

Recognition and Documentation of Strangulation Crimes

A Review

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IMPORTANCE Strangulation accounts for 10% of violent deaths in the United States and 15% to 20% of deaths associated with domestic violence. However, strangulation deaths represent only a small fraction of nonfatal strangulation assaults, which occur with daily frequency in medium to large US cities. Careful evaluation and documentation of strangulation injuries may identify life-threatening medical conditions, and may facilitate prosecution of strangulation crimes.

OBSERVATIONS The most recent article on strangulation identified in the otolaryngology literature was published in 1989, leaving a generation of head and neck surgeons without current guidance regarding this injury. However, strangulation is a common form of intimate partner violence. Among the 300 cases of strangulation reviewed in San Diego in 1995, most survivors (94%) were women who were strangled by a male member of their own household. Many state laws require evidence of injury to prosecute felony strangulation, but as shown in the review of 300 cases, most survivors (97%) were strangled with the perpetrator's hands, leaving little to no sign of injury in most cases. Survivors may seek an otolaryngology consultation with complaints of hoarseness, sore throat, respiratory disturbance, or accidental injury to the neck. A thorough head and neck examination may reveal marks on the neck, facial petechiae, and neck swelling. Fiberoptic laryngoscopy is recommended to look for petechiae and swelling in the airway. Chest radiographs may demonstrate postobstructive edema, and computed tomography of the neck may demonstrate vascular injuries. The most sensitive test for subtle strangulation injuries is magnetic imaging of the neck. Careful examination and documentation can provide critical evidence for the prosecution of these crimes.

CONCLUSIONS AND RELEVANCE Otolaryngologists should be knowledgeable of the subtle patterns of injury and potentially life-threatening complications of strangulation and should consider domestic violence in women presenting with throat complaints or bruises on the neck.

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Any person who, without consent, impedes the blood circulation or respiration of another person by knowingly, intentionally, and unlawfully applying pressure to the neck of such person resulting in the wounding or bodily injury of such person is guilty of strangulation, a Class 6 felony.
-Code of Virginia § 18.2-51.6.

In the Commonwealth of Virginia, felony strangulation is defined as intentional obstruction of blood circulation or respiration by application of pressure to the neck, resulting in wounding or bodily injury (Code of Virginia § 18.2-51.6). However, studies of strangulation survivors indicate that most survivors do not have documented injuries, and many do not seek medical care. For those who do seek help, an otolaryngologist can play a critical role in the evaluation and forensic examination of the survivor. However, there is very little research on strangulation injuries outside of the disciplines of forensic pathology and emergency medicine. We have found only 1 major case series

of strangulation injuries (112 fatal, 59 nonfatal) described in the otolaryngology literature.¹ In the 30 years since that publication, we have found only 1 single case report of strangulation in an otolaryngology journal.² This review was prompted when one of the authors (M.A.) was consulted as an expert witness in a strangulation trial.

Report of Cases

Case 1

A woman in her 30s was picking up her child from her estranged husband when an argument erupted. He threatened to kill her and squeezed her neck with his thumbs across her trachea, pressing down on her carotid arteries until she lost consciousness. When she recovered, he placed her in a choke hold with his arm around her

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neck. A bystander interrupted the assault and allowed the wife to escape. The police took her reluctantly to a local emergency department, where she was evaluated and photographed by a forensic nurse examiner. The patient initially complained of difficulty breathing, hoarseness, sore throat, and dysphagia. A computed tomograph (CT) of the neck was negative, and symptoms were resolving. She was discharged without follow-up.

Case 2

In an unrelated case, a woman in her 20s was seen in an emergency department. She reported that she was brutally beaten by her husband and dragged by the neck, but she did not mention being "choked." She complained of pain in the neck, face, and ribs and had multiple contusions. The emergency department physician documented pain, tenderness, and a small abrasion on the neck. No photographs were taken. A CT of the neck was negative, and she was released.

Case Follow-up

In the first case, the forensic nurse examiner clearly documented the history and physical examination results but was not permitted to testify as an expert. The emergency department physician had not documented any injury. The expert witness (M.A.) testified that the medical findings were consistent with strangulation, but acknowledged that the medical records alone could not prove strangulation. The husband pled guilty to misdemeanor assault, but was acquitted on the felony strangulation charge because the prosecution was unable to prove that an injury occurred as a result of the strangulation.

In the second case, the defendant pled guilty to domestic violence—a class 6 felony because it was his third such conviction. However, the treating emergency department physician was not willing to testify to strangulation based on the medical record. The prosecuting attorney accepted the guilty felony plea for repeated domestic assault and dropped the strangulation charge.

