AN EXPERIMENTAL STUDY OF THE CONTRACTION PROPERTIES OF THE LARYNGEAL MUSCLES IN THE CAT

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The aims of the present study are: (a) to describe the contraction properties of the individual laryngeal muscles, (b) to estimate the time relationship between the muscle action potential and the mechanical effect of contraction, (c) to examine the role of the contraction of the cricothyroid muscle in the tension development of the vocal cord.

As the object muscles, the cricothyroid, the thyroarytenoid and the posterior cricoarytenoid muscles were selected. The muscle to be examined was dissected free in the animal fixed in the supine position under general anesthesia. One end of the muscle was attached to a fine silk thread, the other end of which was connected to an input terminal of a mechano-electric transducer with a high mechanical impedance. The output signal from the transducer was led to one channel of a double beam cathode-ray oscilloscope. The isometric contraction of the muscle was achieved through an electrical stimulation of the pertinent muscle nerve with a train of rectangular pulses repeated at a rate of 1-200 per sec. Evoked muscle action potentials were recorded simultaneously. The output signal was led to the other channel of the cathode-ray oscilloscope.

The results of the present study are summarized as follows:

1. There is evidence that the cricothyroid physiologically differs from the other two muscles, i.e. the thyroarytenoid and the posterior cricoarytenoid. The former is slower in contraction compared with the latter two. The posterior cricoarytenoid appears to have contraction properties similar to the thyroarytenoid, which is considered to be one of the fastest muscle of all voluntary striated muscles.

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2. There is a comparatively constant lag between the onset of the muscle action potential and that of the observed tension. The latency is estimated at 7-msec, approximately.
3. The cricothyroid muscle plays a role as a tensor for the vocal cord.

A full paper is in preparation and it will be submitted for regular publication.