

CASE REPORT

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An Unusual, Deep Lingual Hemorrhage as a Consequence of Ligature Strangulation

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ABSTRACT: During the course of the daily practice of forensic pathology, little or no attention is generally devoted to the tongue (if it is even removed at all during the autopsy examination) except in a handful of relatively well-defined situations. In some other instances, such as injuries involving the neck and laryngopharyngeal organs, the tongue may be removed, but examined in only a cursory manner, since the serious pathology which caused or contributed to death is most often located in adjacent structures. While the postmortem examination was being carried out on a victim of ligature strangulation who exhibited relatively sparse external and laryngeal findings of significance, a unique and apparently heretofore undescribed patterned hemorrhage was discovered within the deep musculature of the tongue, having an appearance and contour identical to that of the curved edge of the subjacent hyoid bone. In difficult cases where strangulation is suspected as well as other potentially medicolegal problems with trauma involving the neck organs, a detailed inspection of the tongue through an easily accomplished dissection technique may provide invaluable information as to the mechanism of injury.

KEYWORDS: pathology and biology, tongue, strangulation

The examination of the tongue has never played a pivotal role in forensic medicine, except primarily in instances where death as a direct result or a complicating factor of an epileptic seizure has been suspected. In these cases, the presence of recent or healing bite marks along the periphery of the lingual mucosa may support the suspicion of generalized seizure, especially in the situation where an individual with a known seizure disorder is found to have died unwitnessed. However, if the cause of death is from virtually any other pathological or medical condition, including trauma, the tongue may be frequently ignored, if it is removed at all. In specific known or suspected injuries of the neck organs, especially involving the larynx and hyoid bone, the tongue is often removed still attached to these structures, but then may be simply dissected free and discarded while the bony and cartilaginous cervical tissues are examined in the great detail that is frequently necessary to document the presence of subtle trauma.

The following case illustrates the usefulness of a careful examination of the tongue as a

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part of the forensic science autopsy and documents a specific patterned hemorrhage deep within the lingual musculature that does not appear to have been previously described.

Case Report

A 74-year-old Native American (Navajo) male was found unresponsive just after midnight on the floor of a room in a "flophouse" hotel located in a western New Mexico town. The clientele of the hotel consisted primarily of transients and patrons of numerous local bars, and the event of this death was not considered unusual by either the hotel management or the police. The pants on the body were pulled partially down, to the mid-thigh level, and the pockets were everted. He had checked into the room during the late afternoon of the previous day, in the company of a young Indian male. During the course of the scene examination, his companion appeared and informed the police that the older man was his grandfather, who suffered from a serious heart condition, and that he had visited the old man in the room about 1 or 2 h earlier to check on his welfare. The police released the younger man; later in the night, he was arrested for public drunkenness and placed in protective overnight custody.

The body of the elderly man was sent for an autopsy. Externally, there were a number of inconsistent findings, including numerous contusions and abrasions scattered over the face, elbows, and legs. Multiple petechial hemorrhages were apparent in the conjunctival surfaces of the upper and lower lids of both eyes, and with the head turned to the left and the skin folds of the neck retracted, a faint, interrupted abrasion was identified. The abrasion was rather narrow, commencing just to the right of the midline, immediately over the prominence of the laryngeal thyroid cartilages, and coursed to the right and very slightly upwards to a maximum length of 9.7 cm (Fig. 1). Internally, the larynx and hyoid bone were stiff, heavily calcified, and intact, without fracture. A small area of hemorrhage was localized in the pharyngeal mucosa and soft tissue immediately posterior to the cornua of the right thyroid cartilage. Neither the lingual tonsils nor the base of the tongue were noticeably congested or hemorrhagic. The margin of the tongue was free of both bite marks and obvious foci of bleeding.

