

## H184 Unrecognized Anatomical Larynx Variants May Lead to More Than 70% of False Larynx Fractures

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**Learning Overview:** After attending this presentation, attendees will acquire a greater understanding of anatomical laryngeal variants, as well as their impact on the diagnosis of fractures of the hyoid bone and thyroid cartilages.

**Impact on the Forensic Science Community:** This presentation will impact the forensic science community by raising awareness of the pitfalls associated with anatomical variants in strangulation cases. Additionally, the estimation of the incidence of false laryngeal fractures based on the prevalence of these variants, already established for a Galician population (Northwest Spain), will also be of interest to the scientific community.

Misinterpretation of fractures of the hyoid bone and thyroid cartilage due to anatomical laryngeal variants are common because the variants are usually unknown or poorly recognized. This comes as no surprise considering that forensic textbooks and the forensic literature have failed to pay attention to these anatomical variants, namely with epidemiologic studies assessing their prevalence.<sup>1,2</sup>

After having identified in 207 consecutive autopsies the most frequent anatomical laryngeal variants (i.e., triticeal cartilage (52.7%), terminal segmentation of the thyroid horns (11.7%), ectopic superior thyroid horns (8%), lateral thyro-hyoid ossification (5.3%), and calcification of the stylohyoid ligament (1.4%)) this study devised a mock exercise to quantify the impact of these variants on the diagnosis of either thyroid or hyoid fractures.<sup>3</sup>

In order to achieve this objective, a case-by-case evaluation exercise was carried out by two experienced pathologists. Taking into account the particular characteristics and specific location of each variant, its potential misinterpretation was recorded. An estimation of the false positive rate was calculated considering the number of anatomical variants possibly misclassified as fractures to all samples in the study.

The results showed 71.5% potential errors (false positives) of the 207 cases studied.<sup>3</sup> Triticeal cartilages were the most important variant affecting the diagnosis of laryngeal fractures, with a rate of potential errors of 46.4%, followed by the terminal segmentation of the thyroid horns (7.3%), ectopic superior thyroid horns with 6.3% of possible errors, and the lateral thyrohyoid ossification (4.4%). In addition to the isolated variants, in 6.8% of the individuals, there were more than one anatomical variant with the potential to influence the diagnosis.<sup>3</sup> The most frequent association was the terminal segmentation of the thyroid horn with triticeal cartilage that may lead to 3.8% of false fracture diagnoses. It should be noted that only 28.5% of the cases would be totally exempt of any negative influence of anatomical variants.

These results demonstrate the necessity for forensic pathologists to be aware of laryngeal anatomical variants in order to avoid erroneous interpretation of autopsy findings. Apart from the increasing use of X-ray and computed tomography as ancillary techniques, the manual dissection of the neck, with observation and palpation of the fractures, remains the major tool for forensic pathologists worldwide. This reinforces the importance of these results and the need for a correct interpretation of the anatomical variants when identifying laryngeal fractures in strangulation.

### Reference(s):

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2. Gok E., Kafa İ.M., Fedakar R. Unusual variation of the hyoid bone: Bilateral absence of lesser cornua and abnormal bone attachment to the corpus. *Surgical and Radiologic Anatomy* 2012;34(6):567-9.
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**False Larynx Fractures, Larynx Anatomical Variants, Triticeal Cartilage**