colloquium-journal

ISSN 2520-6990

Międzynarodowe czasopismo naukowe

Art
Jurisprudence
Medical sciences
Economic Sciences
Biological Sciences
Pedagogical Sciences

№24(147) 2022

colloquium-journal

ISSN 2520-6990

ISSN 2520-2480

Colloquium-journal №234 (147), 2022

Część 1

(Warszawa, Polska)

«Colloquium-journal»
Wydawca «Interdruk» Poland, Warszawa
Annopol 4, 03-236
E-mail: info@colloquium-journal.org
http://www.colloquium-journal.org/

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Dmytrenko R.R.
Boichuk O.M.
Bukovinian State Medical University, Chernivtsi, Ukraine
Sukhonosov R.O.
Kharkiv National Medical University, Kharkiv, Ukraine

FETAL ANATOMICAL VARIABILITY OF THE SUPERFICIAL MUSCLES OF THE ANTERIOR CERVICAL REGION

Лопушняк Л.Я.
Гончаренко В.А.
Дмитренко Р.Р.
Бойчук О.М.
Буковинський державний медичний університет, м. Чернівці, Україна
Сухоносов Р.О.
Харківський національний медичний університет, м. Харків, Україна

ФЕТАЛЬНА АНАТОМІЧНА МІНЛИВІСЬ ПОВЕРХНЕВИХ М'ЯЗІВ ПЕРЕДНЬОЇ ШИЙНОЇ ДІЛЯНКИ

Abstract.
The article provides data on the fetal anatomical variability of the superficial muscles of the anterior cervical region, which were revealed during the dissection of 75 human fetuses aged 4–10 months. Conclusions. In human fetuses, additional muscles and anatomical variability of some superficial muscles of the neck (hyothyroidglandular, thyrothyroidglandular, sternocleidomastoid, sternohyoid, thyrohyoid) are found. The loose form of the intramuscular branching of the nerves of the ansa cervicalis in the infrahyoid muscles of the neck was established, with the exception of the lower belly of the omohyoid muscle, where the main form was found. The distribution of nerves in the thickness of the infrahyoid muscles is uneven: the smallest number of nerve branches is found within the middle third of the sternohyoid muscle and the upper third of the sternohyoid muscle. Arteries in the thickness of the infrahyoid muscles mainly branch in the main form.

Анотація.
В статті наведено дані про фетальну анатомічну мінливість поверхневих м'язів передньої шийної ділянки, які було виявлено під час препарування 75 плодів людини 4–10 місяців. Висновки. У плодів людини виявляються додаткові м'язи та анатомічна мінливість деяких поверхневих м'язів шиї (під'язиково-щитоподібнозалозовий, щито-щитоподібно-залозовий, груднинно-ключично-соскоподібний, груднинно-під'язиковий, щито-під'язиковий). Встановлено розсипну форму внутрішньом'язового галуження нервів шийної петлі у підпід'язикових м'язах шиї, за винятком нижнього черевця лопатково-під'язикового м'яза, де виявлено магістральну форму. Розподіл нервів у товщі підпід'язикових м'язів нерівномірний: найменшу кількість розгалужень нервів встановлено у межах середньої третини груднинно-під'язикового та верхньої третини груднинно-щитоподібного м'язів. Артерії у товщі підпід'язикових м'язів переважно розгалужуються за магістральною формою.

Key words: *muscles, fascia, variability, fetus, human being, anatomy.*
Ключові слова: *м'язи, фасція, мінливість, плід, людина, анатомія.*

Introduction. The study of the development and establishment of correlational relationships of organs and structures of the neck in the prenatal period of human ontogenesis is caused by the theoretical and practical interest of both morphologists and clinicians to find out the prerequisites for the occurrence of congenital and acquired pathology of muscles, fascial-cellular formations, organs and vascular-nervous structures. When studying the fetal anatomical variability of organs and structures of the neck area in the age aspect, the algorithm of anatomical preparation of the neck acquires priority. However, in the sources of the literature available to us, we did not find any information about the sequence of actions during the preparation of the front and lateral cervical areas in human fetuses and the features of the fetal anatomy of the surface muscles of the neck [1–3].

The aim of the study. Identify the anatomical variability of the superficial muscles of the anterior cervical region during the fetal period of human development.

