

CASE REPORT

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Airway Obstruction by a Ball

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ABSTRACT: A toddler died as the result of choking on a toy ball that occluded his upper airway. The size of this toy was within the federal safety standards for use by children under the age of three years. Though it has been recognized since 1987 that the minimum safe diameter set by the Federal Hazardous Substances Act may be too small, no change has been made to the regulation (1). In 1995 a comprehensive review of asphyxia related to the size of the foreign object found 4.44 cm diameter and 7.62 cm length a more comprehensive standard (1). Currently federal warning labels are required on some items that contain balls smaller than 4.44 cm to prevent use by children less than three years of age (2). The small parts fixture test in use by the federal government is available as a safety tool for parents to use at home. Unfortunately the “safe” diameter of 3.17 cm is too small to provide assurance that a toy is not a choking hazard.

KEYWORDS: forensic science, aspiration, foreign body, pediatric, small parts fixture test, forensic pathology, death

Aspiration of a foreign body is a significant problem among children under the age of three years. The most common category of objects is food, usually nuts, seeds, carrots, grapes, and hot dogs. However balloons, small toys, coins, and jewelry may be responsible for some of these chokings. Since 1979 the United States has had regulations in effect which ban interstate commerce of any toy or other article intended for use by children under the age of three years that presents a small parts choking hazard. This Consumer Products Safety Act of the Federal Hazardous Substances Act also provides for testing the size of the small part. There is a test cylinder called a Small Parts Test Fixture with a diameter of 3.17 cm (1.25 in.) and depth range of 2.54 to 5.71 cm (1 to 2.25 in.). Objects larger than these dimensions pass the small parts test. Some products are exempt from testing including balloons. Private companies market this testing cylinder to safety conscious parents to perform this quick test at home. However this provides a false sense of security since it promotes the notion that objects larger than the testing tube are safe for children under three.

In 1987 a recommendation was made to the United States Consumer Products Safety Commission to increase the diameter of the test cylinder to 4.27 cm. However after a review by the Commis-

sion, no change was made in the federal act (1). Rimell published a review analyzing the size of objects associated with choking in deaths from 1972 to 1989 (1). He found that five out of 101 objects met the current Federal safety standards for diameter (>3.17 cm) for use by children under the age of three years and yet were responsible for their deaths. In 1994, the Child Safety Protection Act was enacted by Congress. This act requires labeling for balls with a diameter of 4.44 cm (1.75 in.) or less if the toy is intended for children under the age of eight years. This only applies to United States manufacturers and not imported products, or products made in the U.S. exclusively for export. Also not addressed by this act are general use sports balls, such as ping pong or golf balls (The United States Consumer Product Safety Commission web site at www.cpsc.gov, 10/26/98).

This case report illustrates a situation where a young child had an upper airway obstruction from a ball, 3.4 cm in diameter.

Case Report

The decedent was a 27-month-old white male child residing at home with his biologic parents, both teachers. On the day of his death, he was with his family on the porch of their residence having dinner. Suddenly he ran toward his parents choking. His father attempted the Heimlich maneuver including back slaps, and his mother attempted to sweep the mouth. The child turned blue, became unconscious and then suffered a cardiopulmonary arrest. Responding emergency medical personnel found the child without a pulse, respirations, or blood pressure. They were initially unable to remove the foreign body from the hypopharynx where it had lodged. During transport to the hospital, they removed the object with a Macgill forceps.

Advanced cardiopulmonary resuscitation revived the child's heart and he survived six days in the hospital. Unfortunately the prolonged asphyxial event caused severe brain injury and ultimately brain death. He succumbed to anoxic encephalopathy.

Law enforcement investigation revealed appropriate parental supervision. Medical evaluation revealed no other injuries or disease. An examination of the body at the medical examiner's office revealed a young child, 36 in. tall, and weighing approximately 30 lb. He had undergone organ donation. Aside from medical intervention, no other abnormalities were noted.

The obstructing object was a rubber ball 3.4 cm in diameter (Fig. 1). A safety tube to check the dimensions of the toy in accordance with Federal safety standards is seen in the next figure (Fig. 2). It is obvious that the ball's diameter exceeds the opening of the small parts fixture test tube (Fig. 3).

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FIG. 1—The ball removed from the hypopharynx of the young victim.

