Living Victims of Strangulation

A 10-Year Review of Cases in a Metropolitan Community

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Abstract: The prevalence of reported domestic violence or intimate partner violence has greatly increased, with approximately 1.5 million women violently assaulted annually in the United States by an intimate partner. Strangulation is often seen in violence against women, including domestic violence cases. Strangulation is defined as "a form of asphyxia characterized by closure of the blood vessels or air passages of the neck as a result of external pressure on the neck."

This is a 10-year case review of 102 living victims of strangulation who underwent medicolegal evaluation at the Clinical Forensic Medicine Program at a State Medical Examiner's Office serving Southern Indiana and all of Kentucky. The majority of victims (79%) were strangled by an intimate partner, and manual strangulation was the most common method (83%). A total of 38 victims (38%) described a history of domestic violence, and the same number lost consciousness while being strangled. Nine (9%) women were pregnant at the time of the attack, while 13 (13%) had a history of being sexually abused in addition to being strangled. A paucity of cases involved only strangulation, as most of the victims were subjected to myriad forms of blunt force trauma which included not only the head and neck but also other bodily regions.

This is a unique presentation of strangulation of living persons as most evidence of strangulation in the forensic literature has been derived from postmortem examinations of the victims. This comprehensive study discussing the examination of a living strangulation victim offers valuable insight into the mechanism and the physical findings involved in the strangulation process.

Key Words: forensic pathology, strangulation, asphyxia, domestic violence, living

(*Am J Forensic Med Pathol* 2010;31: 320–325)

Domestic violence refers to "the victimization of a person with whom the abuser has or has had an intimate, romantic, or spousal relationship" and accounts for approximately 5.3 million incidents annually among women 18 years and older and 3.2 million occurring among men.[1] Strangulation, or throttling, consists of 10% of all violent deaths in the United States annually[1] and represents a common form of intimate partner violence (IPV).[2–7] A total of 51.3% of Kentucky women reported the combined current national IPV definition with psychologic abuse and stalking by an intimate partner as an adult; 15.0% of women ages 18 to 93 experienced the expanded IPV definition in the past 12 months.[8] Although manual strangulation injury "is more often a postmortem curiosity for the forensic pathologist",[9] the "walking and talking victims of strangulation" have been underreported in the literature.[2] Many forensic pathologists do not encounter a living strangulation victim.

Strangulation may be divided into 4 categories: (1) hanging; (2) ligature Strangulation; (3) manual strangulation; and (4) positional strangulation.[10] The pathophysiology of strangulation with ensuing loss of consciousness and potential fatality involves one or a combination of the following: obstructing the carotid arteries or jugular veins preventing blood flow to or from the brain, respectively, or compressing the larynx thereby precluding airflow to the lungs.[6] The low pressure constriction on the neck causes venous obstruction and loss of consciousness with subsequent clinically described decreased neck muscle tone.[10] Increased pressure on the neck may lead to arterial occlusion or airway closure resulting in death. The reported amount of pressure necessary to compress the jugular veins is 4.4 lbs; the carotid arteries, 11.0 lbs; and the vertebral arteries, 66 lbs.[11] The compression of the trachea requires 33 lbs of pressure.[11] Unconsciousness usually occurs within 10 to 15 seconds with complete bilateral carotid arterial occlusion, whereas consciousness may be regained in 10 to 12 seconds if this pressure is released.[12]

The Clinical Forensic Medicine Program was in existence between 1990 and 2008 as a collaboration between the Office of the Chief Medical Examiner in Louisville, Kentucky and the University of Louisville School of Medicine Departments of Pathology and Emergency Medicine to perform objective forensic evaluations on living patients and provide expert medicolegal assistance for law enforcement officials and the court system.[13] This Program consisted of forensic pathologists and forensic nurses who were trained to perform historical investigations and physical examinations as well as determination of the mechanism involved in each of the cases referred by Child Protective Services (CPS), Crimes Against Children Unit (CACU), Adult Protective Services (APS), or a police department. The Living Forensics Program in Louisville, Kentucky offered a unique opportunity to investigate a strangulation victim in a condition which is not customarily evaluated in the Medical Examiner community.

