>12.6 (8.4)</td>
<td>0</td>
</tr>
<tr>
<td>Times from end of surgery to (min)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Exit theatre</td>
<td>11.9 (6.5)</td>
<td>6.0 (2.2)*</td>
</tr>
<tr>
<td>Straight leg raise</td>
<td>32.4 (17.9)</td>
<td>3.8 (2.4)*</td>
</tr>
<tr>
<td>Deep knee bend</td>
<td>76.1 (35.6)</td>
<td>3.8 (2.4)*</td>
</tr>
<tr>
<td>Aldrete score &gt;9</td>
<td>51.0 (35.2)</td>
<td>6.7 (1.8)*</td>
</tr>
<tr>
<td>Late recovery times (min)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>PACU stay</td>
<td>79.1 (26.8)</td>
<td>75.8 (38.0)</td>
</tr>
<tr>
<td>Phase II stay</td>
<td>30.4 (16.5)</td>
<td>20.3 (5.6)**</td>
</tr>
<tr>
<td>Total Phase I + II stay</td>
<td>109 (31.6)</td>
<td>96.2 (38.6)</td>
</tr>
</tbody>
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Selective spinal anaesthesia versus general anaesthesia

Canada), sufentanil 10 μg (0.2 ml) and sterile water (1.8 ml). This solution had a specific gravity of 1.002 (CSF=1.0069).2 Patients remained sitting for 1 min, after which they were allowed to lie down, and the operating room table was placed in reverse Trendelenburg position for 6–8 min to facilitate cephalad spread of the hypobaric spinal anaesthetic. During this time, the patients were also prepared for surgery. Before insufflation of the abdomen, the table was returned to the horizontal position. Three to four litres of carbon dioxide was insufflated before insertion of trocars. Shoulder tip discomfort was treated with fentanyl 25–50 μg. Midazolam 1–2 mg was administered for anxiolysis if required. Supplementary oxygen was administered for oxygen saturation <93%.

In both groups, at the end of laparoscopy, perphenazine 1 mg i.v. was given for anti-emesis, port site infiltration with bupivacaine 0.25% was performed to minimize incisional pain, and diclofenac 100 mg PR was administered for post-operative analgesia.

Recovery times were determined at 1 min intervals from discontinuation of nitrous oxide (coincident with the last suture) to awakening (opening eyes to command); orientation to day, place and person; and subsequently at 15 min intervals until the patient had achieved the unit’s discharge criteria.2 Postanaesthetic Aldrete scores were noted at the same intervals. Assessments of operating conditions were made by the surgeon on an ordinal scale (poor, good, excellent).

Observations in the postanaesthetic care unit (PACU) were made by research staff or recovery nurses. Patients in both groups were discharged from the PACU to the Phase II area after meeting the unit’s discharge criteria.2 The incidences of post-operative side-effects and the durations of stay in the PACU and Phase II unit were also recorded.

Statistical analysis was performed with the Number Cruncher Statistical System computer program, version 5.03 (Graph Pad Software, San Diego, CA, USA). Continuous data are expressed as mean (standard deviation); between-group comparisons were performed with two-sample t-tests. A value of P<0.05 was considered significant.

The two groups were similar with respect to patient characteristics and the type and duration of surgery (15–20 min). Surgical conditions were rated good to excellent in most patients in both groups. One patient in the SSA group was converted to GA because of technical difficulties resulting in the loss of some spinal anaesthetic solution during injection and an inadequate block. Six patients in the SSA group experienced shoulder-tip discomfort, and three of these required treatment with fentanyl (<50 μg). Midazolam for anxiolysis was required in five patients in the SSA group and the maximum dose did not exceed 2 mg.

Post-operative outcomes are summarized in Table 1. Times to leaving theatre, straight leg raising, deep knee bending and achieving an Aldrete score of <9 and time spent in the Phase II stay unit were significantly less in the SSA group. Twelve patients in the SSA group reported post-operative pruritus compared with none in the GA group (P<0.05).

Comment

The role of spinal anaesthesia in outpatients is being subjected to increasing scrutiny.1 4 In a study examining factors affecting discharge times in outpatients, Pavlin and colleagues3 demonstrated that patients who received conventional-dose spinal anaesthesia had significantly longer discharge times (202–213 min) than those who were managed with GA (184–185 min).

In an effort to address this dilemma, our centre has attempted to study the role of SSA in the outpatient laparoscopy model.2 4–6 Initial studies demonstrated that recovery with SSA was faster than conventional-dose subarachnoid block,2 and dorsal column and motor function were found to be preserved with SSA.5 6 This study has demonstrated that SSA is a reasonable alternative to GA in terms of recovery profile and operating conditions, and it opens up the possibility of SSA as an alternative to general anaesthetics in selected patients. However, more data from other centres using SSA for other procedures is required before SSA can be presented to patients as a viable alternative for outpatient surgery.

This study has demonstrated a potential weakness in the Aldrete score as a measure of recovery because even though patients in the GA group achieved an Aldrete score >9, they were unable to perform deep knee bends until much later, probably as a result of the combined effects of propofol, opioids and muscle relaxants. Our study suggests that the Aldrete score needs to be validated as a measure of fast-track eligibility by using other yardsticks and other tests of balance and motor function. Unless such a validation is performed, there seems little logic in fast-tracking a patient to a Phase II area if they are unable to perform basic motor tests that are a prerequisite for ambulation.
In conclusion, this study demonstrated that the use of selective spinal anaesthesia (SSA) as an alternative to propofol for the maintenance of GA for short-duration outpatient gynaecological laparoscopy was associated with shorter times to achieve certain milestones of recovery. Future studies need to address the safety of bypassing the PACU after SSA and the feasibility of performing other surgical procedures with SSA.

References