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### The choking game and other asphyxial games in children and adolescents

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**INTRODUCTION** — Unintentional injury is the leading cause of death in children, adolescents, and young adults in the United States [1]. Unintentional injury often results from risk-taking behavior such as alcohol or drug use. Self-induced hypoxia (eg, the playing of asphyxial games, such as "the choking game") is another risky behavior among children and adolescents that may have a fatal outcome.

#### DEFINITIONS

**The choking game** — The choking game is defined as self-strangulation or strangulation by another person with the hands or a ligature to produce a euphoric state caused by cerebral hypoxia [2]. Breath holding and/or compression of the abdomen or thorax are involved in some versions of the game [3-6]. The plan is to release the pressure just before loss of consciousness, but failure to do so can result in death, particularly when the game is played alone using ligatures [2,3,5,7].

**Other names** — Other names for the choking game include: the American dream, air planing, black hole, black out game, California choke, cloud nine, dream game, fainting game, flat lining, funky chicken, gasp game, knock out game, pass out game, purple dragon, purple hazing, the scarf game, something dreaming game, space cowboy, space monkey, suffocation roulette, and the tingling game [2,4,7-11].

**Autoerotic asphyxia** — Autoerotic asphyxia is a similar activity that involves choking oneself during sexual stimulation in order to heighten the sexual pleasure [7,12]. Autoerotic asphyxia may involve elaborate bindings, sophisticated escape mechanisms, sexual images, or cross-dressing [3]. Death may occur if loss of consciousness leads to loss of control and inability to reverse or stop the means of strangulation [7]. Participants of autoerotic asphyxia are almost exclusively older adolescent and adult males [3,4].

#### EPIDEMIOLOGY

**Prevalence** — Asphyxial games are played throughout the world; fatal and nonfatal cases have been reported from the United States, Canada, Australia, Israel, France, England, and Ireland [3,4,13,14]. According to some reports, asphyxial games have been played for generations [3,7,9]; however, the first mention of the choking game in the medical literature occurred in 2000 [2].

There is little information about how many children and adolescents engage in asphyxial games. The playing of such games typically comes to light only when complications occur, and even then, the attribution of complications to asphyxial games is likely to be underreported; death certificates lack the detail necessary to distinguish death related to asphyxial games from other causes of unintentional strangulation [2,3,7]. In the 2006 Youth Health Risk Behavioral Survey from one county in Ohio, 11 percent of children and adolescents aged 12 to 18 years and 19 percent of adolescents aged 17 to 18 years reported ever having played the choking game [2].

Whether there has been a change in the number of children engaging in asphyxial games is uncertain [2,3]. Changes in the numbers of deaths related to the choking game reported in the media may be related to changes in the news media's level of interest, changes in choking game activity, or changes in awareness of the choking game by emergency and health care providers [3].

**Mortality** — The United States Centers for Disease Control and Prevention (CDC) used media reports to estimate the incidence of choking game-related deaths among children and adolescents <20 years of age between 1995 and 2007 [2]. Cases were included only if the death was described in a news report and resulted from self-strangulation or strangulation by another person as part of an activity with elements of the choking game as described above. Deaths were excluded if the news story indicated that the medical examiner ruled the death a suicide or of undetermined intent or if it included any mention of autoerotic asphyxiation. The report included the following observations:

- 82 probable choking game-related deaths were identified; deaths occurred in 31 states with no evident geographic clustering or variation by season or day of the week.
- <3 deaths per year were reported between 1995 and 2004; 22 were reported in 2005, 35 in 2006, and 9 in 2007.
- The deaths occurred in children aged 6 to 19 years, with a mean and median age of 13.3 and 13 years, respectively; 87 percent of deaths occurred in boys.
- The age distribution of choking game deaths is similar to that for deaths attributed to all types of unintentional choking/suffocation [15], but differs from that of suicide by hanging/suffocation ([show figure 1](#)).
- Among deaths for which sufficient detail was reported, 96 percent occurred while the decedent was alone.
- Among deaths for which sufficient detail was reported, 93 percent of parents were not aware of the choking game until the death of their child.

- Information regarding drug use, race/ethnicity, socioeconomic status, and the role of influence by peers or the media/Internet was not available.

The CDC findings are subject to limitations inherent in using news media for case findings. These include incomplete ascertainment of cases, inability for independent verification of case details, attribution of deaths to causes or intents other than those recorded on the death certificate, and lack of information about nonfatal injuries [2]. Nonetheless, a series of 24 deaths attributed to asphyxial games by medical examiners confirms that choking game-related fatalities typically occur among boys between the ages of 9 and 15 years [3].