Historical Context

After the murders of 2 teenage girls in San Diego, California, the San Diego City Attorney's office conducted an extensive study of 300 "choking" cases submitted for misdemeanor prosecution.³⁻⁵ Before their murders, each teenager had previously reported to police that she had been choked, but neither case had been prosecuted. This study resulted in a series of articles on strangulation that was published in the *Journal of Emergency Medicine* in 2001.³⁻⁸ The San Diego Family Justice Center⁹ was opened in 2002, followed by the Training Institute on Strangulation Prevention^{10,11} in 2011 to formally educate police investigators and health care workers in the evaluation and prevention of strangulation injuries (a documentation chart for nonfatal strangulation for use by health care professionals is shown in **Figure 1** and **Figure 2**). As experts in soft-tissue surgery and injuries of the neck, otolaryngologists should be cognizant of the patterns of injury and the symptoms of strangulation. Otolaryngologists should be prepared to evaluate these patients and to testify on their behalf when needed.

Definitions

Strangulation is generally defined as the sustained impairment of air or blood flow through the neck as a result of external pressure.

Obstruction of air or blood flow through the neck can result in *asphyxia*, which is an injury or medical condition caused by hypoxia. Strangulation should be distinguished clinically from *choking*, which most properly refers to an internal obstruction of the airway, such as a foreign body, mass, or laryngospasm. Other causes of asphyxia include drowning due to immersion in a liquid, suffocation from directly covering the airway, and environmental oxygen deprivation, such as from combustion or an enclosed space.

Strangulation is categorized among 4 principal methods. *Manual strangulation*, or *throttling*, is performed by applying direct pressure with the hands or arms around the neck. Manual strangulation accounts for most cases of strangling in domestic assaults.³ *Ligature strangulation*, or *garroting*, is performed by tightening a cord or a ropelike ligature around the neck. *Hanging* is defined as suspending the body weight from a cord or a ropelike ligature around the neck. *Postural strangulation* has also been described, in which body weight or pressure against an object causes pressure on the neck without a ligature.

Pathophysiologic Features

Strangulation may occur with occlusive pressure that impedes ventilation, arterial blood flow, or venous return. The probability of injury or death depends on the location, duration, and amount of pressure applied. Well-placed massage directly to the carotid body can cause instantaneous syncope and cardiac dysrhythmia through vagal reflexes. More commonly, throttling assaults result in diffuse circumferential compression of the internal and external jugular veins. The Training Institute on Strangulation Prevention¹¹ teaches that venous compression is easily achieved with about 2 kg of manual force applied to the lateral neck, and the carotid arteries can be occluded with 5 kg of force applied to the anterior neck, compressing the arteries against the lateral processes of vertebrae C4-C6. About 15 kg of force can compress the trachea, and 30 kg can compress the vertebral arteries. However, these numbers are not based on manual strangulation, but on cadaver studies of hanging performed by French forensic pathologist Paul Brouardel in 1897.¹² The actual force required to compress vascular structures will vary significantly depending on the thickness of the neck and the strength of the neck musculature.⁵ Pressure equals force divided by the surface area; intuitively, direct thumb pressure of only 3 psi on the carotid arteries should exceed a systolic blood pressure of 155 mm Hg. Head and neck surgeons should be aware that the jugular veins can be painlessly compressed during manual examination of the neck.¹³ By contrast, an automotive safety study demonstrated that fresh cadaver larynxes can sustain a static weight of 16 kg without fracture.¹⁴ We can conclude that airway compression is less likely than vascular compression, but it can be achieved easily by an assailant placing his body weight on the anterior neck of the victim or by use of a ligature. If the force is applied over a very narrow surface area—a clothesline ligature as opposed to a broad belt, for example—then much less force is necessary. Brouardel¹² also demonstrated convincingly that hanging generally does not injure the trachea or the larynx because the noose invariably slides above the larynx to the mandible and compresses the soft tissues in the hypopharyngeal airway.

Although hanging is no longer a common method of capital punishment in the United States, the selfie generation has provided

Figure 1. Documentation Chart for Nonfatal Strangulation—History

History:

How was the patient strangled?

One hand (R or L) Two hands Forearm (R or L) Knee/Foot

Ligature (Describe): _____

How long? ____ seconds ____ minutes or Can't remember?

From 1 to 10, how hard was the suspect's grip? (low): 1, 2, 3, 4, 5, 6, 7, 8, 9, 10 (high)

Continuous pressure? Increased pressure?

