Age-related Changes of Muscular Thickness of the Pharyngeal Constrictors in Healthy Adults
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ABSTRACT
Up to the present, Age-related sarcopenia has been recognized in skeletal muscles in relation to the decreased body mass index (BMI). In the swallowing muscles, however, there have been little findings concerning sarcopenia. We studied whether muscle volume of the pharyngeal constrictors decreases by aging in healthy adults.

A retrospective review of head and neck MRI imaging of 207 adults (138 males and 69 females, 21-96 years old) examined was performed. We measured muscle thickness at four levels, i.e. mid-mandibular level, hyoid level, vocal fold level and cricopharyngeal level with OsiriX software. Averaged values of constrictors thickness were statistically analyzed in correlation to their age and BMI. In addition, we compare the results with those of infrayroid strap muscles.

As the results, the pharyngeal constrictor muscles appeared to be thickest at the hyoid level (male: 2.18 ± 0.77mm, female: 1.79 ± 0.83mm), which showed no significant correlation to age (r=0.03 in male and 0.07 in female, p>0.1) and BMI (r=0.27 and 0.33, respectively, p>0.1). Contrary to the age-related thickness change of the pharyngeal constrictors, thickness of the strap muscles were significantly decreased in the elderly.

In conclusion, the pharyngeal constrictors do not appear to become thin in proportion to age and BMI, unlike infrayroid muscles categorized in the skeletal muscles.

INTRODUCTION
Aging becomes the major problem in Japan and other developed countries. Age-related sarcopenia has been recognized in skeletal muscles in relation to the decreased body mass index (BMI). Some people think on the causation of dysphagia in the elderly to be sarcopenia of the swallowing muscles. In the swallowing muscles, however, there have been little findings concerning sarcopenia.

Moreover, most pharyngolaryngeal muscles were branchiogenic, which receive respiratory inputs as long as he/she lives. We studied whether muscle volume of the pharyngeal constrictors, which is branchiogenic, decreases by aging in healthy adults, as compared to the skeletal muscles.

METHODS AND MATERIALS
A retrospective review of head and neck MRI imaging of 207 healthy adults (138 males and 69 females, 21-96 years old) examined at Department of Otolaryngology-Head and Neck Surgery of Kyushu University Hospital between 2010 and 2013 was performed. We measured muscle thickness at four levels, i.e. mid-mandibular level, hyoid level, vocal fold level and cricopharyngeal level with OsiriX software (Fig.1). In each level, measuring points were set at median and three points with equal intervals in both sides on axial view of T2-weighted MRI images. Averaged values of constrictors thickness were statistically analyzed in correlation to their age and BMI.

We also measured thickness of the infrayroid strap muscles, which categorized as skeletal muscles. Neck CT images were collected from 493 (300 males and 193 females) healthy adults ranging 20 to 90 years old. The thickness of strap muscles were measured 3 points, which divided 4 parts of those muscles at the thyroid cartilage notch, using OsiriX as well (Fig. 2).

RESULTS
The pharyngeal constrictor muscles appeared thickest at the hyoid level (male: 2.18 ± 0.77mm, female: 1.79 ± 0.83mm) (Fig. 3), which showed no significant correlation to age (r=0.03 in male and 0.07 in female, p>0.1) and BMI (r=0.27 and 0.33, respectively, p>0.1) (Fig. 5). Results at other levels were almost same as those at the hyoid. Laterality of the muscle thickness was observed at the cricopharyngeal level (left-right).

Contrary to the age-related thickness change of the pharyngeal constrictors, thickness of the strap muscles were significantly decreased in the elderly.

CONCLUSIONS
1. The pharyngeal constrictors appear not to become thin in proportion to age and BMI, unlike skeletal muscles. Branchiogenic swallowing muscles may be tolerable against aging, as compared to skeletal muscles.

2. Unlike skeletal muscles, most branchiogenic muscles has respiratory activities. These phasic activities continue during alive. Thus the property of branchiogenic muscle is different from that of skeletal one.

REFERENCES