

Inhaled nitric oxide in acute respiratory failure

Sir,—I found the recent paper by Young and colleagues [1], interesting, although most of their findings are in agreement with previously published human studies. However, I believe there was a significant error in their calculation of venous admixture (QVa/QT). The values at first inspection appeared very low, particularly in the latter part of table 1. My own estimations of QVa/QT (assuming haemoglobin = 130 g litre⁻¹, P⁰₂ = 3.6 kPa and P⁰₅ = 5.0 kPa) from the appropriate equations produced values of 0.46, 0.57, 0.73, 0.51, 0.52, 0.35, 0.33, 0.47, 0.38, 0.42, 0.30, 0.23, 0.21 and 0.28 quoted values of 0.39, 0.39, 0.35, 0.36, 0.25, 0.05, 0.10, 0.26, 0.18, 0.17, 0.07, 0.11, 0.03 and 0.04, respectively, for the 14 patients. In the calculation of oxygen content, if physically dissolved oxygen is inadvertently calculated as 0.003 ml/100 ml/mn Hg, instead of 0.003 ml/100 ml/mn Hg, then one obtains shunt figures similar to those obtained in the article.

Alteration of haemoglobin concentration and P⁰₂ values within clinically feasible limits does not markedly alter the values obtained. Calculated shunt is sensitive to SV₀ and therefore P⁰₅, but manipulation of this within clinically likely limits did not account for the discrepancy.

As improvement of QVa/QT derangement is a major putative clinical use of nitric oxide, it is important to get the sums correct. It would be useful to know how the results in table 2 change with correct calculation of QVa/QT.

I. R. JENKINS
Vancouver Hospital and Health Sciences Centre
Vancouver, British Columbia, Canada


Sir,—We calculated venous admixtures using a formula that did not include a term for dissolved oxygen, and we are grateful to Dr Jenkins for making us aware of the significance of this omission. Dissolved oxygen changes all oxygen contents, especially calculated end-capillary content. We have recalculated all of the venous admixtures with a term for dissolved oxygen included and obtained values of 0.53, 0.45, 0.47, 0.55, 0.38, 0.095, 0.30, 0.38, 0.41, 0.38, 0.38, 0.27, 0.029 and 0.21 for the baseline values. The mean venous admixtures before and after nitric oxide were 0.33 (±0.15) and 0.29 (±0.15) with 8 vpm, 0.34 (±0.16) and 0.31 (±0.14) with 32 vpm and 0.34 (±0.14) and 0.32 (±0.14) with 128 vpm. All of these changes are significant (P < 0.05).

J. D. YOUNG
Radcliffe Infirmary
Oxford

Postoperative extradural analgesia

Sir,—We read with interest the recent article by Leith and colleagues [1] on the results of a 4-yr audit of 770 patients receiving postoperative extradural analgesia at York Hospital using a mixture of 0.15% bupivacaine with 0.005% diamorphine. Over the past 8 yr we have used different opioids at various strengths mixed with 0.125% bupivacaine in order to determine the most effective analgesia with the lowest incidence of major or minor complications. We have found that the best opioid to add to bupivacaine is fentanyl at a concentration of 8.3 μg ml⁻¹ (i.e. fentanyl 10 ml in a 60-ml syringe).

We have recently completed a 2-yr audit of our ward-based extradural analgesia service consisting of 515 cases. This was based on the work of Wheaterley and colleagues [2] using the same assessment tools as were used in their study. In the past 12 months, however, we have discarded "pain at rest" as we actively encourage our patients to be mobile, and this indicator contradicts this approach. We also found it a poor indication of analgesic quality. The results of our audit are shown in tables 1 and 2.

Table 1 No. of patients (%) experiencing pain on movement

<table>
<thead>
<tr>
<th>Pain on movement</th>
<th>Mild</th>
<th>Moderate</th>
<th>Severe</th>
</tr>
</thead>
<tbody>
<tr>
<td>%</td>
<td>77.7</td>
<td>64</td>
<td>51</td>
</tr>
</tbody>
</table>

Table 2 No. of patients (%) with complications. f = Ventilatory frequency; SAP = systolic arterial pressure

<table>
<thead>
<tr>
<th>f &lt; 10 (b.p.m.)</th>
<th>Nausea</th>
<th>SAP</th>
<th>Pruritis &lt; 100 mm Hg</th>
<th>Motor block</th>
</tr>
</thead>
<tbody>
<tr>
<td>%</td>
<td>3.0</td>
<td>12.4</td>
<td>3.3</td>
<td>1.4</td>
</tr>
</tbody>
</table>

The audit conducted in York showed that from 1990 to 1993, on average, 47% of patients experienced moderate or severe pain on movement while our own audit of 515 patients over 2 yr had an incidence of 22.3% experiencing the same degree of pain on movement. The incidence of complications with our extradural mixture was also comparable; an incidence of respiratory depression (frequency less than 10 b.p.m.) of 3.0% compared with 2.6%. We found an incidence of vomiting of 12.4% compared with 16.8%, and an incidence of itching of 3.3% compared with 12%, in the audit from York, and an incidence of hypotension of 1.4% compared with 34% with the diamorphine mixture.

There has been much discussion in the past on which opioid should be added to bupivacaine in order to provide the best quality analgesia, and the lowest complication rate. One such study by Enevery and colleagues [3] demonstrated that diamorphine was the more appropriate agent. This study used relatively small numbers (61 patients divided into three groups) and we suggest that the different results from these two extensive audits should stimulate further work in this area.

The interesting finding of our own audit was that patients in the over 80-yr age group had an incidence of respiratory depression of 8.6% compared with 2.2% in the under 80-yr age group. This has led us to halve the quantity of fentanyl in the analogistic mixture in all patients over 80 yr of age. The audit will be repeated after 12 months.

We feel that the results clearly support our choice of opioid, namely fentanyl, in our analgesic mixture. While we have demonstrated some differences between our two services, we would wholeheartedly support the conclusion, still refuted in some quarters, that the ward-based extradural service provides a high quality postoperative recovery.

H. M. JONES
S. J. NIXON
Division of Anaesthetics
Royal Gwent Hospital
Glan Hafren NHS Trust
Newport