From 1 to 10, how painful was it? (low): 1, 2, 3, 4, 5, 6, 7, 8, 9, 10 (high)

Multiple attempts: _____ Multiple methods: _____

Could the patient breathe, talk and/or scream?

Is the suspect **RIGHT** or **LEFT** handed? (Circle one)

What did the suspect say while he was strangling the patient, before and/or after?

Was she simultaneously smothered while being strangled? Shaken? Straddled? Restrained?

Head pounded against wall, floor or ground? (Possible concussion)

Where did the incident occur (Any corroborating evidence/possible sexual assault)?

Any visual changes (describe)?

Any hearing changes (describe)?

Any breathing changes (describe)?

Any changes in consciousness (describe)?


What did the patient think was going to happen?

How or why did the suspect stop strangling her?

Any witnesses?

What was the suspect's demeanor? Describe suspect's facial expression during strangulation?

Describe prior strangulation? Prior domestic violence? Prior threats? Prior intimidation?

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Adapted with permission from the Training Institute on Strangulation Prevention and California District Attorneys Association.¹⁰

unexpected new insight into death by strangulation. By reviewing video recordings of 14 fatal hangings (4 suicidal, 1 homicidal, and 9 erotic), the Working Group on Human Asphyxia¹⁵ observed that victims lost consciousness within about 10 seconds of vascular occlusion. Almost simultaneous onset of convulsions was followed by a decerebrate rigidity that progressed to decorticate rigidity within the first minute. Respiratory effort and breathing sounds continued for about 2 minutes, at which time the body was generally flaccid, except for isolated muscle twitches that were observed for about 4 minutes after hanging. The continuation of respiratory sounds

confirmed that airway obstruction was not the initial cause of asphyxiation and death in most cases.¹⁵

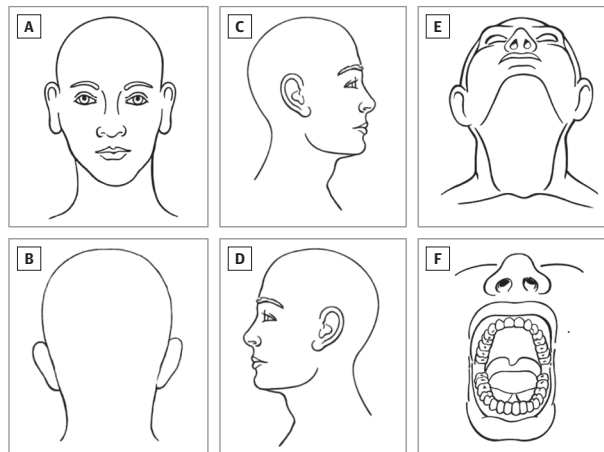
The physiology of strangulation is completely different from the desaturation that occurs during a difficult intubation or airway emergency. While a well-oxygenated, apneic adult may sustain tissue oxygenation for more than 2 minutes, bilateral carotid artery occlusion can cause brain damage within this time.¹³ As with reconstructive flap failures, venous occlusion causes not only ischemia but also engorgement of the blood vessels and extravasation into the tissues (petechiae). Petechiae occur within 20 to 30 seconds of bilateral

Figure 2. Documentation Chart for Nonfatal Strangulation—Physical Examination

Physical Examination

Breathing Changes	Voice or Vision Changes	Swallowing Changes	Behavioral Changes	Other
<input type="checkbox"/> Difficulty breathing <input type="checkbox"/> Hyperventilation <input type="checkbox"/> Unable to breathe Other:	<input type="checkbox"/> Raspy voice <input type="checkbox"/> Hoarse voice <input type="checkbox"/> Coughing <input type="checkbox"/> Unable to speak <input type="checkbox"/> Vision changes	<input type="checkbox"/> Trouble swallowing <input type="checkbox"/> Painful to swallow <input type="checkbox"/> Pain to throat <input type="checkbox"/> Nausea/vomiting <input type="checkbox"/> Drooling	<input type="checkbox"/> Agitation <input type="checkbox"/> Amnesia <input type="checkbox"/> PTSD <input type="checkbox"/> Hallucinations <input type="checkbox"/> Combativeness	<input type="checkbox"/> Dizzy or faint <input type="checkbox"/> Headaches <input type="checkbox"/> Urination <input type="checkbox"/> Defecation <input type="checkbox"/> Hearing changes

