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CASE REPORT

PATHOLOGY/BIOLOGY

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Sleeping Accidents in the Elderly

ABSTRACT: Two cases of dangerous sleeping environments in the elderly are reported to demonstrate similarities and differences of these "sleeping accidents" to similar episodes that occur in infants and children. Case reports: An 87-year-old wheelchair-bound man with a history of dementia was found in his nursing home room hanging off the side of the bed from a vertical metal bar, and an 87-year-old woman with epilepsy, ischemic heart disease, and insulin-dependent diabetes mellitus was found in hospital wedged between an inflatable mattress and the bars of her bed. These cases demonstrate that, as in the very young, relatively poor coordination and strength in the elderly often with limited comprehension and ability to deal with dangerous environments may predispose to sleeping accidents. Significant underlying organic disease may, however, make determination of the precise lethal mechanisms difficult. Modification of beds should only be undertaken when safety issues have been carefully evaluated.

KEYWORDS: forensic science, asphyxia, hanging, bed, nursing home, product safety

Accidental asphyxia occurring in infants and young children in bed is not uncommon and may be due to a variety of circumstances including wedging and hanging associated with defective cots and other hazards (1,2). The term "sleeping accident" has been used to describe such occurrences, although as victims are not necessarily asleep at the time of the fatal episode, the term is somewhat of a misnomer. Lethal asphyxia in bed is less common in adults and is most often attributable to aspiration of gastric contents associated with underlying illness or intoxication or to positional asphyxia where respiration is compromised by abnormal positioning of a body. Accidental hanging is very rarely encountered in the adult sleeping environment. The following cases are reported to compare and contrast the features of such cases at the extremes of life and to comment on safety issues involved.

Case Reports

Case 1

An 87-year-old man who was a nursing home resident was found deceased lying on the side of his bed, suspended by his neck from a metal pole that was designed to assist with getting out of bed (Fig. 1). His past history included dementia, hypertension, and peripheral and cerebrovascular disease. He had a history of falls from his bed and was mobile only in a wheelchair. A vertical metal pole was present on each side of the bed connected by a frame that had been inserted under the mattress. The poles were incorrectly positioned too close to the head of the bed. At autopsy, a linear red mark was present on the left side of his neck corresponding to the position of the bar, associated with underlying bruising of the left side of the thyroid gland. Eyelid and conjunctival petechiae were present. There was evidence of coincidental underlying atherosclerotic vascular disease and chronic obstructive airways disease. Toxicological evaluation of blood revealed therapeutic levels of paracetamol and subtherapeutic levels of frusemide. Death was attributable to low suspension hanging from a metal bar that had been intended to assist the victim in moving to and from his bed.

Case 2

An 87-year-old woman who was in hospital following a successful surgical repair of a fractured right neck of femur was found deceased wedged between her inflatable mattress and the metal side railings of her bed. Her past history included ischemic heart disease, chronic obstructive airways disease, congestive cardiac failure, hypertension, chronic renal failure, a right mastectomy for carcinoma, peripheral and cerebrovascular disease, hyperlipidemia, and insulin-dependent diabetes mellitus. At autopsy, two parallel, approximately horizontal indentations were identified consisting of a 230-mm-long groove across her lower chest and 20 cm caudally, a 20-mm area of blanching with adjacent hyperemia on the right side of her neck. These were not associated with underlying subcutaneous or soft tissue bruising. The larynx was intact, and there were no facial or conjunctival petechiae. Significant underlying organic diseases that included marked coronary artery atherosclerosis with myocardial scarring, chronic obstructive airways disease, previous cerebrovascular accidents, hypertensive cardiac and renal disease were observed. Toxiocology was unremarkable. There was no elevation of vitreous humor glucose or β-hydroxy butyrate. Examination of the bed railings showed vertical metal bars that were 20 cm apart, corresponding to the markings on the body. Death was therefore attributed to possible positional asphyxia complicating ischemic heart disease, chronic obstructive airways disease, and epilepsy.

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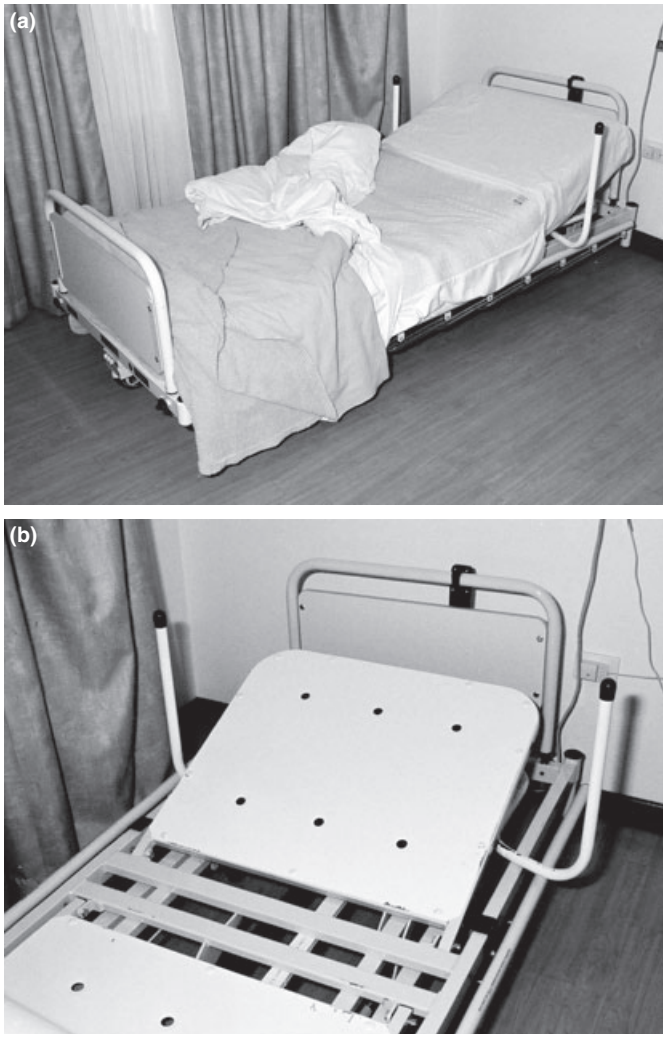