MATERIALS AND METHODS

Clinical Forensic Medicine Program in Kentucky

A 10-year (1998–2007) case review of 102 living victims of strangulation was conducted at a State Medical Examiner's Office serving Southern Indiana and all of Kentucky. The age, race, and sex of each victim were recorded. Each chart was reviewed for location and method of strangulation, relation of perpetrator to victim, presence of others at scene, and history of loss of consciousness, concurrent sexual assault medical care, and previous domestic violence. A thorough history of the

Manuscript received July 27, 2009; accepted July 28, 2009.
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Presented (oral) at the 42th Annual N.A.M.E. Meeting, September 5–10, 2008, Louisville, KY.
Supplemental digital contents are available for this article. Direct URL citations appear in the printed text and are provided in the HTML and PDF versions of this article on the journal's Web site (www.amjforensicmedicine.com).
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ISSN: 0195-7910/10/3104–0320
DOI: 10.1097/PAF.0b013e3181d3dc02

strangulation event was obtained from the victim including the subjective complaints of pain, sore throat, dizziness, hoarseness, headache, and difficulty with breathing, swallowing, and speaking. In addition, a host of numerous findings were discerned through intraoral and external physical examination of the entire body, specifically, subconjunctival/petechial hemorrhages, ecchymosis, abrasions, contusions, edema, and lacerations.

Office of the Chief Medical Examiner in Kentucky

We have selected one prototypical classic case of fatal strangulation to illustrate the features of strangulation uncovered during postmortem examination.

RESULTS

Clinical Forensic Medicine Program Living Strangulation Cases

Demographics, Perpetrator, and Location of Strangulation

A total of 102 living victims of strangulation were evaluated at the Clinical Forensic Medicine Program in Southern Indiana and all of Kentucky between 1998 and 2007. The ages ranged between 17 and 68 with a mean age of 31.2 years. All of the victims were women except for one man. Sixty-three victims were white (62%), while a fewer number of individuals were of other races: African-American, 31 victims (30%), biracial, 3 victims (3%), Hispanic, 2 victims (2%), and not recorded, 3 victims (3%). An intimate partner of the victim was the most common perpetrator of the strangulation (Table 1). Only 7 victims (7%) were strangled by a stranger. In 40 (39%) cases, at least one other individual was present at the scene in addition to the perpetrator and victim, including 26 (25%) cases when at least one of the victim's children witnessed the act of domestic violence against his/her mother. Most (80%) of strangulation events occurred at a home, with a smaller percentage at other locations: outside, 7 cases (7%); car, 5 cases, (5%); combination of locations, 4 cases (4%), specifically, a progression of locations during the attack from a home to a car or vice versa; bar, 2 cases (2%); and one case (1%) each of the following, store and hotel.

Sexual Abuse

Thirteen (13%) victims were sexually abused as a component of the strangulation, and 9 (9%) women were pregnant. Of the 13 women who were sexually abused, 4 victims were abused by a husband; acquaintance, 4 victims; stranger, 2 victims; boyfriend, 1 victim; and ex-partner, 1 victim. Of the 9 women who were pregnant at the time of the strangulation, 3 were victims of their boyfriends; husband, 2 victims; father of their children, 2 victims; stranger, 1 victim; and an uncle, 1 victim. An 18-year-old white woman was strangled and beaten while 5 months pregnant by her husband. Her fetus died during the attack. The woman had filed for a divorce and an Emergency Protective Order (EPO) prior to this incident when her husband had strangled her and had thrown her down the stairs at 8 weeks of pregnancy. She reported to investigators that "he was going to kill her if not he was going to kill her baby." The woman was hit with a belt and fist, "kneed" in the abdomen, and was cut on the wrists with a steak knife, box cutter, and curved sword. She was strangled manually and with a video game cord. Physical examination findings included contusions and edema of the infraorbital region, extending to the maxillary area; an abrasion inferior to the orbital contusion; a contusion of the brow; petechial hemorrhage of the mandibular/submental space; contusion and petechial hemorrhage of the ear; and incised wounds of the forearms and wrists with contusions of the wrists, dorsal aspect of the hands, and forearms (Figs. 1–3). This represented the first case in which a defendant was charged with fetal homicide in Kentucky. The perpetrator was charged with fetal homicide, wanton endangerment, and assault, and was sentenced to 12 years in prison.