**PATHOPHYSIOLOGY** — The pathophysiologic effects of asphyxial games have not been well studied. Several mechanisms, including cerebral hypoxia and hypoperfusion, cerebral vascular engorgement, decreased cardiac output (related to increased thoracic pressure), and hypercarbia have been postulated to play a role in loss of consciousness and other clinical manifestations [4,7,9,13,16]. After loss of consciousness, when the pressure is released, there may be a secondary "high" related to the rush of blood and oxygen to the brain [7].

**Cerebral hypoxia** — Several elements of the choking game may result in cerebral hypoxia. These include breath holding, external limitation of chest wall expansion, and compression of the carotid arteries [13]. Compression of the carotid sinuses further reduces cerebral oxygenation through reflex bradycardia and vasodilation [13].

Acute severe hypoxia can cause loss of consciousness in 10 to 20 seconds, permanent brain damage in 3 minutes, and death in 4 to 5 minutes [17]. Hypoxia that is less severe can cause impaired judgment, drowsiness, dulled pain sensation, excitement, disorientation, and headache [17]. Other symptoms of hypoxia include anorexia, nausea, vomiting, tachycardia, and tachypnea; hypertension occurs when hypoxia is severe.

**Hypoperfusion** — The effects of arrest of cerebral circulation were evaluated in a study that was performed before the Belmont Report (which outlines ethical principles and guidelines for the protection of human subjects) [18]. Complete arrest of cerebral circulation for 5 to 10 seconds resulted in a rapidly reversible loss of consciousness and convulsive syncope that was preceded by an aura of visual blurring and constriction; upon recovery of consciousness, many of the subjects were described as excited, euphoric, and having a foolish smile on their face.

**EEG correlates** — Cerebral hypoperfusion and hypoxia are associated with initial slowing of the background on electroencephalogram (EEG), followed by high-amplitude delta activity [13]. Loss of consciousness, with flattening of the EEG background, occurs if hypoperfusion and hypoxia persist [19].

**CLINICAL FEATURES** — It is not clear what motivates children to play the choking game. Possible motivating factors include: peer pressure, risk- or thrill-seeking behavior, and the possibility of a drug-free "high" [3,4]. In some cases, playing the game may start as a social activity, but then progresses to playing alone [8].

It has been suggested that two types of adolescents may be predisposed to participation [3]. The first group is composed of athletic and average to above-average students who would ordinarily avoid alcohol and drugs; such participants appear to be unaware of the dangers of the choking game (perhaps holding the incorrect belief that the euphoria is safe because it is drug-free). The second group consists of adolescents with limited access to drugs or alcohol who may use the game as a means to "self-medicate" problems such as anxiety or depression.

**Presentation** — Children and adolescents who engage in asphyxial games usually do not come to medical attention unless they have suffered a complication of asphyxia, the most serious of which include neurologic injury (eg, coma, seizures, stroke, brain damage) and death [2,13]. The risk of death and neurologic injury are increased when asphyxial games are played alone and when ligatures are used [2,3,5]. (See "Evaluation of stupor and coma in children" and see "Treatment and prognosis of coma in children").

The presenting complaints of children with less severe episodes of hypoxia whose findings ultimately are attributed to self-induced hypoxia may include [2,4,7,13]:

- Recurrent confusional episodes and seizure-like events. (See "Nonepileptic paroxysmal disorders in children").
- Syncope or recurrent syncope, possibly associated with head trauma or other injuries. (See "Causes of syncope in children and adolescents" and see "Emergent evaluation of syncope in children and adolescents").
- Paroxysmal episodes of altered awareness.
- Acute vision changes or visual loss, resulting from Valsalva retinopathy, characterized by intraretinal and subretinal hemorrhage over the macula [6,20].

**Warning signs** — Potential warning signs that an adolescent is engaging in the choking game include [2,7,8,11]:

- Mention of the "choking game" (by this or other names) (See "Other names" above)
- Marks on the neck
- Wearing high-necked shirts, even in warm weather
- Bloodshot eyes
- Petechiae on the face, especially the eyelids or conjunctiva
- Frequent, severe headaches
- Disorientation after spending time alone
- Unusual need for privacy
- Increased and uncharacteristic irritability or hostility
- The unexplained presence of dog leashes, choke collars, bungee cords, etc
- Ropes, scarves, and belts tied to bedroom furniture or doorknobs, or found knotted on the floor
- Wear marks on bedposts and closet rods

**EVALUATION** — When considering asphyxial games as the precipitant of asphyxia-related complications (eg, loss of consciousness), it is critical to take a careful history [3,4]. It may be necessary to interview siblings, friends, and other associates of the patient. The parents often are unaware of their child's participation in asphyxial games until medical intervention becomes necessary.