However, when the tongue was hemisected in the transverse plane, a distinct area of hemorrhage was apparent in the deep musculature to the right of the midline, well away from the



FIG. 1—Small, interrupted ligature abrasion on right side of neck, hidden by skin folds.

lingual margins and anterior to the base. The largest distinct hemorrhage was strikingly curvilinear, coursing anteriorly and medially, over a length of 3.2 cm and to a maximal width of 0.8 cm. The contours of this hemorrhagic site conformed to the margin of the right side of the hyoid bone, and when this structure was dissected from its moorings and placed against the cut lingual surface, the patterned muscular hemorrhage matched the curved bony surface exactly (Fig. 2). Two other, smaller, somewhat circular muscular hemorrhages were also in the deep lingual tissues, one anterior and one posterior to the larger area of bleeding.

The remainder of the autopsy examination disclosed no traumatic or natural disease processes which could have either caused or contributed to death, and the constellation of injury indicated that ligature strangulation had taken place. This information was conveyed to the police, who then confronted the "grandson," who was still in protective custody. At this point, he broke down and confessed that he and the decedent were, in truth, unrelated. Pretending to be a congenial drinking companion, the young man had checked into the hotel, under an assumed name, with the express purpose of robbing the other man (who had just cashed a Social Security check). Shortly after going to their room, an argument arose when the old man would not surrender his money, whereupon a scuffle ensued, which terminated when the young man tore strips from a bed sheet and strangled his erstwhile companion. He later removed the strips and put them under the bed. A subsequent search by the police disclosed these strips in the closet of the room, where they had been placed by hotel personnel.

Discussion

The pathologic findings associated with both manual and ligature strangulation have been known for centuries and consist primarily of injury variously involving the skin, cervical



FIG. 2.—Cut surface of tongue, viewed from below. Contour of curvilinear deep lingual musculature hemorrhage matches that of edge of hyoid bone.

musculature, soft tissue, larynx, hyoid bone, tonsils, base of the tongue, and related pharyngeal structures. The determination of death as a consequence of homicidal asphyxia may be one of the most difficult challenges to be addressed by the forensic pathologist, since the extent of injury sustained by a victim may be strikingly minimal. In addition, artifactual postmortem bleeding may occur in this region during dissection and manipulation of the body, and this may compound the difficulty of accurate interpretation. Therefore, it is imperative that all of the scattered, individual minor injuries observed at various levels in the cervical organs and tissues be assimilated and considered as a gestalt, where the whole is truly greater than the sum of all the parts.

After the discovery of the previously described, rather distinctive patterned lingual hemorrhage which appeared to conform to the margin of the hyoid bone, a survey of both prominent texts in forensic medicine and other published medicolegal literature was undertaken to attempt to clarify this finding [1-12]. In summary, descriptions of the pathophysiology of hanging and strangulation, especially with regards to findings in the tongue, were similar among sources. Hemorrhage and vascular congestion coursing through the root of the tongue and the lingual tonsils may be a feature of strangulation and hanging. Bite marks may be seen, especially if the tongue is pushed upwards by pressure against the neck (as in hanging) or if direct trauma is delivered to the front of the face during a struggle.

However, the injuries observed during the autopsy examination as previously delineated were not of a bite origin, since the hemorrhages were well away from the teeth and the lingual margins were uninjured. The tongue may also protrude between the lips, and in occasional autopsies of strangled or hanged individuals where the body was frozen after death, the tongue has been found compressed into the posterior oronasopharyngeal region. There were no descriptions of deep muscular hemorrhages which may have arisen from impact or pressure against the hyoid bone, and this patterned lingual hemorrhage appears to be a previously undescribed entity.

