# Strangulation—Asphyxia and terror

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When we learn of a condition or activity that causes great distress to our patients and can be a precursor to death, we normally see it as a challenge. We take extraordinary measures to develop education campaigns to warn the public and develop procedures within our emergency departments to equip staff to be alert to signs and symptoms. However, we have missed the boat on a group of patients whose presentation signals a significant risk of immediate and long-term concerns and eventual fatality.

Specifically, these are the estimated 25% of domestic violence (DV) patients and 25% of sexual assault patients who have been strangled or suffocated during an assault (NFJCA, 2014). Frequently overlooked and often regarded as a rare occurrence in the past, strangulation is increasingly attracting the attention of emergency physicians, forensic nurses, prosecutors and police chiefs (Strack et al., 2001).

Although it has long been recognized that strangulation sometimes accompanies domestic and sexual assaults, the risk of eventual lethality in domestic relationships where a history of strangulation exists has been under-recognized. The San Diego, California, prosecutor's office found a history of reported domestic assaults that led to fatalities. Review of 300 fatalities found a significantly higher incidence of prior assault reports that included a strangulation component. Further studies have estimated that a history of strangulation increases the likelihood of eventual homicide seven-fold (Glass et al., 2008).

Strangulation is "a form of asphyxia (lack of oxygen) characterized by closure of the blood vessels and/or air passages of the neck as a result of external pressure on the neck" (Strack & McClane, 1999). It can be caused by manual pressure (throttling)—pressure applied by one or both hands or forearm; ligature (garroting) in which pressure is applied using a ligature; hanging where the weight of the body is suspended by a ligature; or postural strangulation where the neck is placed over a fixed object (Wilbur et al., 2001). Closely linked in effects are positional asphyxia, compression asphyxia (interference with oxygen exchange related to limitations of the respiratory movements of the chest and diaphragm), and suffocation (obstruction of the flow of air from the environment into the mouth and/or nostrils by mechanical means).

Regardless of the mechanism, emergency patients are unlikely to report in crisp medical terms what happened. Because the significance of strangulation is under-recognized, patients may not report strangulation at all or, when reporting, may minimize it. It may be helpful to ask questions such as, "Have you been choked or squeezed around the neck?", which may be more meaningful to victims.

Strangulation, despite our under-appreciation, is a serious event. It must be explained to victims that strangulation is much more than a casual injury. This is important to note because perhaps 23% to 69% of female domestic violence victims have experienced at least one strangulation during their lifetimes (Anderson, 2009) and one study found that up to 47% of DV victims had been strangled in the previous year. The rate of strangulation in sexual assault has been estimated to range from greater than 15% (Green, 2013) to greater than 25% (Strack, 2014). Ten per cent of violent deaths in the United States are attributable to strangulation (McClane et al., 2001).

Strangulation takes a victim to "the edge of homicide" (Strack & Gwinn, 2011). The consequences of strangulation range from transient and mild to severe and lethal. They may include bruising of the neck, face or chest; petechiae of the face, scalp, neck, eyelids, sclera; dysphagia, hoarseness, cough, headache; miscarriage; otorrhagia or hematotympanum; possible swelling or hemorrhage of the internal structures of neck with potential for lethality; subcutaneous emphysema; damage or fracture of the larynx; fracture of the hyoid bone; damage to the carotid arteries, including dissections; clot formation resulting in cerebral vascular accidents; immediate neurological effects including loss of consciousness, impairment of memory and inability to recount events accurately or delayed catastrophic neurological effects; aspiration pneumonitis, pneumonia and exacerbation of asthma, pulmonary edema; carotid sinus reflex; and death. Many of these signs do not appear for 24-48 hours post strangulation. Some may appear much later.

