THE LOWER OESOPHAGEAL SPHINCTER IN THE FIRST TRIMESTER OF PREGNANCY: COMPARISON OF SUPINE WITH LITHOTOMY POSITIONS

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Regurgitation followed by pulmonary aspiration remains an important cause of anaesthetic induced morbidity and mortality. The risk of gastrooesophageal reflux is exaggerated during late pregnancy, when the increase which occurs in intragastric pressure (GP) may not be compensated for fully by an increase in lower oesophageal sphincter pressure (LOSP), so that barrier pressure decreases [1].

Spence, Moir and Finlay [2] found that the highest intragastric pressures observed in pregnant women at term occur in the lithotomy position. However, in this study LOSP was not measured. Nonetheless, it is generally recommended that anaesthesia should not be induced in pregnant women in the lithotomy position.

Whilst it is accepted almost universally that the trachea should be intubated in women in late pregnancy requiring even minor surgery, this philosophy is extended rarely to those in the first trimester, even when surgery is performed with the patient in the lithotomy position.

This study was designed to compare the effects of the lithotomy with the supine position, on GP, LOSP and BrP during the first trimester of pregnancy.

METHODS AND RESULTS

Seventeen healthy female patients aged 16–37 yr gave informed consent to participate in the study, which was approved by the District Ethics Committee. No patient had a history of gastrointestinal disease or was receiving any drug therapy.

Each patient received a vaginal pessary containing gemeprost 1.0 mg (a prostaglandin E₁ analogue) at least 3 h before surgery. The anaesthetic technique was standardized and consisted of premedication with temazepam 20 mg by mouth 2 h before operation, induction with thiopentone 4 mg kg⁻¹ and tracheal intubation facilitated by atracurium 0.4 mg kg⁻¹; maintenance was with 70% nitrous oxide and 0–1% enflurane in oxygen supplemented by fentanyl 0.1 mg i.v.

The oesophageal manometry system consisted of a fine silastic orogastric tube (3-mm diameter) into which were embedded three subminiature strain gauge pressure transducers. Before each investigation, the system was calibrated in a water column (scale 0–50 cm H₂O) and this manoeuvre was repeated at the end of each study to confirm the absence of significant calibration or zero baseline drift.

When a stable anaesthetic state had been achieved, the oesophageal manometry tube was passed through the patient’s mouth so that the proximal pressure transducer was in the stomach.

SUMMARY

Measurement were made of gastric pressure (GP), lower oesophageal sphincter pressure (LOSP) and barrier pressure (BrP) in the supine and lithotomy positions in 17 healthy women undergoing termination of pregnancy in the first trimester. Values in the supine position were similar to those seen in non-pregnant subjects, but there was a significant reduction in LOSP and BrP in the lithotomy position unrelated to any change in intragastric pressure. It is concluded that the lithotomy position is associated with increased risk of regurgitation in early pregnancy.
TABLE I. Comparison of the supine with the lithotomy position. Mean (SEM). n = 17. *P < 0.05; **P < 0.01

<table>
<thead>
<tr>
<th></th>
<th>Gastric pressure (cm H2O)</th>
<th>Lower oesophageal sphincter pressure (cm H2O)</th>
<th>Barrier pressure (cm H2O)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Supine</td>
<td>4.4 (1.0)</td>
<td>31.7 (4.4)</td>
<td>27.2 (4.4)</td>
</tr>
<tr>
<td>Lithotomy</td>
<td>3.7 (0.8)</td>
<td>25.0 (4.9)**</td>
<td>21.2 (5.0)*</td>
</tr>
</tbody>
</table>

Recordings of GP, LOSP and oesophageal pressure (OP) were made at end expiration by a “pull through” manoeuvre [3]. Measurements were obtained initially with the patient in the supine position and repeated with her legs placed in the lithotomy position. Barrier pressure (BrP) was calculated as LOSP – GP.

All results were analysed using Student's t test for paired data.

The patients’ mean age was 27 yr (range 16–37 yr) and mean weight 62.1 kg (range 51–74 kg). Mean gastric pressure was unaltered by change in position from supine to lithotomy (table I). However, there was a significant decrease in LOSP (P < 0.01) on changing to the lithotomy position and there was a similar decrease in the calculated BrP (P < 0.05).

COMMENT

Previous studies of LOS tone in pregnancy have concentrated on the third trimester, and conflicting results have been obtained. Whilst Lind and colleagues [4] found that pregnant women, without heartburn, were able to compensate for the increased intra-abdominal pressure of late pregnancy by an adaptive increase in LOS tone, other workers [1] failed to confirm this, and reported a decrease in barrier pressure in all pregnant women, especially those with heartburn.

Our patients, evaluated during early pregnancy, exhibited LOS and barrier pressures similar to those observed previously in non-pregnant subjects [5]. Alteration from the supine to the lithotomy position was associated with no change in gastric pressure, but a significant reduction in LOS tone. The hormonal changes associated with pregnancy, particularly an increased plasma concentration of progesterone, which is known to relax LOS tone, may be partially responsible for this phenomenon. All the patients in this study received gemoprost and it is not known how this drug affects the lower oesophageal sphincter. However, this drug is in widespread use in gynaecological practice and so our data may have considerable clinical significance. Although there is no indication from recent triennial reports on maternal mortality [6] that pulmonary aspiration is a major complication of anaesthesia in early pregnancy, our results suggest that there is an increased predisposition to regurgitation in these patients when placed in the lithotomy position.

REFERENCES