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Priority in classification of cervical fasciae

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Abstract

Background: The neck is divided into two compartments: anterior compartment, which includes the organs with their fascial cellular structures and the posterior compartment, which is constituted of muscles with their fascial sheaths.
Study of cervical fasciae represents major difficulties, because the authors did not synchronize over the time a common opinion about the fascia and terminology classification. In the manuals of anatomy in English, French and Russian the same formations are specified differently.
Conclusions: The authors of contemporary textbooks and scientific articles describe equally the real anatomy of cervical fasciae in the anterior visceral compartment of the neck, where they are located, what structures envelop, how they delimitate the narrow clefts and large spaces between them, but in the different manner and using different terms for the same fascial leaves. Maybe there is no need to give preference to a concrete classification, of the 3 fasciae as in the official Anatomical Nomenclature or of the 5 fasciae as is in the textbook of V. N. Shevkunenko. It is enough to know the synonyms of the fascial leaves and consider their clinical significance in the spreading of infection, for opening the cervical phlegmons and performing the surgical approaches.
Key words: neck, cervical fascia classification.

Introduction

The neck is divided into two compartments: anterior compartment, which includes the organs with their fascial cellular structures and the posterior compartment, which is constituted of muscles with their fascial sheaths.

Study of cervical fasciae represents major difficulties, because the authors did not synchronize over the time a common opinion about the fascia and terminology classification. In the manuals of anatomy in English, French and Russian the same formations are specified differently. Thus, the prevertebral fascia is determined by the French anatomists as being aponeurosis. English anatomists name it – "*alar fascia*" and the Russian literature, which is based on the classification given in the manual of V. N. Shevkunenko (fig. 1) considers that it is correct to name it *fascia prevertebralis,* which participates in the formation of the respective muscle sheaths. Taking into account this fact the neck fascia need to be regarded through the practical approach related to the clarification of the ways of purulence propagation and elaboration of surgical approach methods [1].

It is well known that it is difficult to establish and systemize the number of fasciae on the neck, the fact which is determined by the age, physical development, gender, method of investigation and etc.

Thus, the goal of this work is the elucidation of author's priorities in the study, description and classification of cervical fasciae.

The problem about the cervical fascia has its origin in the 19th century by the initiative of surgeons and not by the initiative of anatomists. Initially namely the surgeons attempted to describe the cervical fascia according to the practical requirements. Once the problem appeared, the following net involvement of anatomists did not bring benefits in the direction of the studied problem and even it made this problem to be more difficult and currently only the behavior of the cervical fascia represents a difficulty for the classification and interpretation of cervical fasciae. Such authors as V. P. Vorobyov (1932) quotes the complete expression, in principal, philosophical or with moral, practical sense in a minimum of intonation of Malgain'a, which became classical: "Cervical aponeurosis – this anatomical chameleon which appears every time in a new form as the result of the nib of each person who has tried to describe it". Even A. D. Pansch (1888) in "Essentials of Human Anatomy" said that the neck fascia is the subject of the anatomy that can be considered as being the most confused [2].

Fig. 1. V. N. Shevkunenko.

Practice is truth criteria

It would seem that the settlement of the problem about the cervical fascia is simple – take the scalpel and prepare the region of neck and investigate. Although, the more researchers "appealed to scalpel", the more differences and contradictions appeared.

The main cause of the divergences and contradictions in the description of the neck fasciae is determined by the lack of common concepts, generally accepted, about the structure of fascia and other connective-fibrous formations. That is why practically each connective-fibrous structure in the working field and the author's will can be named (and it is frequently named) fascia and the passion for the "fasciology" led to the fact that the term fascia was assigned even to typical adventitia – coverings of organs and sometimes even a portion of the organ covering, for example the pharynx (*fascia faringobasilaris*).

Causes of divergences and terminological confusions

1. Incertitude in the concepts of "fascia" from the structural point of view. Criteria like density, gloss, fiber orientation and other qualitative features are not conclusive for the recognition of the connective tissue layer between the muscles and organs as the independent formation – the fascia.

2. Lack of "genetic" relationship, i. e. a single source of origin. So, as to one of fascia (the 3rd of 5), according to the origin is considered as a rudimentary muscle and the other (the 4th of 5) is considered to have its origin from the coelomic epithelium.

3. Features for the relations of fascia sheets – fusion and division. As the consequence one and the same fascia sheet can be considered as an independent fascia and/or a constituent part (sheet, lamella) of another fascia. Thus, from this fact results the number of fasciae – from one to six.

4. There are different "topographical" approaches when the fasciae are described. Thus, if we distinguish according to the depth location the superficial fascia and the deep fascia, then vertically in one of the fasciae we distinguish the suprahyoid and infrahyoid portions.

5. Distinguishing between the neck fasciae the "proper" and "improper" fasciae. Proper fasciae are the fasciae which belong only to the neck and they do not spread out of the neck limits and the improper fasciae are spread in other regions.

6. Usage of different words and at the same time words close in meaning while distinguishing the fasciae – fascia, fascia lamella, fascia sheet, fascia plate, aponeurosis, etc.