Four pounds per square inch (PSI) of pressure on the jugular veins (Smock, 2014) or 11 PSI on both carotid arteries can cause unconsciousness in less than 10 seconds, followed by convulsions (Sauvageau et al., 2012). Thirty-three PSI can occlude the trachea. To put this in perspective, it is estimated that an adult male can exert 80–100 PSI (Smock) and a female hexagenarian emergency nurse from Regina squeezed >40 PSI with her dominant hand. Permanent brain damage can occur in three minutes or less as neurons are starved for oxygen. Death can occur within four or five minutes. Glass et al. (2008) report that strangulation may cause serious physical and mental health consequences despite leaving few observable injuries (p. 5). Stated more forcefully, **"Lack of visible findings (or minimal injuries) does not exclude a potentially life-threatening condition"** (Green, 2013, p. 86). In fact, forensic pathologist Dr. Dean Hawley reports that petechiae may be present within the brain with no observable marks on the body of the deceased (Hawley, 2014). It has been proposed that lifelong cognitive deficit from anoxic encephalopathy and intra-cerebral petechial hemorrhage may follow.

Furthermore, these patients have experienced an incredibly emotion-laden event. When a person is strangled, her/his attacker literally holds the victim's life in his/her hands. Not unlike holding a knife to someone's throat, grasping the neck expresses absolute control of the life of the victim and unmistakable threat of imminent death. Even in the absence of injuries, the emotional impact on victims whose lives have been

threatened—often at the hands of an intimate partner—is huge and increases with repeated strangulations. Quite telling are the comments of victims who describe intensely menacing expressions on the faces of their attackers and make statements like the statement made to Regina nurses, "I thought I was done" and [I thought] "I would never see my baby again."

While some victims of single strangulations reported few long-term emotional effects, there is a marked increase in reported problems by victims of multiple strangulations. These consequences may include anxiety, depression, substance abuse, suicidal ideation, sleep disorders, depression, personality changes, memory loss, insomnia, nightmares, anxiety and symptoms associated with Post-Traumatic Stress Disorder (Smith et al., 2001).

Nurses should be alert to the patient whose history or appearance suggests strangulation, or who have marks around the neck and face. These patients may initially report being hit, pushed, shoved or sexually assaulted. Most victims of strangulation are female and have been assaulted by their domestic partner. Every patient who presents with any type of interpersonal violence should be asked if she/he has been "choked" regardless of visible signs. In the presence of a scratchy voice, sore throat, dysphagia, or cough, the index of suspicion should in increased.

It goes without saying that most emergency nurses are equipped to identify and document injuries. Nevertheless, forensic nurses are particularly suited to documenting strangulation patients because of their experience in precise descriptions of injuries and their familiarity (and perhaps greater comfort) with both victims and available resources. Furthermore, these patients often require a great deal of time for injury documentation; calling in a nurse examiner will free the primary nurse to care for other patients.

Comments by patients should be written with extensive use of quotations, principally related to what they experienced, what they saw in the faces of their assailants, and changes in sensorium during and following the occurrence. If the patient describes vomiting or incontinence of urine or feces, this should be noted, as well as signs of altered cognition and reported loss of consciousness. Nurses should also document the means of strangulation—whether hanging or ligature or manual, and whether the patient was pushed against a surface or throttled with hand(s) alone.

Nurses caring for strangulation victims should document all findings carefully, noting location, appearance, size, shape and areas of reported pain or tenderness. Changes in the patient's voice—which may be the only sign of strangulation—or coughing should be documented. Difficulty breathing requires immediate medical attention.

The patient should be inspected for marks and areas of tenderness. Scratch marks and/or lacerations may be present from the victim's attempts to remove the pressure from the neck causing inadvertent fingernail marks to the neck. The tympanic membranes should be inspected for signs of middle ear bleeding. Bruising may demonstrate the shape of the object(s) used to compress the neck, such as forearm, hands or ligature.

Obstruction of the jugular veins may cause petechiae above the level of the obstruction, as the carotid arteries continue to deliver blood to the head, but blood is unable to drain normally. The palpebral surfaces and sclera, and oral cavity should be inspected for petechiae and injuries. Regina forensic nurses have seen extensive petechiae on the scalp. Carotid artery obstruction may cause petechiae of the neck, upper back and upper chest.

