Hospital admission after day-case gynaecological laparoscopy

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We have examined aspects of the anaesthetic technique that may influence the likelihood of unplanned overnight hospital admission after ambulatory gynaecological laparoscopy and have determined if any anaesthetically controllable factors were involved. The retrospective audit involved 300 patients. All patients attended the day-case unit at the Liverpool Women's Hospital between September 1996 and May 1997. One hundred ASA I–II patients who had unplanned overnight admissions during this time were evaluated. For every admitted patient, two similar patients who did not require admission were studied. Variables such as patient age and anaesthetic technique were evaluated by logistic regression. Our results indicated that postoperative emesis was the commonest cause for admission. Significant factors increasing the likelihood of unplanned admission included returning from the recovery unit after 15:00, use of a laryngeal mask airway and undergoing diagnostic laparoscopy. Significant factors reducing the likelihood of admission were the use of fentanyl and rectally administered diclofenac.

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Day-case surgery continues to expand in popularity. Side effects which might be regarded as minor in the inpatient setting may contribute to unexpected admissions in the day-case setting. Prolonged recovery may disrupt patient flow and increase institutional costs per patient. Nausea and vomiting are common postoperative complications which have been demonstrated to prolong recovery room stay after diagnostic laparoscopy1 2 and significantly delay discharge.3 The incidence of postoperative emesis after gynaecological laparoscopy has been estimated at 40–77%.4–7

One study estimated a loss of revenue from the host unit of $415 per patient experiencing severe postoperative nausea and vomiting,8 while another put this value at $253 000–1 520 000 for the average day surgery centre.9 One should consider that such values represent not only the treatment a patient may receive, but also costs such as hotel, nursing and the lost revenue from the host unit, should such admissions prevent routine admissions for elective surgery.10

Factors such as the site of surgery and its complications are unavoidable. The aim in undertaking this study was to examine aspects of the anaesthetic technique that may influence the chance of postoperative emesis and hence unplanned overnight admission, given that day-case anaesthesia exerts a profound effect on the success and feasibility of day-case surgery.11 12 Our objective was to evaluate potentially changeable factors leading to such admissions, such as the time of a patient’s return from theatre and anaesthetic technique.

Patients and methods

Data were collected from the case notes of female ASA I–II patients attending the day-case unit at the Liverpool Women’s Hospital between September 1, 1996 and May 31, 1997. Patients included underwent either laparoscopic sterilization or diagnostic laparoscopy. All patients received general but no local anaesthesia in the per operative period. In all cases, an opioid was administered on induction, anaesthesia was induced with propofol and maintained with isoflurane and nitrous oxide in oxygen. For the purposes of this audit, the doses of anaesthetic drugs used were not recorded.

On the day of surgery, simple observations of postoperative nausea and vomiting were made by the nursing staff in the recovery unit and day-case ward after the procedure. Patient details were logged by nursing staff. Case notes were traced and data collected from the anaesthetic sheets, recovery and ward nursing notes by the authors. The data collected were anonymous in terms of patient identification and medical personnel performing the anaesthesia or surgery.

A total of 300 patients were included in this audit. This value includes 100 patients who experienced unplanned over-
night hospital admissions and, for comparison, 200 similar or control patients whose day surgery was uneventful. An unplanned admission was defined as a patient whose hospital stay, for whatever reason, was prolonged beyond the normal closing time of the day-case ward (19:00). A ‘similar’ patient was defined as ASA I–II, from within the day-case unit’s catchment area, having one of the same standardized surgical procedures performed between September 1, 1996 and May 31, 1997. Only patients whose case notes were completed correctly were included, thus excluding five admissions (total number of unplanned admissions was 105 in the 9-month audit period). The 200 similar patients were selected at random, the method being whether their complete case notes could be located in the medical records department at the time they were being sought.

Subjects were not matched for age, anaesthetist, surgeon or otherwise, as whichever variable was matched would automatically be removed from the statistical analyses. For example, if we had deliberately matched an admitted patient with two control patients anaesthetized by the same anaesthetist, then by definition, that anaesthetist and anaesthetic technique would have been identical and would not have been distinguishable from others. Only unmatched analyses are considered below.

Many variables were analysed, including patient age, admitting consultant gynaecologist, grade of anaesthetist and surgeon performing the procedures, time of return from recovery (15:00 taken arbitrarily), anaesthetic technique, occurrence of postoperative nausea and vomiting (PONV), rescue antiemesis and analgesia in recovery.

We chose 15:00 as the cut-off point for return from the recovery unit because many day-case units close between 18:00 and 20:00; to expect a patient who had returned to the ward after 15:00 to be fully recovered and ready for home was thought, a priori, unlikely. All patients were anaesthetized between 09:00 and 17:00.

