

## Variations in the length of the styloid process and the possible consequences on muscle ligamentous systems with the mandible and the hyoid bone

Massimo Guarna<sup>1</sup>, Margherita Aglianò<sup>1</sup>, Gianmarco Toriello<sup>1</sup>, Enrico Lombardi<sup>1</sup>, Francesca Vannozzi<sup>1</sup>

Dipartimento Scienze Mediche e Chirurgiche e Neuroscienze<sup>1</sup> Università degli Studi di Siena, Italy

The styloid process of the temporal bone has a variable length as demonstrated in studies conducted with different technique: three-dimensional computed tomography or dental panoramic three-dimensional scanning. Data on the osteometric values of the styloid process is scanty with significant length differences existing between the studies attributed to different races or ethnicities. The abnormal length can be in some cases accompanied by a set of symptoms, characterized by neck pain, dysphagia, headache, sore throat, ear pain, mandible dysfunction clinically framed in Eagle's syndrome. We present an osteometric study on the length of the styloid process of a collection of dried skulls belonging to the museum of Anatomy "Leonetto Comparini" at the University of Siena. All skulls came from the local psychiatric hospital. For measurement we employed a digital caliper. The data were analyzed through a free statistical software (Salstat 2). Average and standard deviation (sd), were calculated. Univariate analysis of the length of the styloid process gave the following results: average: 27 mm; sd: 7 mm; normal range: average  $\pm$  2 sd: 41-13 mm. The longest styloid process was 52 mm and the shortest had a length of 0.5 mm. In one case we discovered a skull with stylohyoid calcified ligament on one side. The styloid process was long 50 mm on the right and 70 mm on the left where is the tip calcified. An abnormal long styloid process  $>$ 41 mm is present in 6% of items in our biometric study. The abnormal variations in length are put in relation to the possible anatomical change of the muscular and ligamentous structures of the styloid process by drawings of a case with a marked elongation of the styloid process. The shortening of the stylomandibular ligament that we suppose considering the distance from the angle of mandible of the tip and the possible change in direction could cause difficult in the protrusion of mandible and in mastication. The shortening of stylohyoid ligaments and muscles, could cause difficult in movement of os hyoid and in raising or lowering of larynge during swallowing.

### Keywords

Styloid process, Anatomical variation, Eagle's syndrome.