7. Small number of studies on fasciae (with using for example the anatomic material) and loss in time of the author priorities. In this way Tonkov described the neck fasciae according to Zernov, Zernov according to Vorobyov, Vorobyov according to foreign authors of 19th century, etc.

8. Exaggeration of the importance of fasciae anatomy for the surgeons and the disappointment of practical doctors in the classifications of the proposed neck fasciae because of the difficulty and complexity of the matter.

Cervical fasciae according to manual of V. N. Shevkunenko

However, which description of neck fasciae should be considered as being original in the proposal of classification according to V. N. Shevkunenko?

For the first time this classification was met in a publication of 1934 [3]. Let's analyze this "first" classification.

1. Chapter "Neck", in which the fasciae are described, was written by Professor V. V. Moskalenko, and not by V. N. Shevkunenko.

2. Initially to fasciae were assigned Latin names, though without linguistic equivalent.

3. In the process of fasciae description the author manifests an unusual precaution for the manual: "Neck fasciae". For the schematic presentation of neck fascial laminae he used his own definitions and some new terms for designation of details, which showed that can be admitted the existence of the five cervical fasciae.

4. In the description of fasciae the author refers to an image which is signed as: "Cervical fasciae according to A. P. Samarin" (fig. 2).

5. In the description of three of five fasciae (the 2nd, the 3rd and the 5th) the author refers to Samarin, Gruber, Richet and other authors. The majority of the authors are quoted according to Samarin.

6. The first neck fascia is considered as the prolongation of the common fascia of the body and it is called *fascia superficialis communis*.

Indicator from the point of view of copyrighted priorities constitutes the description of the third fascia: "the following sheet – *facia colli media Gruber* (or *aponeurosis omoclavicularis Richet*, or the deep lamina of a *fascia colli prorpia* – according to Samarin, or the third sheet according to our current schemes".

In this way in the manual edited by V. N. Shevkunenko the cervical fasciae are primordially exposed "according to Samarin" by Professor V. V. Moskalenko, and the priority of the authors in this manual is that they have just numbered the fasciae and called them sheets – the first sheet, the second sheet, etc.

In the following editions of the manuals of topographic anatomy edited by V. N. Shevkunenko, the references to Samarin, as to other authors, have disappeared, and the chapter "Neck" is not written by Professor V. V. Moskalenko, but by Professor A. Y. Sozon-Yaroshevich [4]. In this way the names of some fasciae were modified. Thus, we will present bellow the author's redaction of the fasciae names in the manuals of 1934 year and (in the brackets) 1951 edition years:

1. First sheet – fascia superficialis communis (fascia colli superficialis).

2. The second sheet – fascia colli superficialis Gruber, superficial lamina of fascia colli propria – according to Samarin (lamina superficialis fascia colli propriae).

3. The third sheet – fascia colli media Gruber, aponeurosis omo-clavicularis Richet, deep lamina of fascia colli propriae – according to Samarin (aponeurosis omo-clavicularis).

4. The fourth sheet – fascia endocervicalis (fascia endocervicalis).

5. The fifth sheet – fascia colli profunda, s. prevertebralis, s. lamina parietalis fasciae endocervicalis – according to Samarin (fascia prevertebralis).

In all four editions, including the fourth postmortem (1943) edition of manuals of human anatomy by N. K. Lysenkov and V. I. Bushkovich [5] the neck fasciae are described "according to A. P. Samarin", there are even indicated images with specification "Cervical fasciae according to Samarin". In the fifth authorized edition of this manual (1958), made by M. G. Prives because of the death of both previous authors (V. I. Bushkovich in 1939 and N. K. Lysenkov in 1941) by the indication of the Ministry of Health of USSR and Medgiz Publishing Company, classification of cervical fasciae "according to A. P. Samarin" has disappeared, and for the first time it appeared the classification "according to V. N. Shevkunenko" [6]. Thus, the names and the description of cervical fasciae in the manual of 1958 edited by M. G. Prives practically repeats word by word as in the manual of 1951 edited by V. N. Shevkunenko.

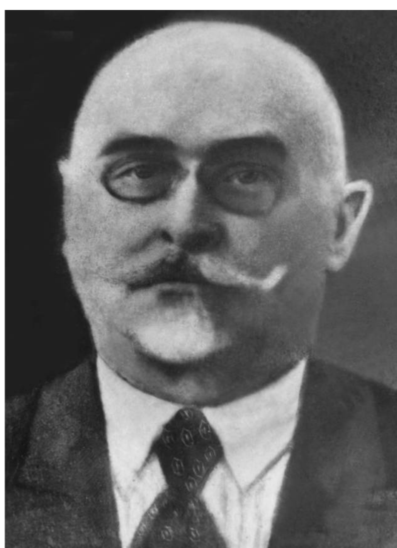

Fig. 2. Professor A. P. Samarin.