Use diagrams to mark visible injuries



Face <input type="checkbox"/> Red or flushed <input type="checkbox"/> Pinpoint red spots (petechiae) <input type="checkbox"/> Scratch marks	Eyes and Eyelids <input type="checkbox"/> Petechiae to R and/or L eyeball (circle one) <input type="checkbox"/> Petechiae to R and/or L eyelid (circle one) <input type="checkbox"/> Bloody red eyeball(s)	Nose <input type="checkbox"/> Bloody nose <input type="checkbox"/> Broken nose (ancillary finding) <input type="checkbox"/> Petechiae	Ear <input type="checkbox"/> Petechiae (external and/or ear canal) <input type="checkbox"/> Bleeding from ear canal	Mouth <input type="checkbox"/> Bruising <input type="checkbox"/> Swollen tongue <input type="checkbox"/> Swollen lips <input type="checkbox"/> Cuts/abrasions (ancillary finding)
Under Chin <input type="checkbox"/> Redness <input type="checkbox"/> Scratch marks <input type="checkbox"/> Bruise(s) <input type="checkbox"/> Abrasions	Chest <input type="checkbox"/> Redness <input type="checkbox"/> Scratch marks <input type="checkbox"/> Bruise(s) <input type="checkbox"/> Abrasions	Shoulders <input type="checkbox"/> Redness <input type="checkbox"/> Scratch marks <input type="checkbox"/> Bruise(s) <input type="checkbox"/> Abrasions	Neck <input type="checkbox"/> Redness <input type="checkbox"/> Scratch marks <input type="checkbox"/> Fingernail marks <input type="checkbox"/> Bruise(s) <input type="checkbox"/> Swelling <input type="checkbox"/> Ligature mark	Head <input type="checkbox"/> Petechiae <input type="checkbox"/> Hair pulled <input type="checkbox"/> Bump <input type="checkbox"/> Skull fracture <input type="checkbox"/> Concussion

To All Health Care Providers: Having been advised of my right to refuse, I hereby consent to the release of my medical/dental records related to this incident to local law enforcement, my attorney, my advocate, the District Attorney's Office and/or the City Attorney's Office.

Patient Signature: _____ Date: _____

Adapted with permission from the Training Institute on Strangulation Prevention, *The Investigation and Prosecution of Strangulation Cases*, Appendices 71,72. <https://www.cdaa.org/wp-content/uploads/Strangulation-Manual.pdf>

Adapted with permission from the Training Institute on Strangulation Prevention and California District Attorneys Association.¹⁰ PTSD indicates posttraumatic stress disorder.

venous occlusion and may be more immediately damaging to the brain than arterial compromise.¹³ Based on the observations of seizures and posturing among the video recordings, it appears that brain injury occurs within the first minute of hanging.¹⁵ Among survivors, cerebral edema may result in subsequent brainstem herniation and further injury. Survivors may also develop anoxic encephalopathy days after the injury. The most sensitive areas of the brain include the hippocampus, dentate nucleus, and cerebellar Purkinje cells. Persistent vegetative coma or brain death may ensue while other body systems continue to function.⁵

Clinical Evaluation of the Survivor

Symptoms and physical findings after strangulation may be difficult to detect without specific training and careful examination. The seriousness of the internal injury may take hours to be appreciated, and delayed death has been reported.⁵ In a study of 300 domestic violence cases³ in which the survivor reported being choked, 67% of victims reported no symptoms after the incident. Only 18% of patients reported pain and 5% reported changes in breathing. Only 2% reported difficulty with swallowing and only 1% reported voice changes. Most patients had no visible injury on

physical examination by the police officer, and only 15% (45 of 300 patients) had injuries that were visible in photographs. Most survivors (95%) did not seek medical attention within the first 48 hours.³

Those who do seek medical attention may complain of difficulty breathing, neck pain, sore throat, and/or dizziness. At least one-third complain of hoarseness, dysphagia, neck swelling, and tinnitus. In another study,⁷ only 7 of 41 survivors referred to a hospital-affiliated women's shelter recalled loss of consciousness. Loss of consciousness and loss of bowel or bladder continence are indicative of brain dysfunction and potentially lethal strangulation.¹⁶ Loss of consciousness may be underestimated by victims, because a victim is by definition unaware when fully unconscious. Anxiety or hyperventilation may be discounted by medical personnel, and hoarseness may be incorrectly attributed to screaming or to tobacco use. Delayed complications may include insomnia, anxiety, depression, and other symptoms of posttraumatic stress disorder.⁴ Swelling in the neck and airway compromise may develop up to 48 hours later. Stanley and Hansen¹⁷ described 3 strangulation survivors who presented 1 to 4 days after the strangulation attempt. Two had laryngeal fractures and one had an abscess. Kuriloff and Pinkus² described another patient who presented with stridor and a neck abscess 36 hours after being strangled. None of these 4 patients had recognized injuries immediately after the assault, but all 4 required an emergency tracheotomy.^{2,17} Overnight hospital observation is recommended to monitor the airway, evaluate for mental health issues, consult social services, and make plans for future safety. Further evaluation by neurosurgery or otolaryngology may also be indicated.¹⁸

