Chapter 4

Positional and Restraint Asphyxia

Tom Neuman

INTRODUCTION

The use of physical restraint to control violent, uncooperative, or combat-ive individuals is to be expected in the law enforcement setting. Furthermore, the more violent, combative, or uncooperative an individual, the greater and greater degrees of force required to restrain such persons. When an individual dies under such circumstances, it becomes a legitimate question whether the restraint process or specific method itself had any causal relationship with the death or whether the death was predicated more upon the circumstances that led to restraint in the first place. Clearly, certain methods of restraint have been reported to be potentially harmful to individuals and as a result, certain “choke hold” maneuvers are no longer used by most police or law enforcement agen-cies because of the risk they apparently represent (1,2).

Similarly the “hogtie,” “hobble,” or maximal restraint position has also come under scrutiny as a possible factor in the deaths of individuals being brought into custody (3). In these positions, individuals are bound in the prone position with their arms handcuffed behind their backs and their knees flexed with their ankles bound together and then secured (with varying degrees of freedom) to the handcuffs (see Figs. 1 and 2). The literature includes multiple reports of deaths of individuals placed into these (or similar) positions, and the conclusion of some authors has been that the deaths were directly attributable to the restraint positioning (4–6). The rationale for this conclusion was that the position impaired the ability of the individual to breathe and ventilate to such a degree that hypoxemia (low oxygen levels in the blood) secondary to
Fig. 1. Hobble prone restraint position. The position is similar to the hogtie position, but there is greater distance between the wrist and ankles when secured together allowing less flexion of the knees.

Hypoventilatory failure occurred, and that the degree and duration of the hypoxemia was sufficient to cause death. With the understanding that this argument is predicated on certain pathophysiological processes taking place, it is worthwhile to review, albeit briefly, the normal physiology of the most important aspects of respiration.

**GAS EXCHANGE AND VENTILATION**

Ultimately, the process of asphyxiation is the death of the individual and the associated failure of critical organ systems owing to lack of oxygen delivery. The delivery of appropriate amounts of oxygen to the tissues of the body is dependent on a variety of factors. For the purposes of this chapter, the most important factor is that oxygen actually gets into the blood (oxygen transport from the blood to tissues is assumed). Oxygenation of the blood is in turn dependent on two major processes. First and foremost is ventilation. Adequate amounts of gas must be delivered to the lung tissue or alveoli in order for proper oxygenation of the blood to occur (movement of gas also requires that the airway is patent). Assuming adequate ventilation takes place, then appropriate gas