Materials and methods of research. The study was conducted on 75 preparations of human fetuses without external signs of anatomical deviations or developmental anomalies using a complex of morphological research methods. The distribution of the material

into age groups was carried out in accordance with the classification of periods of human ontogenesis, adopted by the VII All-Union Conference on the Problems of Age Morphology, Physiology and Biochemistry (Moscow, 1965), the periodization of intrauterine development according to G.A. Schmidt (1968) and taking into account the «Instructions for determining the criteria of the perinatal period, live births and stillbirths», approved by Order No. 179 of the Ministry of Health of Ukraine dated March 29, 2006. The age of the subjects of the study was determined according to the consolidated tables of B.M. Patten (1959), B.P. Khvatova, Y.N. Shapovalova (1969) based on the measurement of parietal-coccygeal length (PCL). During the research, preparations of human fetuses from the museums of the Department of Human Anatomy named after M.G. Turkevich and the Department of Anatomy, Clinical Anatomy and Operative Surgery of Bukovinian State Medical University. Preparations of fruits weighing more than 500.0 g were studied directly at the Chernivtsi Regional Communal Medical Institution «Pathological Anatomical Bureau» in accordance with the cooperation agreement.

The research methods were: macromicroscopic – to find out the shape, features of the external structure of the thyroid and parathyroid glands in the fetal period of human development; production of topographic and anatomical sections – for the study of the syntopy of the parathyroid glands and vascular and nervous formations of the anterior cervical area; computer three-dimensional reconstruction – to clarify the shape and space-time relationships of the thyroid and parathyroid glands, obtaining digital morphometric data; morphometric – to obtain quantitative characteristics; statistical – to determine the degree of probability of the morphometric parameters of the parathyroid glands in human fetuses.

The results. During the dissection of the neck area, complex topographical and anatomical relationships between muscles, fascia, vascular and nervous structures and organs are encountered. During the preparation of vessels and nerves in the sternocleidomastoid area, it is necessary to ensure maximum access to it while preserving all anatomical structures and the integrity of the sternocleidomastoid muscle [4]. Studies devoted to variant anatomy of the neck muscles have scientific and applied value. F. Ferelli and others, N.K. Bandarupalli, S.R. Bolla describe such accessory muscles of the neck as the levator clavicle and the accessory clavicle. If additional muscles are attached to the thyroid gland, intraoperative bleeding may occur and, as a result, hematoma formation and scar tissue formation in the postoperative period. In literature sources, there are fragmentary data on variants of the structure and topography of the muscles of the infrahyoid area of a person. During the performance of diagnostic manipulations and surgical interventions in the cervical region, data on the variability of the form, structure and topography of the muscles of the infrahyoid region acquire important clinical significance [5–7]. The infrahyoid muscles (sternohyoid, sternothyroid, thyrohyoid and omohyoid) are located under the skin in front of the larynx, trachea, and thyroid gland and are innervated by branches of the ansa cervicalis. Thanks to the interaction of the infrahyoid group of neck muscles, the hyoid bone is kept in its position. When performing myoplastic operations and surgical interventions on the thyroid gland, trachea, and esophagus, information on the variant anatomy of the infrahyoid muscles of the neck, in particular, the features of their innervation, is of great practical importance. In literature sources, there is information about the participation of the branches of the cervical loop in the innervation of the neck organs, as well as the heart and diaphragm, which indicates the connection of the nerves of the infrahyoid group of neck muscles with the innervation of these organs, and also emphasizes their importance in the act of swallowing. breathing and speech. The main sources of blood supply to the infrahyoid muscles are the branches of the upper and lower thyroid arteries, and additional ones are the lingual artery and the transverse artery of the neck [8]. Data on branching variants of vessels and nerves and their vascular-nerve relationships in a separate part of the sternohyoid, sternohyoid, thyrohyoid and omohyoid muscles should be taken into account when performing rational cuts in the neck area, moving both flaps and the above-mentioned muscles as a whole, which is quite often used in plastic surgery [9].

A significant amount of scientific research is devoted to the study of the topographical and anatomical features of the muscles and fascia of the neck in the postnatal period of human ontogenesis [10]. However, a clear answer has not been established in the published scientific works to date, which explains the variety and variability of the names and definitions of the anatomical terminology of the neck fascia. Until now, there are no comprehensive studies that shed light on the peculiarities of the formation of the fetal topography of the cervical fascia plates and the fibrous spaces of the anterior and lateral cervical areas. In order to carry out adequate surgical treatment and improve the provision of medical care to patients, studies dedicated to the study of the origin of fascia and the development of a modern embryological classification of tissues are of great importance. According to the histological structure, fascia is a densely designed connective tissue in which collagen fibers intertwining in different directions predominate. Layers of collagen fibers alternate with bundles of elastic fibers that form mesh structures. The composition of the fascia contains a small number of cellular elements, which are represented mainly by fibrocytes. The superficial, pretracheal, and prevertebral plates of the cervical fascia are formed depending on the origin and morphogenesis of the corresponding groups of neck muscles. The muscles of the neck area have different origins: from the mesenchyme of the I pharyngeal arch, the mylohyoid muscle and the anterior belly of the digastric muscle develop, from the II pharyngeal arch, the posterior belly of the biventricular muscle and the stylohyoid muscle develop. I'm from. The sternocleidomastoid and trapezius muscles of the neck develop from the mesenchyme of the III-V pharyngeal arches. The sternohyoid, sternohyoid, thyrohyoid and omohyoid muscles are formed from the ventral parts of myotomes; the anterior, middle, and posterior scalene muscles, as well as the longus neck muscle and