Video-EEG monitoring was useful in a case in which the patient presented with recurrent seizure-like events [13]. During monitoring, the patient was observed to hold his breath and use his hands to compress his carotid arteries. Within 5 seconds, this behavior was followed by EEG changes consisting of bursts of generalized polymorphic delta-theta slowing that resolved when the patient returned to a normal breathing pattern.

In cases of death, evaluation of the death scene may provide subtle clues to the mechanism of injury [3]. With the permission of the caregivers, examination of journals, diaries, and computers also may provide important information.

**DIFFERENTIAL DIAGNOSIS** — The differential diagnosis for children who present with complications related to the choking game may include syncope, traumatic asphyxia (intentional or unintentional), seizures, brain tumor, cardiac dysrhythmia, and substance abuse. (See "Causes of syncope in children and adolescents" and see "Emergent evaluation of syncope in children and adolescents").

**MANAGEMENT** — The management of children and adolescents who engage in asphyxial games depends upon the method of presentation. Acute management for those who are found unconscious necessitates aggressive resuscitation and treatment of postanoxic brain injury; with such measures, full recovery is possible [21-26]. Initial treatment is focused on ensuring cerebral oxygenation and lowering increased intracranial pressure [22]. A good response to initial resuscitation is an important prognostic factor for eventual recovery [25]. Stabilization of children with critical injuries is discussed separately. (See "Classification of trauma in children", see "Initial approach to severe traumatic brain injury in children", and see "Treatment and prognosis of coma in children").

Psychiatric consultation is generally warranted for children and adolescents who survive near-hanging injuries [22]. Neuropsychiatric evaluation is necessary to assess for possible residual sequelae [25].

Referral to a mental health provider is also usually warranted for children and adolescents who play asphyxial games alone and those who appear to be using the game as a means of self-medication.

**PREVENTION** — Until there is better information regarding the epidemiology of asphyxial games (eg, prevalence, risk factors, protective factors), prevention efforts must focus on increasing public awareness of such games and the very real risk of death when such games are played [2,3].

We recommend children and adolescents receive education regarding the dangers of asphyxial games, emphasizing that there is no way to safeguard against serious complications or death. Educational interventions to prevent or reduce participation in asphyxial games have not been studied. However, counseling interventions have been demonstrated to prevent or reduce other behaviors with health risks (eg, tobacco use during pregnancy, risky sexual behavior) [27-30]. A framework for identifying health risks in adolescents and working with the adolescent to develop a management plan is presented separately. (See "Guidelines for adolescent preventive services", section on Strategy for provision of adolescent preventive services).

Improved mortality surveillance, with proper attribution of deaths to asphyxial games rather than suicide or unintentional hanging, may help to identify interventions aimed at reducing or eliminating participation in choking games, and choking game-related deaths [2].

**Resources** — Web sites devoted to increasing awareness of asphyxial games include:

- CDC Features. The Choking Game: Risky Youth Behavior

([www.cdc.gov/Features/ChokingGame/](http://www.cdc.gov/Features/ChokingGame/))

- Games Adolescents Shouldn't Play ([www.stop-the-choking-game.com](http://www.stop-the-choking-game.com))
- "The Choking Game" Advocating Education of the Dangers ([www.chokinggame.net](http://www.chokinggame.net))

## SUMMARY AND RECOMMENDATIONS

- The choking game is defined as self-strangulation or strangulation by another person to produce a euphoric state by reducing cerebral oxygenation. Failure to release pressure before loss of consciousness can result in serious neurologic injury or death, particularly when the game is played alone. (See "The choking game" above).
- Deaths related to asphyxial games are most common in teenage boys (median age 13 years) who play the game alone. (See "Epidemiology" above).
- Loss of consciousness may occur within seconds of strangulation and death may occur within minutes. (See "Cerebral hypoxia" above).
- Presenting complaints of children with less severe episodes of hypoxia whose findings ultimately are attributed to self-induced hypoxia may include confusional episodes, seizure-like events, syncope, paroxysmal episodes of altered awareness, acute visual loss, and neurologic injury. (See "Presentation" above).
- When considering asphyxial games as the precipitant of asphyxia-related complications, it is critical to take a careful history; it may be necessary to interview siblings, friends, and other associates of the patient. Video-electroencephalographic monitoring may be useful in patients with paroxysmal episodes. (See "Evaluation" above).
- Children and adolescents who are found unconscious require aggressive resuscitation and treatment of postanoxic brain injury. With such measures, full recovery is possible. Referral to a mental health provider is usually warranted for children who engage in asphyxial games. (See "Management" above).

- We recommend that children and adolescents receive education regarding the dangers of asphyxial games (**Grade 1B**). The education should stress that there is no way to safeguard against serious complications or death. (See "Prevention" above).

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