

### AIR IN THE SPINAL CANAL ASSOCIATED WITH CARDIOPULMONARY RESUSCITATION IN AN INFANT

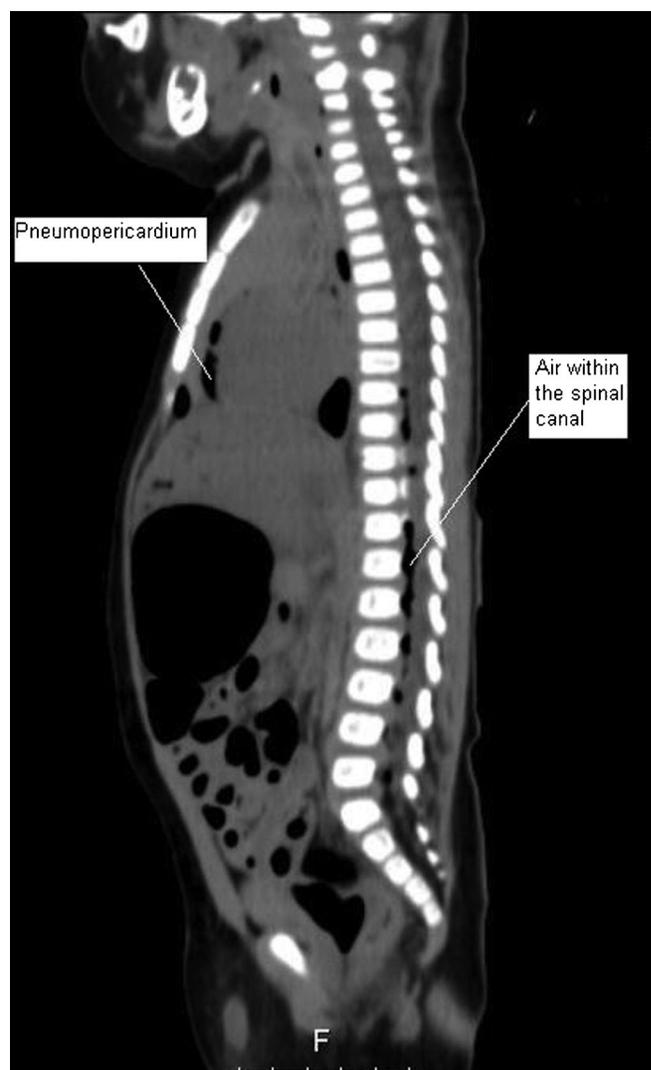
*To the editor:* Pneumorrhachis (PR), defined as air in the spinal canal, has never been reported as having occurred as a result of Basic Life Support (BLS) maneuvers. We describe the first case of an infant found to have air in the spinal canal after BLS and Advanced Life

Support (ALS).

A 3-month-old infant was found in cardiac arrest at home. The paramedics performed BLS and ALS according to the American Heart Association guidelines.<sup>1</sup> After an hour of resuscitation, the patient was transported to the emergency department, where, after 25 more minutes of attempted resuscitation, the infant was declared dead.

History revealed fever and poor feeding for 2 days and no other

symptoms. The parents stated that the baby had not suffered any recent trauma. Total body computed tomography (CT) was done to rule out abuse. No evidence of trauma was identified. Rather, the CT revealed pneumothorax, pneumomediastinum, pneumopericardium, and PR (Figure 1). Pneumoperitoneum was not found. A lumbar puncture was performed after the CT and polymerase chain reaction-based assay detected *Neisseria meningitidis* in all



**Figure 1.** Computed tomographic scan showing pneumothorax, pneumomediastinum, pneumopericardium, and pneumorrhachis.

three samples of cerebrospinal fluid. *N. meningitidis* is not a gas-forming organism, so our assumption was that the gas in the spinal canal resulted from BLS. Autopsy was not performed on this infant.

The incidence of iatrogenic injuries following BLS in children varies between 15 in 211 (7.1%) and 65 in 153 (52.5%), but PR has not been previously reported.<sup>2,3</sup> The 65 patients studied by Ryan and colleagues had minor injuries, such as bruises and abrasion related to BLS.<sup>3</sup> Patients who were resuscitated for less than 1 hour had a 27% incidence of injury as opposed to 62% for patients resuscitated for longer than 1 hour.<sup>3</sup> Our patient was resuscitated for 90 minutes.

In children, PR is an extremely rare entity. A search of the electronic databases *PubMed* and *Embase* and the Internet search engine *Google Scholar* (using the search terms “pneumorrhachis” AND “child” OR “infant” OR “pediatrics” OR “paediatrics”) retrieved only eight cases, none of which were related to BLS.

In adults, 81 cases of PR have been reported. Causes of PR can be traumatic, nontraumatic, and iatrogenic. Forty-four of the cases were found in multiple trauma patients. Barotrauma due to high intrathoracic pressures caused by vigorous ventilation or chest compressions

accounted for the majority of these cases.<sup>4,5</sup> Except for two cases, most PR cases were asymptomatic. Consequently, they were found incidentally by diagnostic imaging: CT or magnetic resonance imaging. Most cases of PR resolve without intervention. Rest allows for air to be absorbed into the circulating blood over several days. In adults, only one case of PR was reported after BLS.<sup>4</sup> In this context, a possible mechanism for creating PR is ventilation-induced barotrauma with air dissecting between the pleural or pericardial spaces into the paraspinal soft tissues. The air can then migrate through the neural foramina into the epidural space.<sup>4,5</sup> We suspect that this was the case with our infant. The fact that our infant had air mainly in the lower thoracic and lumbar area indicates the direction of dissection. Our case highlights the possibility that prolonged pediatric BLS might be associated with severe barotrauma. Although it is exceedingly rare, we should be reminded of the possibility of barotrauma in prolonged pediatric BLS and consider its potential effect on resuscitation outcome.

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