The causal mechanism of this injury must relate to the pressures exerted on the neck during the course of ligature strangulation. Gonzales et al. note that, in a ligature strangulation, "the ligature may constrict the upper portion of the neck and produce a dislocation of the tongue upward and backward" [4]. If the ligature is placed somewhat below the prominence of the thyroid cartilages, pressure directed towards the back of the neck and superiorly will displace the larynx and hyoid upwards into the base of the tongue, as well as against the posterior oropharyngeal wall. This interplay provides the most probable explanation for a lingual injury occurring via direct pressure against the hyoid bone. The curvilinear hemorrhage was in the right side of the tongue, and this, coupled with the fact that the external abrasion was on the right aspect of the neck, may indicate that the pressure of the ligature was directed asymmetrically, from right to left, as well as upwards. In addition, the fact that the decedent was elderly may contribute to the occurrence of such a patterned hemorrhage; the larynx was heavily calcified and stiff, and the hyoid bone exhibited complete ossification, thus these surfaces were relatively harder and unyielding as compared with the resilient, incompletely ossified hyoid and minimally calcified larynx of a younger individual. As a consequence, suddenly exerted pressure on the front of the neck that effects upward movement of both the larynx and the thick, hard hyoid might serve to forcibly impact these structures into the deep lingual musculature.

A point of this case that perhaps overshadows the discovery of an apparently unique pattern of injury is that if examination of the tongue had not been undertaken, or if it had been inadequately sectioned, the relationships and contours of the hemorrhage would not have been so apparent. This underscores the importance of including inspection and dissection of the tongue as a part of the complete autopsy.

Unfortunately, in the United States the tongue is often not removed during postmortem procedures because it is far more convenient to transect the airway above the larynx during the process of organ removal. A number of pathologic conditions may involve the tongue,

including acromegaly, myxedema, amyloidosis, thyroglossal duct cyst, carcinoma, lymphoma, and granular cell myoblastoma [13]. Pernicious anemia, chronic iron deficiency anemia, and especially pellagra may result in lingual mucosal atrophy. Lingual hemangiomas are not rare, and hereditary hemorrhagic telangiectasia frequently manifests in the tongue. The edema of erythroblastosis fetalis may be externally suggested only by protrusion of the tongue in a stillborn infant. In a case within the author's experience, a previously unsuspected and undiagnosed form of oculopharyngeal muscular dystrophy was detected and confirmed through gross and microscopic features of the tongue. In medicolegal practice, a bite mark may be the only objective anatomical finding that upholds the diagnosis of death by isolated seizure or status epilepticus. Hereditary angioneurotic edema may solely involve the tongue. The tongue may also sustain injury during beatings, and the documentation of lingual trauma is especially significant in suspected child abuse.

An autopsy procedure which provides both superior anatomic exposure and yet minimizes iatrogenically introduced artifact in the examination of strangulation and hanging deaths is the chin-to-pubis midline incision. This directly exposes the anterior cervical structures and allows virtual complete visualization of these organs prior to their removal. Regrettably, the usual Y-shaped autopsy incision is nearly universally used in the United States in every instance where a body is to be viewed after the postmortem. This rather limiting practice may potentially be altered if the need for a midline incision is discussed with funeral service professionals before the performance of an autopsy in which such an approach is indicated.

To demonstrate pathologic findings and injury, it is important to section the tongue properly. The best way to accomplish this is to make a single, transversely oriented cut, commencing at the tip and passing posteriorly, to terminate at the base, in the manner delineated by Spitz [7]. This separates the tongue into symmetrical upper and lower halves and exposes the entirety of the margins, so that even the smallest mucosal bite mark hemorrhage is revealed. Then, the tongue halves may be serially sectioned to facilitate evaluation of the deeper muscles and soft tissues. In this way, hidden lesions may be exposed and subsequently sampled for histological identification.

Conclusion

Examination of the tongue is an important but often neglected or incompletely performed part of the autopsy examination. Proper exposure, sectioning, and histopathologic inspection may disclose unsuspected disease processes or provide evidence of subtle injuries that may substantiate the suspicion of seizure, child abuse, or other entities. The tongue may also exhibit injuries sustained during the course of a strangulation or hanging. In a case described herein, a distinct hemorrhage was disclosed in the tongue which correlated both in location and configuration to the edge of the hyoid bone, and this manifestation upheld other rather subtle indications of ligature strangulation. This specific type of lingual hemorrhage has not apparently been previously described in the literature of forensic medicine, and this observation underscores the necessity for systematic and sequential examination of seemingly innocuous or inconsequential organs, such as the tongue.

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