Results of a physical examination may reveal petechiae in the skin, conjunctiva, or other mucosal surfaces. Petechiae may be caused by asphyxia from strangulation, aspiration, suffocation, drowning, or any number of causes. The presence of petechiae does not prove strangulation, but in the presence of a clinical history of strangulation, petechiae are a sign of a serious, life-threatening attack.^{16,19} Contusions may be visible from the assailant's fingers and especially the thumbs, which are the strongest part of the hand. Fingernail scratches may be present from the victim's defensive efforts. Ligature marks are characteristic of the object used and will typically be horizontal in ligature strangulation cases but travel obliquely in the case of hanging. The presence of these findings does not prove strangulation, and the absence of these findings does not exclude the possibility of strangulation, even in fatal cases.^{5,20} Photographic documentation of even the smallest lesions can be critical in criminal trials.

Diagnostic testing may include immediate pulse oximetry and chest radiography to exclude postobstructive pulmonary edema. Any patient with hoarseness, respiratory distress, or neck swelling should undergo evaluation with fiber-optic laryngoscopy or a CT scan of the neck to assess the airway and to rule out a soft-tissue hematoma. The patient should be intubated if progressive airway swelling or respiratory distress is present. If vascular injury or thrombosis is suspected, a CT arteriogram of the neck is more sensitive than carotid Doppler ultrasonography and nearly as sensitive as selective arteriography.¹⁶ Patients with evolving neurologic signs require a thorough neurovascular workup, including vascular studies and brain imaging.⁴ All patients with a history of unconsciousness, loss of bowel or bladder control, facial petechiae, or swelling of the airway or neck

have survived a life-threatening strangulation and should be observed in the emergency department or hospital for 12 to 24 hours.¹⁹

Plane radiographs of the neck may reveal free air in the soft tissue or a fracture of the hyoid, but these findings are quite rare with isolated strangulation. Cervical spine fractures and dislocations are also extremely rare, except after a severe beating or when hanged after being dropped from a height.

In the one otolaryngology series on strangulation, Line et al¹ reviewed their experience with strangulation hospital admissions and autopsy cases across 11 or 12 years in Los Angeles. This series included only the most severely injured and excluded those treated and released from the emergency department as well as any who did not seek medical care. Forty-eight of 59 hospitalized survivors (81%) had been hanged, 25 of them while in police custody or in jail. Seventeen (29%) required intubation and 5 (8%) required cardiopulmonary resuscitation. Only 3 of the survivors (5%) had immediately life-threatening laryngeal injuries, but the authors described several examples of more subtle laryngeal and hyoid fractures. Ninety percent of the survivors (53 of 59) were men. By contrast, 84 of 112 victims of fatal strangulation (75%) were women. Laryngeal fractures were common on autopsy and twice as likely in deceased women (53%) as in deceased men (25%). Neck injuries were also more common after manual strangulation (37 of 57 [65%]) compared with suicidal hangings and ligature strangulation (13 of 52 [25%]). Given the frequency of laryngeal injuries in this population, the authors recommended routine CT scans on strangulation survivors.¹

Magnetic resonance imaging provides the most sensitive method of documenting an injury to the neck, with swelling or edema seen in 31 of 56 strangulation survivors (55%) in a 2009 Swiss study.¹⁹ Patients with injuries deep to the platysma were more likely to have ocular petechiae on examination or to report loss of consciousness. Although magnetic resonance imaging is not routinely used for emergency medical management and has not been shown to affect patient care, it is a very sensitive tool for documenting deep injuries to the neck that might not be visible on results of a physical examination. This documentation may become an important piece of evidence in a criminal trial.