If suffocation is a component of the assault, the victim may have bruising to the face, nose and mouth caused by pressure from the assailant's hands or objects. Injuries that are unrelated to strangulation should also be described on the chart. Strangulation rarely occurs apart from other injuries.

If the emergency department has an alternate light source (ALS), it may prove a valuable tool in the detection of bruising that is not apparent in ambient light. Faugno and Holbrook (2013) suggest that benefits of using an ALS include: enhanced ability to view bruises not seen by the naked eye; being able to advise law enforcement of presence of injuries; and demonstrating to physicians the presence of injuries. Vogeley et al. (2002) report identifying bruising using a Wood lamp (having a wavelength of approximately 365 nm) on pediatric patients. The Regina, Saskatchewan, forensic nurses have had success with hand-held lamps with wavelengths of 415 nm and of 455 nm and orange filters.

If the emergency department or the forensic nursing team is equipped for photography, this is an excellent opportunity to serve the patient by incorporating photography in the exam. If strangulation occurred during a sexual assault, routine swabs and samples should be collected. In some instances, surface DNA may be obtained on the neck from the assailant (reference).

If the patient has chosen to report the strangulation to police, or if the strangulation occurred within an assault that mandates reporting, the nurse should explain this to the patient and contact the police. Police may want to photograph injuries immediately. The nurse should advise responding officers that additional bruising may be more visible several days later.

The nurse should ensure that the emergency physician is informed of the strangulation related injuries and other observations. Most physicians will use appropriate diagnostic tools (when available), which may include chest x-ray, cervical spine x-ray, pharyngoscopy, carotid ultrasound, CT head/neck, and MRI of the neck (Falkenberg, 2014). It may be determined that the patient should remain in the hospital for observation for 24 hours.

Swiss researchers studied the use of imaging with CT and MRI to assess the life-threatening potential of manual strangulations. They preferred MRI over CT because of its superiority in identifying soft tissue injuries without the radiation exposure. Using a point system, they identified that a history of loss of consciousness (and/or incontinence), congested petechial hemorrhages, and a positive MRI for two of the three zones of the neck (Christe et al., 2010) signalled increased risk of permanent injury or demise.

Once a patient has been cleared medically, the patient should be advised to seek medical care immediately if there is development of any respiratory or neurological symptoms (described to the patient in lay terms). The nurse should stress the need for counselling by a practitioner with an understanding of interpersonal violence.

The patient should be warned about the long-term risks associated with a relationship in which strangulation has occurred. The health care team should review safety issues and present options within the community. If children reside in the home, their welfare should be addressed, perhaps with involvement of social services agencies. If the strangulation occurred within a dangerous relationship, which is often the case, and the patient states readiness for transition housing, the patient should be linked with community agencies that can facilitate a suitable escape from a the situation that created this need for medical attention.

The strangulation documentation form used by Winnipeg Health Sciences Centre is presented below. Thank you to the Winnipeg Health Sciences Centre for permitting us to reproduce its strangulation documentation form.

***A note about the strangulation assessment record:*** *The information contained in this publication is of a general educational nature intended for the use by staff of the Winnipeg Regional Health Authority (WRHA) and is in no way to be considered as medical or other professional advice. The authors, reviewers and publishers shall not be responsible for errors, omissions, inaccuracies or continued completeness contained herein. The information in this publication should not be used or relied upon to replace the skill and professional judgment required when determining appropriate patient care or treatment, to ensure compliance with any applicable laws or regulations, or as a substitute for specific medical or professional advice from a licensed professional. The authors, reviewers and publishers disclaim all legal liability in respect to the contents herein. The information contained in this package should be used as a guideline or for reference purposes only.*



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## References


Anderson, M. (2009). Why strangulation should not be minimized *Watch Post, 17*(2), 1–3. Available from 038d538.netsolhost.com/watchwordpress1/wp.../NewsletterSP09.pdf

Christe, A., Oesterhelweg, L., Ross, S., Spendloive, D., Bolliger, S., Vock, P., & Thali, M.J. (2010). "Can MRI of the neck compete with clinical finding in assessing danger to life for survivors of manual strangulation? A statistical analysis." *Legal Medicine, 12*, 228–232.

