Clinical intra-amniotic infection with meconium-stained fluid at term: an analysis of Apgar scores

THOMAS P. CONNOLLY, DO

A retrospective analysis of 1- and 5-minute Apgar scores of patients at term gestation (37 to 42 weeks) with evidence of clinical intra-amniotic infection and meconium-stained amniotic fluid was performed. The patients were selected from the labor and delivery records of two Detroit hospitals during the study period from January 1988 through May 1994. The author suggests that the presence of clinical intra-amniotic infection with meconium-stained fluid does not affect Apgar scores of term infants.

(Key words: Apgar scores, meconium, intra-amniotic infection)

Clinical intra-amniotic infection (IAI), which has an incidence of 1% to 4%, develops an ascending process after prolonged premature rupture of membranes, with other cases being hematogenous in origin. By definition, IAI is a presumptive clinical diagnosis made on the bases of maternal fever, uterine tenderness, fetal tachycardia, maternal leukocytosis (>10,000 WBC), and malodorous amniotic fluid.1

Maberry and colleagues2 reported that using criteria used to define asphyxia (Apgar scores of 6 or less), significantly more infants in the infected group had low Apgar scores. However, 60% of these patients were preterm infants, and it is known that preterm infants have other influences on Apgar scores that make the use of Apgar scores less reliable.3 Yoder and colleagues4 investigated IAI and its effect on maternal and perinatal well-being and found no adverse outcomes. The combined influence of meconium and IAI in term patients has not specifically been studied.

A number of published studies have noted lower Apgar scores related to meconium-stained fluid (MSF).5,6 Berkus and colleagues7 reported that moderate or thick meconium placed an infant at three times the risk of an adverse neonatal outcome (including meconium aspiration syndrome and significantly more neurologic sequelae) regardless of other stress factors. The presence of thick meconium early in labor has been associated with fetal acidosis and lower 1- and 5-minute Apgar scores.8 Meconium-stained fluid is a risk factor for IAI in preterm patients and is considered a sign of hypoxia.9 Approximately 60% of term patients with chorioamnionitis have MSF.10 In light of these reported findings, and as no studies to date have exclusively investigated this group of patients, the purpose of this study was to determine if Apgar scores were affected by the combination of IAI and MSF at term.

Methods
A review of labor and delivery records...
at two Detroit, Michigan hospitals (Michigan Hospital and Medical Center; Detroit Riverview Hospital) was conducted. Patients were selected for the retrospective study on the bases of gestational age between 37 and 42 weeks, signs and symptoms of clinical IAI (maternal tachycardia, uterine tenderness, maternal fever, malodorous amniotic fluid, leukocytosis), and presence or absence of MSF. Age, race, parity, mode of delivery, length of time between rupture of membranes and delivery, and use of prostaglandin gel or oxytocin was also noted. If pathologic diagnosis confirmed chorioamnionitis or microbiologic studies confirmed positive cervical or vaginal cultures, this was additionally documented. The patients were placed into two groups on the basis of presence or absence of MSF in addition to the IAI criteria.

**Table 1**

<table>
<thead>
<tr>
<th>Patient No.</th>
<th>Age, y</th>
<th>Parity</th>
<th>Delivery</th>
<th>APGAR score</th>
<th>Cord pH</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>28</td>
<td>2</td>
<td>Normal spontaneous vaginal delivery</td>
<td>5</td>
<td>9</td>
</tr>
<tr>
<td>2</td>
<td>22</td>
<td>2</td>
<td>Normal spontaneous vaginal delivery</td>
<td>8</td>
<td>9</td>
</tr>
<tr>
<td>3</td>
<td>27</td>
<td>0</td>
<td>Cesarean section</td>
<td>7</td>
<td>8</td>
</tr>
<tr>
<td>4</td>
<td>19</td>
<td>0</td>
<td>Vacuum</td>
<td>8</td>
<td>9</td>
</tr>
<tr>
<td>5</td>
<td>26</td>
<td>2</td>
<td>Normal spontaneous vaginal delivery</td>
<td>9</td>
<td>9</td>
</tr>
<tr>
<td>6</td>
<td>25</td>
<td>0</td>
<td>Kielland forceps</td>
<td>8</td>
<td>9</td>
</tr>
<tr>
<td>7</td>
<td>25</td>
<td>1</td>
<td>Normal spontaneous vaginal delivery</td>
<td>8</td>
<td>9</td>
</tr>
<tr>
<td>8</td>
<td>21</td>
<td>2</td>
<td>Normal spontaneous vaginal delivery</td>
<td>9</td>
<td>9</td>
</tr>
<tr>
<td>9</td>
<td>26</td>
<td>5</td>
<td>Cesarean section</td>
<td>8</td>
<td>9</td>
</tr>
<tr>
<td>10</td>
<td>13</td>
<td>0</td>
<td>Cesarean section</td>
<td>0</td>
<td>4</td>
</tr>
<tr>
<td>11</td>
<td>24</td>
<td>5</td>
<td>Cesarean section</td>
<td>6</td>
<td>9</td>
</tr>
<tr>
<td>12</td>
<td>28</td>
<td>3</td>
<td>Normal spontaneous vaginal delivery</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>13</td>
<td>22</td>
<td>2</td>
<td>Normal spontaneous vaginal delivery</td>
<td>9</td>
<td>9</td>
</tr>
<tr>
<td>14</td>
<td>17</td>
<td>0</td>
<td>Normal spontaneous vaginal delivery</td>
<td>7</td>
<td>9</td>
</tr>
<tr>
<td>15</td>
<td>35</td>
<td>3</td>
<td>Normal spontaneous vaginal delivery</td>
<td>8</td>
<td>9</td>
</tr>
<tr>
<td>16</td>
<td>16</td>
<td>0</td>
<td>Cesarean section</td>
<td>9</td>
<td>9</td>
</tr>
<tr>
<td>17</td>
<td>26</td>
<td>0</td>
<td>Normal spontaneous vaginal delivery</td>
<td>8</td>
<td>8</td>
</tr>
<tr>
<td>18</td>
<td>19</td>
<td>0</td>
<td>Cesarean section</td>
<td>9</td>
<td>9</td>
</tr>
<tr>
<td>19</td>
<td>20</td>
<td>2</td>
<td>Normal spontaneous vaginal delivery</td>
<td>5</td>
<td>8</td>
</tr>
<tr>
<td>20</td>
<td>17</td>
<td>1</td>
<td>Cesarean section</td>
<td>9</td>
<td>9</td>
</tr>
</tbody>
</table>