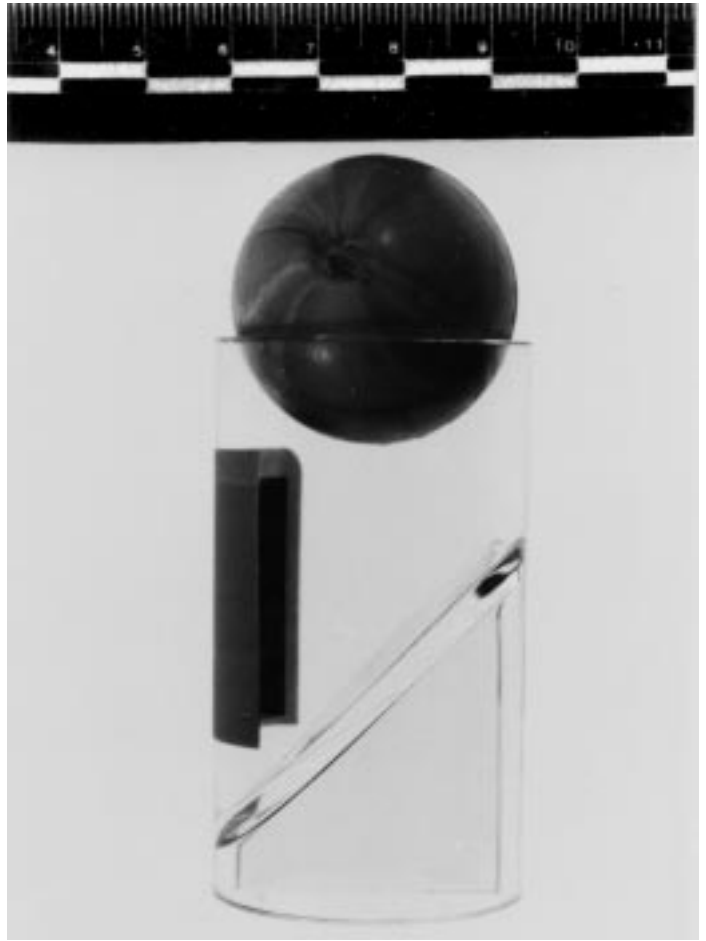
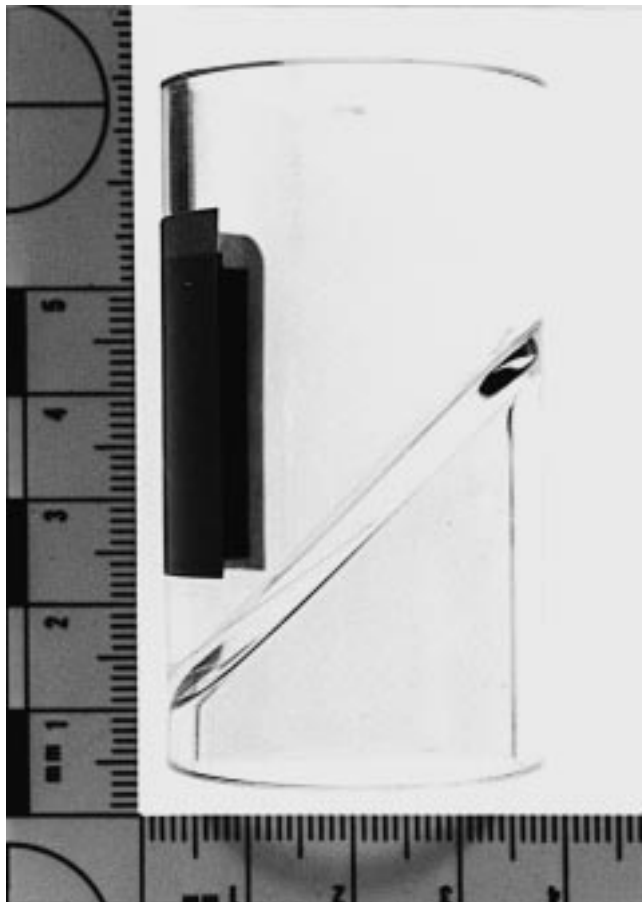


FIG. 3—The size of the ball exceeds the opening diameter of the small parts test cylinder.



WARNING: Contains small parts which may be hazardous to children under age 3.
ATTENTION: Contient de petites pièces pouvant être dangereuses pour des enfants de moins de 3 ans.
ADVERTENCIA: Contiene partes pequeñas que podrían ser peligrosas para los niños menores de 3 años.

FIG. 4—Federal warning present on toys that contain parts smaller than 3.17 cm in diameter or 5.71 cm in length.

← FIG. 2—The small parts test fixture, a tube used to check the dimensions of small toys to determine if the toy is safe for use by a child under the age of three years.

Discussion

Aspiration of foreign objects caused the death of 465 children under the age of 14 in 1980 (3). By 1985 this number had decreased to 324 (4). Approximately 250–300 deaths occur annually in children under the age of four due to choking on food or other foreign objects (5). Education campaigns have been shown to be an effective method to reduce the incidence of this childhood injury (6). The United States government has attempted to make toys and other articles used by young children safer by regulating the size of the parts. If objects do not pass the small parts test then consumers see the familiar warning labels to prevent use of the product by children younger than three years (Fig. 4). However, even objects larger than the Federally mandated minimum pose a choking hazard for young children.

The Federal Government has attempted to address this special issue of the choking hazard of small balls by requiring warning labels on any toy or game containing an accessible ball that measures less than 4.44 cm (1.75 in.) in diameter if intended for use by children less than eight years old. However many products are exempt including general sports balls. In this case the ball measured 3.4 cm in diameter. The small parts test fixture is now marketed as a safety device to help parents and caretakers assess the safety of small toys and objects in their home. If the toy can fit into the device it is considered small enough to be a choking hazard to young children. The ball in this case does not fit inside the tube but clearly sits completely outside the tube. Thus this toy would be considered safe ac-

ording to this test. By using this testing tube parents may be provided with a false sense of security and an unrealistic comfort about the safety of their home environment.

Acknowledgments

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