

# Infant Immobilization and Pediatric Papooses: We've Come a Long Way

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J Emerg Nurs 2007;33:451-5.

0099-1767/\$32.00

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doi: 10.1016/j.jen.2007.01.023

*“Brutane” (Noun)—The punitive name of a fictitious anesthetic agent used as a euphemism for the careful and scientific application of brute force to manually restrain the patient for a procedure, i.e. a wiggling child for repair of a laceration.<sup>1</sup>*

Whether you call it “Brutane” or just “brute force,” when coupled with the understanding that “I’m bigger and therefore I win,” you have a formula for the immobilization of infants and children that has been used for countless years in various aspects of pediatrics and emergency care.<sup>2</sup> Perhaps this is the time to re-evaluate past practices and look for better, safer, more “patient friendly” equipment. Whether for diagnostic imaging or procedures, medical professionals working with infants and children, especially in emergency situations, should have the ability and equipment to properly and safely immobilize infants.

## A Tale of Two Traumas

A 3-week-old infant was appropriately restrained in a rear-facing child safety seat when the vehicle the infant was riding in was struck from behind by a tractor trailer moving at a high rate of speed. The mother was critically injured and was not expected to survive. Twenty-four hours after the accident, while on a pediatric floor, the infant was found to have a possible cerebral spinal fluid leak from the ear. Also found was a skull fracture on radiograph. Transport to a pediatric trauma center was appropriately requested for the infant.

When the transport team arrived, the infant was supine in a crib, actively sucking on a pacifier, and appeared to be neurologically intact. A review of the previous workup found that no cervical spine radiographs or head computed

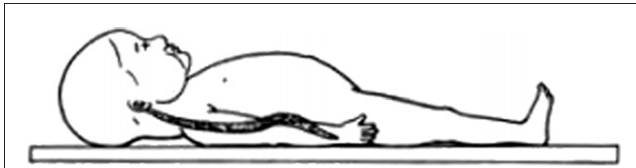


FIGURE 1

“Chin on chest” position with standard backboard. Reprinted from Herzenberg JE, Hensinger RN, Dedrick DK, Phillips WA. Emergency transport and positioning of young children who have an injury of the cervical spine. The standard backboard may be hazardous. *J Bone Joint Surg* 1989; 71:15-22. Reprinted with permission from The Journal of Bone and Joint Surgery, Inc.

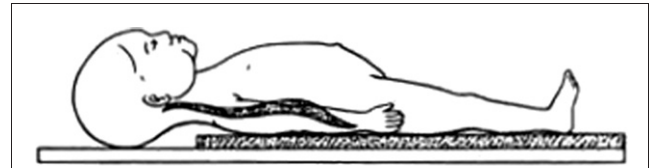


FIGURE 2

Traditional spine board with shoulder padding. Reprinted from Herzenberg JE, Hensinger RN, Dedrick DK, Phillips WA. Emergency transport and positioning of young children who have an injury of the cervical spine. The standard backboard may be hazardous. *J Bone Joint Surg* 1989; 71:15-22. Reprinted with permission from The Journal of Bone and Joint Surgery, Inc.

tomography (CT) imaging had been performed, and in light of the mechanism of injury and associated physical findings, the decision was made to take some additional precautions. The infant was placed in the Papoose Infant Spinal Immobilizer, also known as the “Peanut Papoose” (Ossur, Moorestown, NJ) to provide both spinal immobilization and proper positioning for the diagnostic imaging that was ordered.

Later that same week, a 2-month-old infant was accidentally dropped in the shower by her mother. Although no neurologic deficits had been noted, the child was being transferred to a pediatric trauma center because of a small epidural hemorrhage. When the transport team arrived for this patient, they found the infant secured on an adult spinal board. Towels were being used to immobilize the cervical spine, because no cervical collars were available that properly fit the patient. This infant was placed in the Papoose Infant Spinal Immobilizer for transport and further imaging studies and had an uneventful and full recovery.

