In women who have primary pulmonary hypertension, maternal mortality is more than 50% usually during labor or puerperium. The hemodynamic features of this condition consist of pulmonary artery pressure higher than 30/15 mmHg, right ventricular hypertrophy, and eventually failure and a low fixed cardiac output. Most complications arise from a decrease in systemic vascular resistance and reduction in venous return. For this reason, spinal or epidural anesthesia often is avoided in these patients. Hyperbaric morphine injected intrathecally provides excellent analgesia during labor without any significant autonomic or motor effects. We describe the labor and delivery in a patient with severe pulmonary hypertension who received intrathecal morphine analgesia.

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Intrathecal Morphine for Relief of Labor Pain in a Parturient with Severe Pulmonary Hypertension

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any treatment. Two hours after injection of the intrathecal morphine, a 2,400-gm female infant was delivered with the aid of forceps. Pudendal block anesthesia with 1% lidocaine, 15 ml, was used for delivery. Infant Apgar scores were 9 at both 1 and 5 min, and cord blood acid base status was within normal limits. Estimated blood loss during delivery was 400 ml. Following delivery, the patient complained of severe itching of the face and the trunk, which was treated successfully with initial iv bolus of 0.08 mg of naloxone, followed by a drip of 0.1 mg/h for 5 h. The patient then was transferred from the delivery room to the Coronary Care Unit for observation.

The postpartum course was mostly uneventful, with the exception of a hypotensive episode that occurred 13 h postpartum. Blood pressure at that time was 85/60 mmHg, which responded to iv crystalloid therapy. Hemodynamic measurements were discontinued and the patient was transferred to the cardiology ward 3 days postpartum. At 7 days she was judged to be ready for discharge when she experienced chest pain, severe hypotension, and sudden cardiovascular collapse. All attempts at resuscitation were unsuccessful. The patient died 4 h later. Autopsy showed right heart hypertrophy and extensive atheromatosis in the pulmonary arteries.

DISCUSSION

Pain, anxiety, and stress are especially detrimental in patients with pulmonary hypertension because pulmonary vascular resistance may increase markedly. Regional anesthesia techniques may be associated with decrease in systemic vascular resistance and venous return. Systemic analgesics may not be very effective in relieving labor pain, also, excessive doses may cause maternal hypercarbia and acidosis, with a resulting increase in pulmonary vascular resistance. In addition, neonatal depression from the narcotic also may result. Thirty-eight pregnancies have been described in 21 patients with primary pulmonary hypertension. Eleven of these 21 patients (52%) died during pregnancy or the early postpartum period, mostly because of sudden cardiovascular collapse. No mention was made of the anesthetic management of these patients. Only one report exists in which epidural anesthesia was administered during labor to a patient with severe pulmonary hypertension who also had sudden cardiovascular collapse and died on the eighth postpartum day. Even though no hypotension due to the epidural block was observed, this technique was associated with a decrease in cardiac output and increase in pulmonary pressures, which indicate a progressive impairment of left ventricular stroke volume.

Cause of death in our patient and in the later report by Sorensen et al. was not entirely clear because controlled hemodynamic data or electrocardiographic information were unavailable. Worsening of the balance between myocardial oxygen and demand may lead to ischemia and consequently to right ventricular failure and fatal arrhythmias. Cause of death in this group of patients could be due to autotransfusion after delivery, right heart failure, increased pulmonary resistance, or a combination of all of these factors. Since the isolation of the opiate receptors in the central nervous system,
various reports have shown the effectiveness of small doses of intrathecal morphine in relieving the pain of labor.\textsuperscript{5,16,17} A possible disadvantage of this technique is the high incidence of pruritus, nausea and vomiting, urinary retention and somnolence, and, on some occasions, delayed respiratory depression.

In our patient the only side effect encountered was pruritus, which was treated easily by the administration of naloxone. A possible advantage of this technique over other methods of pain relief in obstetrics is the selective analgesic effect without other sensory, motor, or autonomic side effects.\textsuperscript{18} Intrathecal injection of morphine also has been used experimentally in the parturient rat and rabbit without any detectable effect on the viability of the newborn or the initiation and the progress of labor.\textsuperscript{19} The small effective dose of intrathecally injected morphine and its slow release into the systemic circulation\textsuperscript{19,20} may spare the fetus and result in selective maternal analgesia without adverse effects on the cardiovascular system.

We conclude that intrathecal morphine given to our patient provided good analgesia during labor, without causing any adverse effects on the cardiovascular or the respiratory system, but this technique did not change the unfortunate result for the patient. Prognosis might have been improved if monitoring had been continued post-delivery as a guide for treatment and intervention.

## REFERENCES


### Table 1. Analysis of Maternal Blood Gases

<table>
<thead>
<tr>
<th></th>
<th>6 Days before Delivery</th>
<th>3 Days before Delivery</th>
<th>Delivery</th>
<th>12 hr after Delivery</th>
<th>26 hr after Delivery</th>
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<tbody>
<tr>
<td>FIO₂ (%)</td>
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<td>20%</td>
<td>40%</td>
<td>60%</td>
<td>40%</td>
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<tr>
<td>Paco₂ (mmHg)</td>
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<td>50</td>
<td>109</td>
<td>140</td>
<td>85</td>
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<td>Paco₂ (mmHg)</td>
<td>28</td>
<td>26</td>
<td>22</td>
<td>26</td>
<td>26</td>
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<td>pH</td>
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<td>Base excess mEq/L</td>
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<td>-5</td>
<td>-2</td>
<td>-7</td>
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<td>HCO₃ (mEq/l)</td>
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<td>20</td>
<td>21</td>
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<td>O₂ sat</td>
<td>98%</td>
<td>89%</td>
<td>97%</td>
<td>99%</td>
<td>97%</td>
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<tr>
<td>Respiratory rate (min)</td>
<td>28</td>
<td>28</td>
<td>22</td>
<td>32</td>
<td>18</td>
</tr>
</tbody>
</table>

12 hr after delivery: 40%