Normal topography of the conus elasticus
Anatomical bases for the spread of laryngeal cancer

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Summary. The topographic relations of the conus elasticus were studied with special regard to the local spread of laryngeal cancer. Sections of twelve plastinated adult human larynges were investigated. Lateral from the median cricothyroid ligament, the conus elasticus reveals two broad gaps containing adipose tissue and blood vessels. Along these routes, tumors of the larynx may easily extend into the ventral extralaryngeal tissues by continuous growth. Fibres of the conus elasticus cover the entire cranial surface of the vocalis muscle near the muscle's insertion at the thyroid cartilage. This part of the conus elasticus has been termed "thyro-glottic ligament" in the fetus [22]. In the adult, this ligament prevents early cancer of the anterior vocal cords from invading adjacent structures. Other colagenous fibres continuous with the conus elasticus provide only an incomplete layer separating the lateral cricoarytenoid and the thyroarytenoid muscle. These fibres do not constitute an effective barrier against cancer growth.

Etude topographique du cône élastique. Implications dans l'extension des cancers du larynx


Key words: Conus elasticus — Larynx — Cancer — Plastination

The conus elasticus (CE) represents an efficient barrier to the local spread of laryngeal cancer [2, 13, 15, 18, 21]. Therefore, a precise knowledge of the topographic relations between the CE and adjacent laryngeal structures is important. Former authors [1, 10, 11, 17, 24] investigated mainly the relation of the vocalis muscle and the vocal cord, which is the thickened cranial edge of the CE [23]. The aim of this study is to give further information on the topography of other parts of the CE.

Material and methods

Terminology: The term conus elasticus (CE) is usually applied to the subglottic part of the fibro-elastic membrane of the larynx. Synonymously, the terms cricothyroid membrane and cricovocal membrane are used [23]. The anterior part of the CE is separately defined as the median or anterior cricothyroid ligament. It connects the cricoid arch to the inferior thyroid margin [23]. The vocal cords are the thickened cranial edges of the CE [23]. The vocalis muscle is the medial part of the thyroarytenoid muscle [3, 16, 20].

Twelve formalin-fixed larynges of male and female adults between 44 and 87 years of age were investigated. The specimens showed no macroscopic abnormalities except mild hyperemia and edema of the laryngeal mucosa in two cases. The material was subjected to a plastination process [7, 8, 12]. This technique is advantageous in the examination of the larynx [6] and extension of laryngeal cancer [5]. The epoxy-resin
blocks were cut with a diamond wire saw (Well®, Germany) into 500-800μm sections [4] in a sagittal, horizontal or frontal plane. The sections were mounted on glass slides, polished to transparency and stained with azureII/methylene blue and basic fuchsin at 90 °C [9].

**Results**

In paramedian sagittal sections (Figs.1, 2a), the median cricothyroid ligament appears as a strong layer of dense connective tissue. It is often pierced by small blood vessels near its attachment to the cricoid perichondrium. At the inferior thyroid margin, fibres of the ligament radiate both into the perichondrium of the cartilage and the perimysium of the vocalis muscle. In more lateral sagittal sections (Figs. 1, 2b), the caudal part of the CE consists of one coherent layer of dense connective tissue which is fixed to the cricoid arch. Near the inferior thyroid margin, this fibrous sheet splits into two portions. The anterior part is anchored at the thyroarytenoid muscle and is conspicuous also in more lateral sagittal sections (Figs. 1, 2c). There, the anterior portion of the CE has disappea-