Statistical analysis was performed using univariate and multivariate logistic regression using SPSS version 7.0 and SAS version 6.1 for Windows on an IBM compatible PC. P < 0.05 was taken as significant. P values quoted are from likelihood ratio tests (essentially a comparison of the goodness-of-fit of the model with covariate to that of the null model). The coding of variables was as follows: age was continuous, every other variable being categorical (‘yes’ or ‘no’, for example in relation to the use of the laryngeal mask airway or ‘given’ or ‘not given’, in the case of anaesthetic drugs), except surgeon/anaesthetist grading which were in several categories (reduced to binary indicators for the analyses).

**Results**

The Liverpool Women’s Hospital Day-Case Unit treated a total of 1974 patients in the 9-month period between September 1, 1996 and May 31, 1997; 44% (869) underwent laparoscopic surgery. Our overall unplanned overnight admission rate, with anaesthetic complications precipitating 90% of admissions, was 5.3% for all day cases (105 of 1974) and 12.1% for all laparoscopy patients (105 of 869).

There were no differences between the two groups in patient characteristics, ASA status or grade of anaesthetist/surgeon involved (registrar (53.3%) and consultant (34.3%) anaesthetists performed most of the work). In the admission group, 44% underwent laparoscopic sterilization and 56% diagnostic procedures compared with 59% and 41% in the control group, respectively (Table 1).

In the admissions group, postoperative nausea and vomiting (PONV) was the largest cause of admission, either alone or in combination with pain, not passing urine, dizziness or drowsiness, and accounted for 61% of the total causes. Pain (15%), not passing urine (9%), dizziness (5%), surgical (6%), social (2%) and miscellaneous causes accounted for the rest; 69% of the admission group returned from theatre after 15:00 compared with 27% of controls.

Use of antiemetics in the peroperative period and in recovery was similar; 62% and 2%, 63.5% and 3.5% in the admission and control groups, respectively. Ondansetron and then droperidol were used most widely in the peroperative period. Prochlorperazine was used as the sole rescue antiemetic in the recovery unit and was given to 7% of all patients.

Fentanyl, then morphine, and then a combination of the two were the most commonly used narcotics, given to 78% in the admission group and 81.5% of controls in the peroperative period. In recovery, 79% of admissions and 63% of controls required opiates, morphine and cyclimorph, 10/50 being used equally. Per rectum diclofenac was administered to the majority of admission (55%) and control (70.5%) patients, either after induction of anaesthesia or at the end of the procedure before the patient woke up.

A laryngeal mask airway was the main form of airway management (80% in the admission and 62% in the control groups); in all other patients a tracheal tube was used except for two patients in the control group where airway management was with a face mask.

Statistical analyses indicated five significant factors affecting unplanned overnight admission. Patients returning from theatre after 15:00 increased their risk of admission by 5.9 times, use of the laryngeal mask airway increased the likelihood of admission by a factor of 2.3, while undergoing laparoscopic sterilization reduced the likelihood

**Table 1** Type of gynaecological laparoscopic surgery, time of return from the recovery unit and method of airway management for 300 day-case patients.

<table>
<thead>
<tr>
<th>Variable</th>
<th>% of patients</th>
</tr>
</thead>
<tbody>
<tr>
<td>Diagnostic laparoscopy</td>
<td>46.0</td>
</tr>
<tr>
<td>Laparoscopic sterilization</td>
<td>54.0</td>
</tr>
<tr>
<td>Patients returning at 15:00 or earlier</td>
<td>58.3</td>
</tr>
<tr>
<td>Patients returning after 15:00</td>
<td>41.7</td>
</tr>
<tr>
<td>Face mask</td>
<td>0.70</td>
</tr>
<tr>
<td>LMA</td>
<td>68.0</td>
</tr>
<tr>
<td>COETT</td>
<td>31.3</td>
</tr>
</tbody>
</table>
Table 2 Statistically significant factors associated with unplanned hospital admission after day-case gynaecological laparoscopy. OR = Odds ratio (with 95% confidence intervals); NNT = number of patients needed to treat (with 95% confidence intervals); 15:00 = patients returning from recovery after 15:00; LMA = use of the laryngeal mask airway; PR = per rectum; fentanyl = use of fentanyl i.v. in the peroperative period; and LS = laparoscopic sterilization. An odds ratio greater than 1 indicates an increased odds of admission, while an odds ratio less than 1 indicates a reduction. Multivariate analysis allows the five significant factors chosen by univariate analysis to be adjusted for each other. In all cases, the dependent variable was unplanned overnight admission.