TABLE 1. Perpetrator of Strangulation of Living Strangulation Victims in Kentucky, 1998–2007

Perpetrator of Strangulation	No. Cases
Intimate partner	81 (79%)
Boyfriend	43
Husband	26
Father of children	7
Ex (separated, estranged)	5
Stranger	7 (7%)
Acquaintance	6 (6%)
Other (son, uncle, police, father, brother-in-law)	8 (8%)

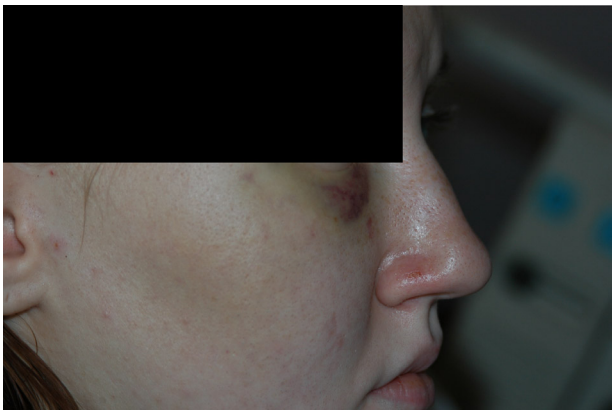

FIGURE 1. Contusion and edema of the infraorbital region extending to maxillary area. In addition, there is an abrasion inferior to orbital contusion as well as a contusion of the brow. Figure 1 can be viewed online in color at www.amjforensicmedicine.com.

FIGURE 2. Petechial hemorrhage of the mandibular/submental space. Figure 2 can be viewed online in color at www.amjforensicmedicine.com.

FIGURE 3. Contusion and petechial hemorrhage of the posterior ear on the antihelix. Figure 3 can be viewed online in color at www.amjforensicmedicine.com.

Method of Strangulation

Manual strangulation was the most common method used in 81 (79%) cases with a smaller number in the remainder of the cases: belt, 3 cases (3%); dog leash (1%); combination, 4 cases (4%), specifically, manual strangulation in conjunction with one of the following items used for strangulation, necklace, dog leash, belt, and sweatshirt. The victim was unable to discern the method in 2 (2%) cases, and 11 (11%) additional methods of strangulation included a blanket, rope, telephone cord, hammer, and electrical cord.

Subjective Complaints

A beneficial aspect of this study is the voice of the victims through the declaration of their symptoms (Table 2). Due to the victim's inability to recall specific events when evaluated, the number of these symptoms may be deceivingly low. Six victims experienced urinary incontinence, while 3 had fecal incontinence. A high percentage (69%) of victims underwent medical treatment following the domestic violence attack involving strangulation. In certain cases, the EMS solely evaluated the victim at the scene where the event occurred, whereas other victims were assessed at the Emergency Department (ED). Seven individuals were hospitalized for extensive bodily injuries, and one comatose, ventilator-dependent victim was evaluated by the forensic pathologist in the Intensive Care Unit. This latter victim was an elderly white woman who sustained strangulation and blunt force facial injuries. She had evidence of massive midfacial fractures as well as a left cerebral infarction of the distal posterior cerebral artery and a dissection of the right vertebral artery. Upon physical examination, she had unresponsive pupils and was unconscious.

TABLE 2. Subjective Complaints of the Living Strangulation Victims in Kentucky, 1998–2007

Subjective Complaints	No. Cases
Difficulty breathing	40 (39%)
Loss of consciousness	39 (38%)
Difficulty swallowing	25 (25%)
Hoarseness	21 (21%)
Difficulty speaking	14 (14%)
Dizziness	13 (13%)

TABLE 3. Blunt Force Trauma Involved in Living Strangulation Cases in Kentucky, 1998–2007

Blunt Force Trauma	No. Cases
Blow	54 (53%)
Thrown	38 (37%)
Jumped on	22 (22%)
Kick	21 (21%)
Bite	4 (4%)
Other	25 (25%)

Blunt Force Trauma

While each of the 102 cases in this study include strangulation as a method of injury, only 3 (3%) victims sustained strangulation as the sole method. The majority of cases (97%) involved blunt force trauma inflicted by various means in addition to the strangulation (Table 3). In numerous cases, a victim experienced more than one type of blunt force trauma. The "Other" category consists of a host of objects that inflicted the trauma, including a knife (9 cases), belt (4 cases), and various other implements, consisting of a telephone hand piece, hammer, metal ice cream scoop, screwdriver, and metal pole. A total of 39 (38%) victims had experienced a history of domestic violence prior to the strangulation event.