the longus capitis muscle. At the same time, the muscles of the neck are placed in several layers and have complex topographical-anatomical relationships both among themselves and with neighboring anatomical formations. The sternocleidomastoid and trapezius muscles are located superficially, and the superficial plate of the cervical fascia forms the fascial sheath for them. The latter, in the cranial direction, grows with the hyoid bone, continues upwards and covers the suprahyoid group of neck muscles and is attached to the lower edge of the body of the lower jaw. The surface plate of the cervical fascia grows with the capsule of the submandibular salivary gland, and in the caudal direction it is attached to the clavicle and handle of the sternum [11].

As a result of the study, additional muscles of the infrahyoid area were found in 6.67% of the fetuses, and fetal anatomical variability of some surface muscles of the neck was established. In a fetus of 196.0 mm TCL, an additional muscle was found – the hyothyroidglandular, which begins with a thin tendon from the body of the hyoid bone, passes through the upper edge of the thyroid cartilage and is attached to the base of the pyramidal lobe of the thyroid gland with a muscle belly. The length of the hyothyroidglandular muscle is 3.8 mm, the width in the middle part of the abdomen is 1.2 mm, and the thickness is 0.2 mm. The hyothyroidglandular, muscle is located deeper than the sternohyoid and sternohyroid muscles, but more superficial to the thyrohyoid and cricothyroid muscles. In a fetus of 205.0 mm TCL, the hyothyroidglandular, muscle was found, which starts from the lower edge of the lateral part of the body of the hyoid bone and is attached to the capsule of the left lobe of the thyroid gland, the latter having an inherent crescent shape. The length of this muscle is 3.9 mm, the width in the middle part of the abdomen is 2.6 mm, and the thickness is 0.4 mm. In a fetus of 188.0 mm TCL, the right thyrothyroidglandular muscle was found, which starts from the upper edge of the right plate of the thyroid cartilage and attaches to the capsule of the right lobe of the thyroid gland. In a fetus with 248.0 mm TCL, the left thyrothyroidglandular muscle was also detected, which starts from the outer surface of the left plate of the thyroid cartilage and attaches to the capsule of the left lobe of the thyroid gland. In a fetus with a 360.0 mm TCL, a right additional thyrohyoid muscle was found, which begins with thin muscle fibers from the outer surface of the right plate of the thyroid cartilage, more medial to the beginning of the right thyrohyoid muscle, and is attached to the lateral parts of the body of the hyoid bone. Blood supply to the identified additional muscles is provided by additional branches of the right and left superior thyroid arteries. In one case (fetus 370.0 mm TCL), a tendon membrane was found in the right sternohyoid muscle. The main source of blood supply to the sternohyoid muscle is the superior thyroid artery. The upper and lower thirds of the sternohyoid muscle are best supplied with blood and innervated. At the same time, the branching of arteries occurs in the direction of passage of muscle bundles, mainly in the trunk form, and nerves – in the loose form. Nerve trunks (1-2) go at an acute angle to the back surface of the sternohyoid muscle. As a rule, one nerve enters the sternohyoid muscle at the border of its upper and middle third, and the lower nerve enters the lower third of the muscle. In most cases of observation, the nerves together with the vessels enter through the lateral edge of the middle third of the sternothyroid muscle. The blood supply of the sternothyroid muscle is provided by the branches of the superior and inferior thyroid arteries. The latter enter the sternothyroid muscle through its outer surface, then cross the muscle belly in the transverse direction and branch, as a rule, according to the trunk shape, parallel to the direction of passage of the muscle bundles. The left thyrohyoid muscle was absent in a 240.0 mm TCL fetus. In a fetus of 179.0 mm TCL, the medial and lateral crus of the left sternohyoid muscle were detected; the left thyrohyoid muscle is absent in a 240.0 mm TCL fetus; In a fetus of 310.0 mm TCL, the right sternocleidomastoid muscle began with three crura: medial, intermediate and lateral.

Conclusions. In human fetuses, additional muscles and anatomical variability of some superficial muscles of the neck (hyothyroidglandular, thyrothyroidglandular, sternocleidomastoid, sternohyoid, thyrohyoid) are found. The loose form of the intramuscular branching of the nerves of the ansa cervicalis in the infrahyoid muscles of the neck was established, with the exception of the lower belly of the omohyoid muscle, where the main form was found. The distribution of nerves in the thickness of the infrahyoid muscles is uneven: the smallest number of nerve branches is found within the middle third of the sternohyoid muscle and the upper third of the sternohyoid muscle. Arteries in the thickness of the infrahyoid muscles mainly branch in the main form.

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