G69 Pitfalls in the Interpretation of the Hyoid and Thyroid Fractures in Strangulation: The Importance of Anatomical Variations

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After attending this presentation, attendees will have a better knowledge of the importance of anatomical variations in the interpretation of fractures of the hyoid bone and thyroid cartilages.

This presentation will impact the forensic science community by developing and increasing awareness of the pitfalls associated with anatomical variations of the hyoid bone and the thyroid cartilage in strangulation cases.

Strangulation is defined as asphyxia by closure of the blood vessels and/or air passages of the neck as a result of external pressure on the neck. Three subtypes are recognized: hanging, ligature strangulation, and manual strangulation.

A proper neck dissection is a key element in the investigation of these deaths. Despite the usefulness of x-ray and computed tomography as ancillary techniques, manual dissection of the neck structures remains the most widely used technique to assess the integrity of neck structures. Considering the relative complexity of the neck dissection, it is important that it is performed by a trained forensic pathologist.

Apart from basic anatomical background and technical skills, forensic pathologists are in general well trained in recognizing postmortem artifacts encountered during the neck dissection. Unfortunately, anatomical variations as pitfalls in the interpretation of fractures of the hyoid bone and thyroid cartilage are however unknown to most. This comes to no surprise considering that forensic textbooks and the forensic literature have failed to pay any attention to these anatomical variations.

The anatomists have described several anatomical variations of the hyoid bone and thyroid cartilage that are of great interest to forensic pathologists. The triticea, a very small cartilage located in the thyroid- hyoid membrane, is encountered in approximately 13 to 16% of individuals. This cartilage can easily be mistaken as a fracture of the superior horns of the thyroid cartilage. Asymmetrical length of the superior horns of the thyroid cartilage, morphological differences between horns, and unilateral absence of one horn are all variations that

also constitute pitfalls in the interpretation of fractures of the thyroid cartilage. In the hyoid bone, the forensic pathologist should be aware of the following possible variations: unusually long great horn, uncommonly long lesser horns, difference in the fusion time of the greater horns to the body, and calcification of the stylohyoid ligament. The consistency of the hyoid bone and thyroid cartilage in relation to the victim's age should also be taken into consideration in the interpretation of autopsy findings.

Forensic pathologists should be aware of the anatomical variations of the hyoid bone and thyroid cartilage and should be trained in recognizing them, in order to avoid erroneous interpretation of autopsy findings. The role of x-ray and computed tomography as ancillary techniques will be discussed, but the importance of a proper manual dissection, with palpation of the fractures, will be reinforced. After removing the viscera from the chest and abdominal cavities and removing the brain (dry neck dissection), it is recommended to dissect *in situ* the muscles layers and then to remove the neck organs from the mouth and cervical column, in order to perform a dissection *ex-situ* of the hyoid and thyroid cartilage. Ultimately, the hands and eyes of the pathologist constitute an invaluable tool, provided there is proper training and knowledge. The dissection technique to assist in the discrimination of anatomical variations versus fractures of the neck structures will be further described.

Despite the tremendous importance of correct interpretation of anatomical variations in the identification of fractures of the neck structures in strangulation, this issue has not been properly discussed in the forensic literature so far. This presentation is aimed to fulfill this gap. **Hyoid, Thyroid Cartilage, Strangulation**

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