Physical Examination Findings

A total of 23 (22%) victims had evidence of subconjunctival hemorrhages by physical examination, while almost one-quarter of the victims (24%) experienced intraoral injuries. Most (85%) of victims displayed neck injuries (Table 4), and 55 victims (54%) complained of neck pain. The location of the neck pain and injuries was noted and, in many cases, in more than one area of the neck (Table 4).

TABLE 4. Neck Injuries and Location of Neck Pain/Injuries in Living Strangulation Cases in Kentucky, 1998–2007

Neck Injuries and Location of Neck Pain/Injuries	No. Cases
Neck injuries	87 (85%)
Contusions	55 (54%)
Abrasions	41 (40%)
"Redness/discoloration"	26 (26%)
Swelling	18 (18%)
Petechial hemorrhages	15 (15%)
Location of neck pain/injuries	
Anterior	60 (59%)
Lateral	46 (45%)
Posterior	32 (31%)

FIGURE 4. Marked swelling of the right side of face and head as well as bilateral periorbital edema and ecchymoses. Figure 4 can be viewed online in color at www.amjforensicmedicine.com.

Office of the Chief Medical Examiner—A Prototypical Case of Fatal Strangulation

An 18-year-old African-American woman who was 22 weeks pregnant went to her boyfriend's father's apartment to announce that the baby was not her boyfriend's. The boyfriend admitted to strangling and beating her. The father attempted to pull his son off the woman, however, the perpetrator continued to beat her with a hammer on the face. She died shortly thereafter. At autopsy there was marked swelling, abrasions, and lacerations of the face and scalp with bilateral periorbital edema and ecchymoses with extensive bilateral scleral and petechial hemorrhages (Fig. 4). Multiple comminuted fractures of the mandible bilaterally were noted in addition to multiple petechial hemorrhages, contusions, and lacerations of the lips with contusions of the tongue (Figs. 5 and 6). Upon neck dissection, extensive hemorrhages of the right sternocleidomastoid muscle, bilateral sternohyoid and sternothyroid muscles, thyroid gland, esophagus, and tongue were observed with petechial hemorrhages of the carotid sheath and epiglottis. The thyroid cartilage was fractured, while the hyoid bone was intact. Cranial examination revealed galeal hemorrhage of the scalp, subarachnoid hemorrhage, and cortical contusions. A 480 g male fetus (foot length 4.2 cm) was discovered at autopsy. The cause of death was manual strangulation and blunt force cranial injuries; the manner was homicide. The boyfriend later hanged himself in jail.

FIGURE 5. Extensive bulbar and palpebral petechial hemorrhages of the left globe. Figure 5 can be viewed online in color at www.amjforensicmedicine.com.

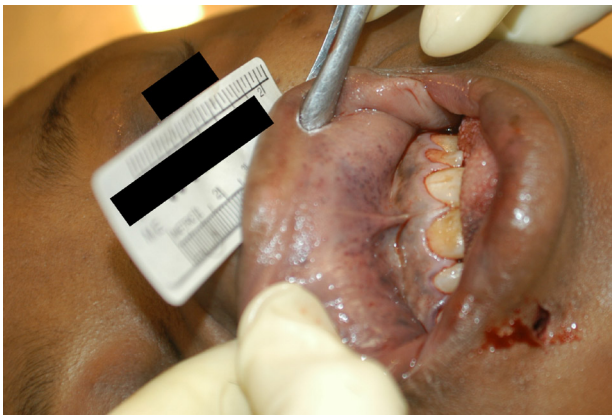

FIGURE 6. Laceration of the gingiva associated with a mandibular fracture and multiple petechial hemorrhages of the buccal mucosa of the upper lip. Contusions and lacerations of the buccal mucosa of the right lower lip are noted as well as contusions of the tongue and bloody fluid within the nose and mouth. Figure 6 can be viewed online in color at www.amjforensicmedicine.com.