*NA* – not available. Cord blood gas measurements were not routinely taken at either institution until later in the study.
Results
Using the criteria described, 20 patients qualified for the IAI-meconium group (Table 1). Twenty patients also fulfilled criteria for the IAI-only group (Table 2). Performing the χ² test of the independence of categorical variables, there was no statistical significance in the abnormal Apgar scores at 1 and 5 minutes for either group. The χ² value of 0.625 was less than the 6.635 required for the significance level of 0.01 (df=1) for the 1-minute Apgar scores; the χ² value of 0.540 was not significant for the 5-minute Apgar scores.

Discussion
The outcomes for IAI have been noted in the literature. Gibbs and coworkers reported that the outcome for infants delivered within 12 hours of the onset of clinical IAI was not influenced by maternal infection. In another study controlling for prematurity, clinical IAI had no adverse outcomes. The data obtained in this study from the IAI group appear to be consistent with these findings. The presence of MSF, in addition to low Apgar scores, is considered to be an indicator of hypoxia. As mentioned previ-
ously, Apgar scores are influenced by other factors. However, 60% of term IAI is associated with MSF; therefore, this study was considering a significant area to examine in terms of perinatal outcomes. This study did not demonstrate any statistically significant influences on Apgar scores in these patients. Although use of the Apgar score as a measure of asphyxia has been noted in other studies,13,14 the use of umbilical artery pH more recently has been used in defining asphyxia with regard to fetal acidosis and in determining the significance of MSF.15

Cord blood gas measurements were not routinely taken at either institution until later in the study. The diagnosis of IAI is a subjective clinical diagnosis and has varying presentations as well.

In term infants born to patients with clinical IAI and meconium-stained fluid, there is no statistically significant effect on Apgar scores. The author suggests that current management methods continue, including active management of labor, appropriate antibiotic regimens, and amnioinfusion. Additional follow-up studies using umbilical artery pH, the effects of amnioinfusion, and documented microbiologic diagnosis of IAI are needed.

References


Future issues of JAOA

- Research Conference Abstracts
- “Effects of a structured curriculum in OMT on osteopathic structural examinations and use of OMT for hospitalized patients”
- “Preparing medical students for the changing healthcare environment in the United States”
- “Objectivity and accuracy of the interpretation of mammograms using the BI-RADS final assessment categories in 40- to 49-year-old women”
- “Galbreath technique: an old manipulative treatment for otitis media revisited”
- “HbA1c and beyond: glycation as the glucose link to diabetic complications: minireview”
- “Spiritual history”
- “Minor depression in primary care: what the generalist should know”
- “Correlation of scores for the COMLEX-USA with osteopathic medical school grades”
- “Clinical experience using intracorporeal lithotripsy with the Swiss lithoLaser”
- “Black widow bites in children”
- “Collaboration between osteopathic medicine and pharmacy to teach via the Internet”
- “Weaning from mechanical ventilation: an update”
- “The cranial rhythmic impulse related to the Traube-Hering-Mayer oscillation: comparing laser-Doppler flowmetry and palpation”
- “Occupational and environmental medicine in a family medicine residency”
- “Effect of cooling on muscular health prior to a marathon race”
“Student perceptions of osteopathic manipulative treatment after completion of a manipulative medicine rotation”

“Evaluation of aminotransferase elevations in a bodybuilder using anabolic steroids: hepatitis or rhabdomyolysis?”

“Characteristics, satisfaction, and perceptions of patients receiving ambulatory healthcare from osteopathic physicians: a comparative national survey”

“Combating ageist attitudes at the end of life: the case for physicians as advocates”

“Adjunctive osteopathic manipulation for the treatment of pneumonia in the hospitalized elderly”