### Infant Immobilization (Trauma)

In the ED setting, it can be difficult, if not nearly impossible, to adequately restrain a vigorous infant. Nevertheless, it is crucial that the infant be restrained to avoid further injury, especially when there is even the suspicion of trauma to the head and/or cervical spine. Young children, and especially infants, have what is often referred to as “big head, little body syndrome.” Their big occiputs are disproportionately larger than their little bodies. When lying supine on a hard surface, this “syndrome” can result in problems with maintenance of a patent airway and proper cervical

spine immobilization.<sup>3-6</sup> While it commonly has been thought that the “chin on chest” phenomenon that accompanies unmodified supine positioning for infants could cause the airway to close off, recent evidence has actually shown that this is not necessarily the case (Figure 1). Anesthesia research reveals that the infant trachea is not necessarily crimped off when the infant is supine on a flat surface. Instead, it appears likely that an obstruction at the hypopharynx can be the real problem associated with this positioning.<sup>6,7</sup> Whatever the source of the airway compromise, what is important is that we always remember that “A” comes before “B and C.” Perhaps the American Lung Association motto summarizes it best: “When you can’t breathe, nothing else matters!”

Just as positioning is critical to maintaining the infant airway, the same considerations also apply for young children with real, suspected, or even potential cervical spine injuries. Although these injuries are very rare in the infant population, if an infant is placed flat on a traditional spine board, the cervical spine can be forced into flexion. In extreme cases, a radiograph of the cervical spine would come out looking like a “U,” providing a dramatic example of what is not intended by placing the small patient on a standard spine board in the first place.<sup>8</sup>

Although the idea of clinically clearing cervical spines in the prehospital environment and emergency department is not a new one, the practice continues to evolve as more and more research is available. In the case of pediatric patients who may have difficulty providing reliable responses, and especially for infants who cannot say, “Ouch, my neck hurts,” immobilization and formal cervical spine clearance with diagnostic imaging is still the standard.<sup>8-12</sup> In addition,

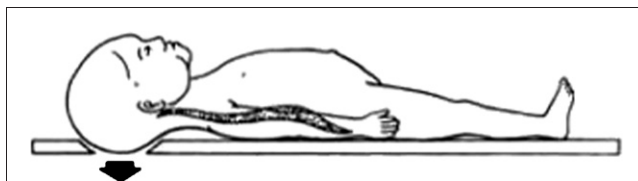


FIGURE 3

Spine board with “head drop.” Reprinted from Herzenberg JE, Hensinger RN, Dedrick DK, Phillips WA. Emergency transport and positioning of young children who have an injury of the cervical spine. The standard backboard may be hazardous. *J Bone Joint Surg* 1989;71:15-22. Reprinted with permission from The Journal of Bone and Joint Surgery, Inc.

if the infant or child is intubated, immobilization of the head and neck should be considered to help minimize the potential for unexpected extubations.

### Infant Immobilization (Medical)

Immobilizing pediatric patients in the emergency department and other areas is a common concern for medical reasons as well as for trauma cases. While we might think that it would be nice if our smallest patients would respond to our wish for them to “be quiet and lie still,” we really know that if they did it would be a clear signal that these patients are indeed very, very sick. Evaluating a febrile, possibly septic child often includes such procedures as bladder catheterization, venipuncture for blood counts and cultures, chest radiography, and even a lumbar puncture for cerebrospinal fluid samples.

In addition, infant physiology and baby fat can make obtaining vascular access for laboratory studies or peripheral intravenous line placement difficult even in the best of hands. Adding infant movement to the picture, whether reflexive or vigorous, can be a true challenge. The success of diagnostic imaging studies, such as CT and even plain radiographs, also is highly dependent on the patient being immobile.<sup>13</sup>

### Immobilization Options

Options for immobilizing infants range from “brutane” to commonly found linen items such as pillowcases and sheets to commercially available immobilizers and even to deep sedation or general anesthesia. Whichever option is chosen to minimize motion, the key is remembering the “big head, little body” syndrome and its effect on positioning. Whether



FIGURE 4

Traditional papoose board. (Photo courtesy of Olympic Medical, Seattle, Wash; [www.olycomed.com](http://www.olycomed.com).)

for head or spinal injuries, or simply for laceration repairs, supine immobilization should involve some sort of accommodation, such as padding behind the shoulders, to allow for proper airway and cervical spine positioning (Figures 2 and 3).<sup>3,4,8,11,14,15</sup>

### SHEETS AND SWADDLING

Infants can be swaddled in a pillow case or sheet with their arms tucked in at their sides. This technique is easy and certainly cost-effective because the only equipment required is linen commonly found in the hospital. Although frequently used, this immobilization method does not allow for easy access to the arms for peripheral intravenous line placement or venipuncture, provides no head immobilization, and may hinder ongoing respiratory and cardiovascular assessments.