Intimate Partner Violence

Intimate partner violence affects millions of women and men in the United States each year. The Centers for Disease Control and Prevention²¹ report that 22.3% of women and 14.0% of men have experienced physical violence from an intimate partner in their lifetime. Intimate partners are defined as current or former spouses, boyfriends, girlfriends, dating partners, or ongoing sexual partners. Violent acts may include physical or psychological abuse, unwanted sexual advances, and stalking.²¹ In 2013, the Attorney General of Virginia reported 34 836 emergency protective orders in family abuse cases and more than 65 000 hotline calls for domestic and sexual violence.²² In addition, 122 family and intimate partner homicides occurred in 2013. Henrico County, Virginia, a suburb of Richmond, with less than 300 000 residents, had sufficient evidence to file strangulation charges in 155 intimate partner violence cases from September 1, 2014, through August 31, 2015 (Deputy Commonwealth's Attorney Nancy Oglesby, oral communication,

September 24, 2015). Although these statistics provide some light on the scope of the problem in Virginia, they do not capture the large number of threats and assaults that are not reported by victims.

Among the 300 cases of strangulation reviewed in San Diego in 1995,³ 99% of the defendants were male. In most cases (94%), the defendant was the current husband (25%), current boyfriend (43%), or parent of her child (26%). Only 6% of defendants were described as a former husband, boyfriend, or roommate. Eighty-nine percent of these couples had a history of domestic violence. Ninety-seven percent of the victims reported manual strangulation, whereas only 3% reported the use of a ligature. Children were reported to have witnessed 41% of the incidents.³

Domestic strangulation is more than simple assault and battery. It is an effort to demonstrate absolute control of life and death over another. A survey of 62 women seeking asylum in 2 domestic violence women's shelters in Dallas, Texas, and Los Angeles, California,⁷ reported that 68% acknowledged a history of strangulation and that 93% of the attackers lived in the same household as the survivor. Eighty-seven percent of strangulation survivors reported death threats. Most of these had been strangled on more than 1 occasion. With repeated episodes, the injuries escalate; injuries to the neck and throat and neurologic injuries were more common in women who had been strangled multiple times.⁸ A case-control study in which the families of murder victims were interviewed regarding prior domestic violence²³ concluded that if a man strangles a woman, even just once, she is 7.5 times more likely to become a homicide victim (odds ratio, 7.48; 95% CI, 4.53-12.35).

Today, it is unequivocally understood that strangulation is one of the most lethal forms of domestic violence. Strangulation can produce minor injuries, bodily injury, or immediate or delayed death. Signs of life-threatening or near-fatal strangulation may include sight impairment, loss of consciousness, urinary or fecal incontinence, and petechiae. However, the evidence of the assault can be difficult to detect. The best medical evidence of strangulation is derived from post mortem examination of the body.^{5,12,20} An autopsy affords the ability to examine all of the tissues of the neck, superficial and deep, and to track the force vector that produced the injuries. Given the significant risk for death and the very real terror experienced by survivors and their young witnesses, experts have successfully lobbied that strangulation be treated as a felony, not a misdemeanor.¹⁸

Unintentional Strangulation Deaths

Unintentional death may also occur owing to intentional strangulation performed to achieve a euphoric state or to enhance orgasmic pleasure. The "choking game" is intended to achieve brief euphoria without drugs through self-inflicted hypoxia. The practice is believed to have resulted in 82 deaths of adolescents from 1995 to 2007 in the United States, with a mean age of 13 years.²⁴ Many of these children had experimented with hypoxia in groups or through discussions with schoolmates. Fatality victims were generally found alone, without a suicide message, having strangled themselves by hanging.²⁴ In an anonymous survey of 7757 Oregon eighth graders, one-third were familiar with the choking game, and more than 1 in 20 had participated in intentional hypoxia.²⁵

Autoerotic hypoxia is practiced primarily by men, but occasionally by women or by couples, with the expectation of intensifying

orgasmic pleasure. Practitioners are typically adults who most commonly hang themselves with their feet in reach of the floor. Self-recorded videos of fatal strangulations indicate that victims may lose consciousness within 10 seconds of neck constriction and then become unable to rescue themselves.¹⁵ The incidence of autoerotic fatalities may be underestimated, because families have been known to alter the scene of death to suppress evidence of autoeroticism.

Legal Considerations

For many years, police and prosecutors have failed to treat nonfatal strangulation assaults as serious crimes owing to a lack of visible injury, a lack of medical training, and a lack of strangulation laws. If strangulation cases were prosecuted at all, they were only prosecuted as simple misdemeanors.¹⁰ Strack and colleagues³ observed that 85% to 90% of domestic violence cases in San Diego from 1990 to 1997 were handled as misdemeanors, because no intent to injure or kill was documented. The Diana Gonzalez Strangulation Prevention Act of 2011 was a landmark legislation in California that made domestic strangulation with even minor injury a felony (California Penal Code §273.5). As of April 2015, strangulation is a felony in at least 39 states.²⁶