Falkenberg, A. (2014). *Strangulation.* Webinar for the Forensic Nursing Society of Canada, June 19, 2014.

Faugno, D., & Holbrook, D. (2013). *Use of Alternate Light Source in IPV Strangulation Cases*. National Family Justice Centers Alliance Webinar Training, August 14, 2013.

Glass, N., Laughton, K., Campbell, J., Wolf, A.D., Block, C R., Hanson, G., Sharps, P.W, & Taliaferro, E. (2008). Non-fatal strangulation is an important risk factor for homicide of women. *Journal of Emergency Medicine*, *35*(3), 329–335.

Green, W.M. (2013). *Evaluation and Management of the Sexually Assaulted and Sexually Abused Patient.* American College of Emergency Physicians. Retrieved from http://www.acep.org/Clinical---Practice-Management/Management-of-the-Patient-with-the-Complaint-of-Sexual-Assault/

Hawley, D. (2014). National Family Justice Centers Alliance. *Advanced Strangulation Course*. San Diego, CA, February 4-7, 2014.

Holbrook, D.S. & Jackson, M.C. (2013). Use of an alternate light source to assess strangulation victims. *Journal of Forensic Nursing*, 9(3), 140–145.

McClane, G.E., Strack, G.B., & Hawley, D. (2001). A review of 300 attempted strangulation cases part II: Clinical evaluation of the surviving victim. *Journal of Emergency Medicine, 21*(3), 311–315.

National Family Justice Centers Alliance (2014). *Advanced Strangulation Course*. San Diego, CA, February 4-7, 2014.

Sauvageau, A., Ambrosi, C., & Kelly, S. (2012). Three nonlethal ligature strangulations filmed by an autoerotic practitioner. *American Journal of Forensic Pathology, 33*(4), 339–340.

Sethi, P.K., Sethi, N.K., Torgovnick, J., & Arsura, E. (2012). Delayed left anterior and middle cerebral artery hemorrhagic infarctions after attempted strangulation: A case report. *American Journal of Forensic Medicine*, *33*(1), 105–106.

Smith, D.J., Mils, T., & Taliaferro, E.H. (2001). Frequency and relationship of reported symptomology in victims of intimate partner violence: The effect of multiple strangulation attacks. *Journal of Emergency Medicine*, *21*(3), 323–329.

Smock, W. (2014.) Clinical Forensic Nursing Evaluation in the Strangulation Patient. Presentation at the International Conference on Forensic Nursing Science and Practice hosted by the International Association of Forensic Nurses. Phoenix, AZ, October 24, 2014.

Strack, G. (2014). *The History and Need for Strangulation Training.* Presentation at the National Family Justice Centers Alliance, Advanced Strangulation Course. San Diego, CA, February 4–7, 2014.

Strack, G.B., McClane, G E., & Hawley, D. (2001). A review of 200 attempted strangulation cases, part 1: Criminal legal issues. *Journal of Emergency Medicine, 21*(3), 303–309.

Strack, G.B., & Gwinn, C. (2011). One the edge of homicide: Strangulation as a prelude. *Criminal Justice, 26*(3).

Strack, G.B., & McClane, G. (1999). *How to improve your investigation and prosecution of strangulation cases.* Retrieved from www.ncdsv.org/images/strangulation_article.pdf

Vogeley, E., Pierce, M.C., & Berto, I.G. (2002). Experience with wood lamp illumination and digital photography in the documentation of bruises on human skin. *Archives of Pediatric and Adolescent Medicine, 156*(Mar 2002),263–268.

Wilbur, L., Higley, M., Hatfield, J., Surprenant, Z., Taliaferro, E., Smith, D.J., & Paolo, A. (2001). Survey results of women who have been strangled while in an abusive relationship. *Journal of Emergency Medicine, 21*(3), 297–302.