### TRADITIONAL PAPOOSE BOARDS

Traditional papoose boards have been used for many years and are available in many emergency departments (Figure 4). Depending on the model used and the age of the child, access to the arms can be as difficult as it is with sheets and swaddling. One also must remember to place padding not only on the papoose in general but especially



FIGURE 5  
Medi-Kids Baby Board. (Photo courtesy of Ferno-Washington, Inc., Wilmington, Ohio; [www.Ferno.com](http://www.Ferno.com).)

under the shoulders of the infant. Traditional papoose boards can be a very good choice for immobilizing pediatric patients older than a few months, and because they are readily available, radiolucent, and easy to apply, these are a very good choice.<sup>2,15</sup>

#### MEDI-KIDS BABY BOARD

The Medi-Kids Baby Board from Ferno (Wilmington, Ohio) is an infant immobilization device that offers some unique features (Figure 5). Each radiolucent, padded board has a pneumatic inflation device (bladder) that can be inflated to the desired height to promote proper positioning for the “big head” of infants. In addition, the Medi-Kids Baby Board allows different options for securing the infant by providing straps that can be placed to go



FIGURE 6  
“Peanut Papoose” with cervical collar. (Photo courtesy of Ossur, Moorestown, NJ; [www.ossur.com](http://www.ossur.com).)

either directly across the body or in a criss-cross pattern. The child may also be immobilized in less traditional positions, such as side-lying or prone, and can be secured easily to a cot, backboard, or isolette.

#### PEANUT PAPOOSE

The Papoose Infant Spinal Immobilizer or “Peanut” papoose recently has been introduced by Ossur (Moorestown, NJ) (Figures 6 and 7). For medical patients, it functions as a papoose-like immobilizer with a built in “head drop.” It allows full access to the extremities, as well as to the abdomen and genitals if necessary. For diagnostic imaging, the device is CT and magnetic resonance imaging compatible. If cervical spine immobilization is required, the “head drop” portion of the “Peanut” allows for proper C-spine and airway positioning. This device also comes with a “Broselow Gray” color-coded cervical collar that, unlike many other pediatric cervical collars, in the authors’ experiences, actually provides a proper fit for infants. It also may be worth remembering that very young infants do not have the strength to lift their heads when positioned supine, so there may be cases where there is no need for the collar to be used.<sup>16</sup>

#### Medications for Immobilization

For many years, a variety of medications have been given to infants and children to provide a degree of chemically assisted immobility. The administration of sedative agents comes with an additional risk to the patient, additional



FIGURE 7  
“Peanut Papoose” without cervical collar. (Photo courtesy of Ossur, Moorestown, NJ; [www.ossur.com](http://www.ossur.com).)

nursing responsibilities, and time associated with monitoring the patient. With the advent of newer and faster imaging devices, the use of this time-honored technique is now being challenged. In conjunction with age-appropriate comfort measures and with proper physical immobilization techniques, the newer helical CT scanners are allowing for brief imaging studies to be done without pre-medication. Many practitioners have questioned the wisdom and need for sedation for a CT scan that can be done almost as quickly as a chest radiograph.<sup>2,17,18</sup>

In summary, whether for medical or traumatic conditions, infant immobilization is frequently performed in hospital emergency departments and throughout pediatric treatment areas. Remembering that our smallest patients come to us with big heads and little bodies is crucial. Our understanding of the effects of pediatric anatomy and physiology on airway concerns is essential, as is our knowledge of proper cervical spine immobilization procedures. These factors, coupled with proper positioning techniques and devices, will help us optimize the safe and effective care that we provide as health care professionals.

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