<table>
<thead>
<tr>
<th>Factor</th>
<th>Univariate analysis</th>
<th>Multivariate analysis</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>P</td>
<td>OR</td>
</tr>
<tr>
<td>15:00</td>
<td>&lt; 1×10⁻¹²</td>
<td>5.9 (3.5, 9.9)</td>
</tr>
<tr>
<td>LMA</td>
<td>&lt; 0.005</td>
<td>2.3 (1.3, 4.2)</td>
</tr>
<tr>
<td>Diclofenac PR</td>
<td>&lt; 0.01</td>
<td>0.51 (0.3, 0.8)</td>
</tr>
<tr>
<td>Fentanyl</td>
<td>&lt; 0.05</td>
<td>0.55 (0.3, 0.9)</td>
</tr>
<tr>
<td>LS</td>
<td>&lt; 0.05</td>
<td>0.54 (0.3, 0.9)</td>
</tr>
</tbody>
</table>

Discussion

We have examined the incidence of unplanned overnight hospital admission after day-case gynaecological laparoscopic surgery at the Liverpool Women’s Hospital between September 1, 1996 and May 31, 1997. We have confirmed that PONV was the most likely causes of unscheduled admission after gynaecological laparoscopic surgery.

Day surgery is proposed as a cost effective, quality approach to surgery and has expanded rapidly in recent years. Hence factors associated with post-anesthetic morbidity, such as PONV, have received increasing attention. Anaesthetists exert some control on the incidence of emesis, and thus unplanned admissions, via their choice of premedication, anaesthetic technique and postoperative pain management. The unplanned overnight hospital admission rate may well reflect the quality of care in this area

We caution that one should never use the same data to achieve the three aims of identifying risk factors, estimating variable values and validating the subsequently chosen model(s). However, as there was little change in the adjusted variables when moving from univariate to multivariate models, we have some confidence in having achieved the first two of our three aims.

The number-needed-to-treat (NNT) is the expected number of patients to be treated with, for example, the corresponding drug to induce one further overnight stay. An example from our results would be that for every five patients returning from recovery after 15:00, we would expect one admission more than for patients returning before 15:00. The corresponding odds ratio of 5.9 gives the increased risk of overnight admission for each patient returning from recovery after 15:00.

One caveat to NNT is that their estimates, and particularly their confidence intervals, are inherently unstable, and even more so in the case of adjusted NNT (that is those derived from multivariate analyses). Thus we would only recommend, and have only given NNT, for univariate analyses.

The increase in incidence of postoperative emesis and unplanned admission after the use of a laryngeal mask airway may be because of sensitization of pharyngeal afferents, projecting to the brainstem via the glossopharyngeal nerve, which can contribute to PONV, even when the airway has been removed.

The incidence of postoperative emesis is related to the experience of the anaesthetist, as inexperience leads to a deeper level of general anaesthesia and inefficient manual ventilation of the lungs using a face mask, thereby furthering gastric distention. However, the vast majority of medical staff involved in the care of our patients were either
registrars (trainees with at least 2 yr anaesthetic experience) or consultants. Nausea and vomiting after laparoscopy may depend on the phase of the menstrual cycle, with the highest incidence of emesis during the luteal phase (days 20–24) and lowest during the pre-menstrual and menstrual phases (days 25–06). These data were not collected in our audit.

As the abdominal cavity is insufflated with gas during laparoscopy, it is important that the surgeon rigorously decompresses the abdomen after this procedure, reducing the overall level of noxious sensations from the abdomen. We had no data concerning the efficacy with which the abdomen was decompressed.

The observed 50% reduction in admission with the use of fentanyl may imply that shorter-acting narcotic agents are more appropriate in the day-case setting than longer-acting ones such as morphine.

Undergoing laparoscopic sterilization as opposed to a diagnostic procedure almost halved the likelihood of admission. While this may be artificial, it may also be because many patients undergoing sterilization are younger and healthier than those undergoing a diagnostic procedure. The former may also have to return home irrespective of their own post-operative morbidity for social reasons, for example to look after their children, given that childdressing arrangements may have only been made for that working day. Patients undergoing diagnostic laparoscopy may be in an older age group (although the mean ages of our two patient groups were similar, 32 yr), may be experiencing chronic pain and have had multiple diagnostic procedures (for example to investigate subfertility, further increasing uncertainty about the diagnosis), combining to greatly enhance their level of anxiety. Some studies have suggested that anxious patients may voluntarily swallow large amounts of air before operation, distending the upper gastrointestinal tract, contributing to emesis.

In summary, our results confirm some established practices in day-case anaesthesia, including the use of shorter-acting opioids such as fentanyl and balanced analgesia using diclofenac. More importantly, our results suggest that by finishing laparoscopies and returning patients to the day-case ward by 15:00, there may be beneficial results for all, suggesting that sufficient time must be left for patients to recover adequately. Our results may give weight to scheduling patients for gynaecological laparoscopy, or patients with an increased risk of PONV, early in the day. Additionally, it may be desirable to leave aside a part of the recovery unit for such patients.

An area of weakness in our audit was that patients were not selected at random rigorously, for example patient selection was not via random number tables. Further investigations are needed, preferably with randomized, controlled, double-blinded, prospective studies accounting for as many confounding variables as possible, with larger sample sizes and multicentre studies to ascertain the reliability of these findings. Ultimately, one must bear in mind that the aetiology of PONV is surely multifactorial, still not completely understood, and that there are probably as many different but equally effective anaesthetic practices as there are day-case units.

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References