Careful documentation of external and internal injury is critical to criminal prosecution of these crimes. In Virginia, strangulation is considered a class 6 felony that can carry a term of 1 to 5 years, whereas domestic assault and battery constitute a misdemeanor with a maximum sentence of 1 year in prison. The difference between a misdemeanor and a felony depends on the documentation of a wound or injury caused by the pressure applied to the neck of the victim. At present, most strangulation cases in Richmond have still been handled as misdemeanors. However, subsequent to the case reports described herein, the Virginia Court of Appeals has ruled that internal injuries may occur without visible cuts or bruises on the neck and that "even a momentary 'black out' caused by pressure to the neck is sufficient to constitute a bodily injury."^{27(p9)}

Physicians should become familiar with their own state and federal laws regarding privacy and reporting of domestic violence. Whenever possible, physicians should obtain consent from the patient for all examinations, photographs, and radiographs and treat these records as protected health information. All states require reporting of suspected child abuse and most states require reporting of abuse against dependent and elderly adults. Crimes committed with a weapon, such as a knife or gun, are also reportable in most states. However, only 5 states mandate reporting of intimate partner violence, and none specifically mandate reporting of strangulation.²⁸ In situations without mandatory reporting, physicians should obtain the patient's permission before contacting law enforcement authorities. A hospital-based social worker or forensic nurse specialist can be very helpful in guiding patient choices.

The US Health Insurance Portability and Accountability Act permits disclosure of protected health information when required by law (as above), but also in cases of domestic abuse if the patient agrees to disclosure. In the absence of such agreement, the physician may disclose protected health information "to the extent the disclosure is expressly authorized by statute or regulation and: (A) The covered entity, in the exercise of professional judgment, believes the disclosure is necessary to prevent serious harm to the

individual or other potential victims.^{29(p756)} In the absence of a clear and present danger, physicians should refrain from speaking to law enforcement without the patient's consent.

Conclusions

Strangulation is a common form of intimate partner violence in which the aggressor asserts the ability to control life or death over another. Most cases involve females at the hands of a male household member, often in the presence of her children. Those strangled may experience physical pain, terror, and a sense of impending death.

Unless the assault is witnessed by another adult, most strangulation survivors fail to report the attack to authorities or medical personnel. Those who seek care usually have limited physical findings to document the attack. The absence of visible trauma makes it difficult to obtain a felony conviction and often results in failure to pursue any legal remedy. Repeated strangulation is associated with an increased risk for brain injury or death by murder.

Otolaryngologists should be prepared to evaluate survivors of strangulation within 48 to 72 hours, at which time hoarseness, bruising, or other temporary injury may be most evident. Examining physicians should take great care to document the history of the injury and any physical findings that might describe a wound or injury to the neck.