DISCUSSION

Comparing the strangulation victims in our 2 categories, living and deceased, why did 102 victims remain alive following the strangulation assault and the other one die as a result of her injuries? We present 2 cases of pregnant women who were viciously attacked by the fathers of their unborn children resulting in the deaths of the fetuses. Why did one woman survive and the other did not?

The mechanism of strangulation has been described as 4 contributing factors, including the (1) anatomic location of applied pressure; (2) amount of applied pressure; (3) duration of applied pressure; and the (4) surface area of applied pressure.[10] Each one of these integral features plays an important role, and their simultaneous interaction may determine whether a fatality will result. Although our numbers may be low due to a victim's difficulty in remembering the full extent of the experience, more than one-third (36%) of living strangulation victims stated that the perpetrator threatened to kill them. Victims quoted the phrases used by the perpetrators: "I could have killed you. You are lucky I didn't" and "When you see her again, she may be half dead." At the brink of consciousness, victims often recalled their attacker saying "I love you" and "sorry". One victim recalled the comment made by the perpetrator "I'm sorry, I didn't realize what I was doing until I saw your eyes roll back in your head" as the asphyxia proved nonfatal.

Seven (7%) victims in the present study lied to medical personnel to protect the perpetrator, suggesting the victim's fear of repercussion and potential ongoing protection of the perpetrator over many instances of domestic abuse. In one case, the victim begged her husband to take her to the emergency department, and she lied that she had been involved in a bar fight. She had experienced a ruptured proximal jejunum with pneumoperitoneum, requiring a small bowel resection with primary anastomosis 2 days following the attack at the hands of her husband. Other victims did not want to report the attack as the

perpetrator was already in legal trouble, and the victims were threatened with death. Another woman said she "fell onto a fence" when she had suffered chest pain secondary to domestic trauma by her ex-professional boxer husband. One victim stated that she had been attacked by 3 juveniles on bicycles when, in reality, her boyfriend had assaulted her. She admitted that she had been too afraid and embarrassed to tell her family.

Few studies in the medical literature address the myriad of factors pertaining to living victims of strangulation, specifically, the distinct method of strangulation, the perpetrator of the strangulation, and the subjective complaints offered by the victim. Wilbur et al conducted a survey of 62 women at 2 women's shelters and at a Violence Intervention Prevention (VIP) Center in California and Texas.[3] Their findings closely mirror ours such that the perpetrator of the strangulation is most often an intimate partner of the victim: 42 of 62 surveyed (68%) in the study by Wilbur et al's study and 81 of 102 cases (79%) in the present study (Table 1). The specific intimate partner varied between these studies in that the husband was more commonly involved in their study (23 of 42 surveyed [55%]) as opposed to the boyfriend in the present study (43 of 81 cases [53%]). Similarly, a stranger is a less likely perpetrator of strangulation: 1 of 62 surveyed (1.6%) in the study Wilbur et al's and 7 of 102 cases (7%) in the present study. Wilbur et al's study reported a high percentage of perpetrators who threatened to kill the victim (87%) and victims who feared death during the strangulation (70%).[3]

Several other commonalities existed between Wilbur et al's study and the present study, specifically, the home as the most common locale for the strangulation (91% versus 84%), the presence of others at the scene (39% in both studies), and the subjective complaint of neck pain following the strangulation (68% vs. 54%). A higher number of victims sought medical help in the present study (69% vs. 29%). Wilbur et al demonstrate that strangulation occurs late in an abusive relationship, suggesting that these victims may be at a higher risk for major morbidity or mortality.[3] Furthermore, victims who sustain multiple strangulation events have increased frequencies of dizziness, memory loss, nightmares, tinnitus, and unilateral weakness.[7] We have shown that a total of 39 (38%) victims had experienced a past history of domestic violence prior to the strangulation event.