FIG. 1—*The bed in case 1 showing the position of the metal bars (a) with removal of the mattress to show their structure (b). Their position was maintained by the weight of the mattress and the incumbent.*

Discussion

Accidental asphyxia associated with sleeping environments is most often encountered in infants and young children and is because of a combination of factors including broken or defective cots, infants' poor understanding of danger, and their physical inability to deal with entrapment (1,2). The most common situations involve wedging between a mattress and a cot side or wall, and hanging. In addition, soft mattresses with excessive bedding may result in suffocation, plastic bags and bedding may occlude airways, and shared sleeping with an adult may result in lethal overlaying (3). The age range of victims is usually around 1 month to 3 years, with an average age of 10 months (2), although children with severe developmental delay are at risk of such events at older ages (4–6). Curious toddlers are also at risk of placing ligatures and cords around their necks with their poor coordination and balance predisposing them to falls and thus to hanging.

Adults are generally much safer in their beds as they are able to avoid or correct dangerous environments and are also able to extricate themselves from potentially injurious situations. Positional asphyxia may, however, occur if a body is lying in a position where the chest is splinted, diaphragmatic movement is impaired, and/or the airway is occluded (7). Individuals who succumb to positional asphyxia usually do not extricate themselves from the hazardous situation because of the impairment of their cognitive responses and coordination from a variety of conditions that include neurological diseases, intoxication, sedation, loss of consciousness, physical impairment, or physical restraints (7,8).

In case 1, accidental hanging had occurred when the victim had rolled out of bed and had been suspended by his neck from a metal bar that was designed to assist in getting into and out of bed. His debilitated physical state had prevented him from extricating himself, compounded by his dementia that may have interfered with his comprehension of the danger of his position. Cognitive impairment and a poor sense of orientation have also been found to be factors involved in falls in elderly nursing home residents (9). In addition, loss of consciousness from hanging is known to develop very rapidly (10–12) and may have occurred before the seriousness of the situation was appreciated by the victim. Of note, the bar should also have been much further down the bed and not near the head.

The second case demonstrates difficulties that may arise in determining the exact sequence of lethal mechanisms involved in such episodes in the elderly. While there was a definite history of entrapment between an inflatable mattress and metal side bars with neck and chest compression, there existed the possibility that entrapment was an agonal phenomenon and that death had been initiated by underlying conditions that included ischemic heart disease and possible epilepsy. This issue is less of a problem in the young who usually do not have underlying potentially lethal diseases. A problem that does occur at both ages involves the lack of diagnostic features of asphyxia owing to wedging (13,14). While parallel impressions on the neck and chest in case 2 were in keeping with the body's position when found, there were no facial or conjunctival petechiae to indicate that neck or chest compression had occurred during life as in case 1. Thus, in this case, positional asphyxia remained only a possibility. However, the fragility of the skin and subcutaneous tissues in the elderly, with a tendency for bruising, may make wedging and hanging events easier to diagnose than in the very young, given the tendency for skin markings to be present. Scene re-enactment and the careful comparison of skin markings with beds and devices at the death scene that are common in infant deaths may also be of use in the elderly.

Several issues arise out of this report. The first case demonstrates that elderly cognitively impaired individuals are in a similar risk category to the very young in terms of inadequately dealing with hazardous situations associated with their sleeping environment. For this reason, elderly individuals with health problems, as well as the young, need evaluation of their beds for possible dangers. Restraint harnesses and webbing should be installed carefully and monitored when in use. Devices such as the one described need to be assessed by product safety experts, with clear fitting instructions being provided. Given the entirely preventable nature of such deaths, identification of lethal outcomes associated with bed modifications and hazardous situations around beds is an important component of the forensic autopsy. The information derived will enable product safety evaluations to be undertaken with information being passed on to the relevant authorities with the aim of preventing further similar fatalities. The second case also not only reveals a potentially hazardous situation involving wedging between an inflatable mattress and metal bed side railings, but also demonstrates difficulties that may arise in determining whether death was attributable to an accident, to natural disease, or to a combination of factors. Compressibility of inflatable beds has been identified as a factor predisposing to accidental

suffocation in infants (15), and it also appears that devices designed to prevent the very young (6), and the very old, from falling out of bed may result in entrapment.

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