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REFERENCES

- Line WS Jr, Stanley RB Jr, Choi JH. Strangulation: a full spectrum of blunt neck trauma. *Ann Otol Rhinol Laryngol*. 1985;94(6, pt 1):542-546.
- Kuriloff DB, Pincus RL. Delayed airway obstruction and neck abscess following manual strangulation injury. *Ann Otol Rhinol Laryngol*. 1989;98(10):824-827.
- Strack GB, McClane GE, Hawley D. A review of 300 attempted strangulation cases, part I: criminal legal issues. *J Emerg Med*. 2001;21(3):303-309.
- McClane GE, Strack GB, Hawley D. A review of 300 attempted strangulation cases, part II: clinical evaluation of the surviving victim. *J Emerg Med*. 2001;21(3):311-315.
- Hawley DA, McClane GE, Strack GB. A review of 300 attempted strangulation cases, part III: injuries in fatal cases. *J Emerg Med*. 2001;21(3):317-322.
- Taliaferro E, Mills T, Walker S. Walking and talking victims of strangulation: is there a new epidemic? a commentary. *J Emerg Med*. 2001;21(3):293-295.
- Wilbur L, Higley M, Hatfield J, et al. Survey results of women who have been strangled while in an abusive relationship. *J Emerg Med*. 2001;21(3):297-302.
- Smith DJ Jr, Mills T, Taliaferro EH. Frequency and relationship of reported symptomatology in victims of intimate partner violence: the effect of multiple strangulation attacks. *J Emerg Med*. 2001;21(3):323-329.
- Family Justice Center Alliance. Web page. <http://www.familyjusticecenter.org/>. Accessed August 27, 2015.
- Training Institute on Strangulation Prevention and California District Attorneys Association. The investigation and prosecution of strangulation cases. <https://www.cdaa.org/wp-content/uploads/Strangulation-Manual.pdf>. Published 2013. Accessed September 7, 2015.
- Training Institute on Strangulation Prevention. Online strangulation training. <http://www.strangulationtraininginstitute.com/training/online-strangulation-training/>. Accessed August 16, 2015.
- Brouardel P. *La pendaison, la strangulation, la suffocation, la submersion*. Paris, France: IB Bailliere et Fils; 1897:36-45.
- Hawley DA. Death by strangulation or suffocation. In: San Diego, CA: Training Institute on Strangulation Prevention; Sacramento: California District Attorneys Association. *The Investigation and Prosecution of Strangulation Cases*. 2013:63-80. <https://www.cdaa.org/wp-content/uploads/Strangulation-Manual.pdf>. Published 2013. Accessed September 7, 2015.
- Travis LW, Olson NR, Melvin JW, Snyder RG. Static and dynamic impact trauma of the human larynx. *Trans Sect Otolaryngol Am Acad Ophthalmol Otolaryngol*. 1975;80(4, pt 1):382-390.
- Sauvageau A, Laharpe R, King D, et al; Working Group on Human Asphyxia. Agonal sequences in 14 filmed hangings with comments on the role of the type of suspension, ischemic habituation, and ethanol intoxication on the timing of agonal responses. *Am J Forensic Med Pathol*. 2011;32(2):104-107.
- Stapczynski JS. Strangulation injuries. *Emerg Med Rep*. 2010;31(17):193-203.
- Stanley RB Jr, Hanson DG. Manual strangulation injuries of the larynx. *Arch Otolaryngol*. 1983;109(5):344-347.
- Taliaferro E, Hawley D, McClane G, Strack G. Strangulation in intimate partner violence. In: Mitchell C, ed. *Intimate Partner Violence: A Health-Based Perspective*. New York, NY: Oxford University Press; 2009:217-236.
- Christe A, Thoeny H, Ross S, et al. Life-threatening versus non-life-threatening manual strangulation: are there appropriate criteria for MR imaging of the neck? *Eur Radiol*. 2009;19(8):1882-1889.
- Ely SF, Hirsch CS. Asphyxial deaths and petechiae: a review. *J Forensic Sci*. 2000;45(6):1274-1277.
- Breiding MJ, Basile KC, Smith SG, Black MC, Mahendra R. Intimate partner violence surveillance: uniform definitions and recommended data elements, version 2.0. National Center for Injury Prevention and Control, Centers for Disease Control and Prevention. <http://www.cdc.gov/violenceprevention/pdf/intimatepartnerviolence.pdf>. Published 2015. Accessed September 7, 2015.
- Herring MA. 2014 Annual report on domestic and sexual violence in Virginia. [http://leg2.state.va.us/dls/h&sdocs.nsf/By+Year/RD12015/\\$file/RD1.pdf](http://leg2.state.va.us/dls/h&sdocs.nsf/By+Year/RD12015/$file/RD1.pdf). Published December 29, 2014. Accessed November 28, 2015.
- Glass N, Laughon K, Campbell J, et al. Non-fatal strangulation is an important risk factor for homicide of women. *J Emerg Med*. 2008;35(3):329-335.
- Centers for Disease Control and Prevention (CDC). Unintentional strangulation deaths from the "choking game" among youths aged 6-19 years—United States, 1995-2007. *MMWR Morb Mortal Wkly Rep*. 2008;57(6):141-144.
- Centers for Disease Control and Prevention (CDC). "Choking game" awareness and participation among 8th graders—Oregon, 2008. *MMWR Morb Mortal Wkly Rep*. 2010;59(1):1-5.
- Pritchard AJ, Reckdenwald A, Nordham C. Nonfatal strangulation as part of domestic violence: a review of research [published online December 30, 2015]. *Trauma Violence Abuse*.
- Ricks v Commonwealth and Chilton v Commonwealth*, 290 Va 470, 778 SE2d 332 (2015).
- Moskop JC, Marco CA, Larkin GL, Geiderman JM, Derse AR. From Hippocrates to HIPAA: privacy and confidentiality in emergency medicine, part I: conceptual, moral, and legal foundations. *Ann Emerg Med*. 2005;45(1):53-59.
- Department of Health and Human Services. §164.512 Uses and disclosures for which an authorization or opportunity to agree or object is not required. 45 CFR Subtitle A (October 1, 2004 edition). <https://www.gpo.gov/fdsys/pkg/CFR-2004-title45-vol1/pdf/CFR-2004-title45-vol1-sec164-512.pdf>. Accessed January 17, 2016.