Strack et al conducted a review of 300 attempted strangulation cases focusing on the criminal legal issues.[4] Their study corroborates Wilbur et al's findings and the present study in that manual strangulation is the most common method used.[3,4] Children witnessed the strangulation in 41% of cases[4] compared with 25% of cases in the present study. A paucity of victims (5%) sought medical attention in Strack et al's review.[4] Smith et al reiterate that strangulation victims rarely seek professional medical care, even in cases when the victim has suffered numerous strangulation attacks.[7] Less than 1 in 5 victims who experienced 5 or fewer strangulation events sought medical care whereas only 2 of 5 survivors of more than 5 attacks received medical attention.[7]

An important point to note is that a lack of physical evidence of external neck injuries does not necessarily indicate that a strangulation did not occur. It has been stated in the literature that victims without obvious injuries often receive a "cursory" history and physical examination, and many strangulation victims die annually without a visible injury to the external surface of the neck.[5–7] In study of 300 strangulation cases by Strack et al, half of the victims did not have visible injury, 35% had injuries deemed "too minor to photograph," and only 15% of victims demonstrated injuries that could be photographed and be used in court as evidence of strangulation.[4] The majority (85%) of victims in the present study displayed neck injuries (Table 4). Plattner et al categorized different gradations of strangulation based on physical examination findings and symptomology based on victims of manual strangulation 1 to 2 days following the incident.[14] They divided strangulation into 3 types: "light," "moderate," and "severe, life-threatening." "Light strangulation" refers to skin abrasions and/or reddening of the skin of the neck. "Moderate strangulation" is bruising to and/or bleeding from the neck and/or damage to deeper soft tissues or larynx with complaints of sore throat, difficulty swallowing, and hoarseness. "Severe, life-threatening strangulation" involves petechial bleeding with or without loss of consciousness.[14] Although Plattner et al reported these physical findings, the present authors believe that the categories can not be distinctly categorized based on external injury alone.

Glass et al conducted a case control study demonstrating that nonfatal strangulation by an intimate partner is a risk factor for attempted or completed homicides of women.[15] They demonstrated that nonfatal strangulation was associated with greater than 6-fold odds of becoming an attempted homicide and over 7-fold odds of becoming a completed homicide.[15] Furthermore, they reported that Idaho has the most stringent legislation regarding strangulation in the United States to date, specifically, a law (Senate Bill 1062; April 2005) that stated that "any individual who willfully and unlawfully chokes or attempts strangulation of a household member, or a person with whom there was a dating relationship, is guilty of a felony punishable by incarceration for up to 15 years."[15] Physical evidence of strangulation is not required nor is intent to kill or injure the victim needed for conviction.[15]

CONCLUSION

The lack of external physical examination findings commonly encountered in a living victim of strangulation warrants a detailed history of the strangulation event. Historical information that should be collected from the victim may include: the method used, the lapse of time between the event and the examination, and other subjective symptoms experienced by the victim. Strangulation often occurs in later stages of an abusive relationship,[3] necessitating a heightened vigilance to the situation when a strangulation victim presents with such a history.

Most of the victims in the present study are attacked by an intimate partner who prefers manual strangulation versus another method. The victims often experience a vast array of blunt traumatic injuries to various areas of the body. This study addresses the physical findings of strangulation in both living and deceased individuals. A perpetrator's intent to harm or kill the victim through strangulation is beyond the scope of this paper and warrants an explanation by a forensic psychiatrist. The fine line between life and death in strangulation depends on a host of factors, including the strength of the victim/perpetrator, drugs involved, natural state of health of the victim, and circumstances of whether an onlooker may be present who may disengage the perpetrator from the victim prior to a fatality. The physician who may have the opportunity to evaluate a living victim of strangulation bears the responsibility of recognizing the severity of the situation, documenting all injuries, and possibly facilitating the avenues that a victim may take to attain treatment care and safety options.

The forensic pathologist should recognize subtle findings discerned through evaluating a strangulation victim as potential, however not diagnostic, evidence of strangulation, especially in victims of intimate partner homicide. Strangulation injuries are commonly encountered in intimate partner violence and, according to the literature, demonstrate an escalating pattern of

violence. In this respect, it is imperative that these injuries are recognized by family practitioners, obstetricians and gynecologists, and emergency department physicians to ensure that appropriate intervention and counseling may be undertaken.

ACKNOWLEDGMENTS

We acknowledge the Medical Examiners and the Clinical Forensic Nurses at the Clinical Forensic Medicine Program and the Office of the Chief Medical Examiner in Louisville, KY. We also thank Deborah I. Shields for her valuable review of the manuscript.

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