In this way, on the initiative of M. G. Prives after six years of V. N. Shevkunenko's death (1872–1952) it has appeared and it continues to exist in the anatomic literature (especially in the Russian literature) the classification of neck fasciae "according to V. N. Shevkunenko". In this way even V. N. Shevkunenko never has assigned to himself the priority of author in the description and names of cervical fasciae. Even more, in all the editions of the existent manuals edited by V. N. Shevkunenko there are references to Samarin, Gruber, Richet and other authors.

Thus, who is A. P. Samarin, who is in fact the main author, but not the single one, the author of the "5 laminae" classification of cervical fasciae and why his name after 1943 has disappeared from the pages of the manuals and monographs.

A. P. Samarin was professor of anatomy, born in 1874, died not earlier than 1925, the author of the biggest and most original research about the neck description.

In 1922 he was appointed the head of the Department of Topographic Anatomy and Operative Surgery of the University of Medicine of Voronezh, Russia. He came from the University of Medicine of Odessa where in 1912 he defends the PhD Thesis under the title: "Investigation of fasciae and connective tissue spaces of the neck", namely in this thesis he for the first time describes endocervical fascia and demonstrates that it is constituted from the parietal and visceral laminae [7, 11]. The copy of his thesis is kept at the National Library of the Belarus Republic [8].

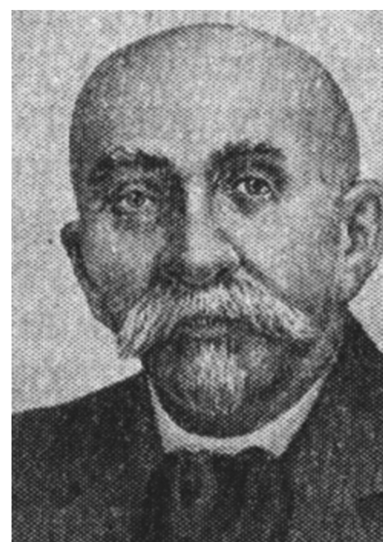

Fig. 3. Professor N. K. Lysenkov.

The title for the PhD was proposed to him by the professor of anatomy N. K. Lysenkov (fig. 3). It is a curious fact that in all editions of the manual of anatomy of the author N. K. Lysenkov in the chapter "The Neck" he refers to his student – A. P. Samarin.

N. K. Lysenkov (1865-1941) was a Russian anatomist and surgeon. In 1893 he finished the faculty of medicine of the University of Moscow; in 1896 he defended the doctor thesis about the cerebral hernia, the theory of formation and its treatment. Since 1902 he was Professor of the Department of Topographic Anatomy and Operative Surgery in the University of Odessa and since 1923 – the head of the department of morphology and physiology [9].

The fate of A. P. Samarin was dramatic and possibly tragic. After the 2nd congress of doctors in Russia, which took place on May 10-14, 1922 in Moscow, through the multitude of the representatives of the dissident intellectuals he was arrested and repressed in the North Siberia. The decisive moment in his arrest was the letter of N. A. Semashko (then he was the commissioner for the health of population), the fact which was certified by the disclosed documents "the doctors repression was coordinated with the commissioner N. A. Semashko" [10]. The fate of A. P. Samarin after the repression is unknown.

Thus, the additional searching for the "correct" names

of neck fasciae and the copyright in their description seem to be inopportune because of the "limitation status", including the incertitude of the main concepts (tissue, fascia, aponeureosis, laminae, plates, etc.). Now the term of "fascia" is unanimously accepted, notwithstanding that it has an indicative character over a concrete structure, but it corresponds sufficiently to the existent idea about fasciae as connective-fibrous coverings of different expression and character – from dense fibrous to thin, lax, cellulous tissue [11].

Now in the anatomy there are kept a lot of vagueness, confusions of terminology, but these historic "mistakes" do not influence significantly the practice. And the "reconciliation" of the parties can be reached by the strict observation of the unique anatomic law – *Nomina Anatomica.*

The international anatomic modern nomenclature (Rome, 1998) – in the composition of a cervical fascia there are three laminae: superficial, pretracheal and prevertebral (it means the 2nd, the 3rd, and the 5th fascia from the list of those five according to the classification of V. N. Shevkunenko. Separately there are distinguished the carotid sheaths and the suspensory ligament of thyroid gland and from the interspascial spaces there is distinguished only the suprasternal space. After the unanimous acceptance of the Parisian International Nomenclature in 1955, the project of the Russian nomenclature elaborated by the commission of Soviet anatomic nomenclature came with the proposal within the International Committee for the Anatomic Nomenclature for the legalization of those five fasciae "according to V. N. Shevkunenko" and adding to this list interfascial spaces because between the cervical fasciae there are narrow clefts and the large spaces. But the International Commission considered these details as being supplementary and has refused the proposal.

Conclusions

The authors of contemporary textbooks and scientific articles describe equally the real anatomy of cervical fasciae in the anterior visceral compartment of the neck, where they are located, what structures envelop, how they delimitate the narrow clefts and large spaces between them, but in the different manner and using different terms for the same fascial leaves. Maybe there is no need to give preference to a concrete classification, of 3 fasciae as in the official Anatomical Nomenclature or of 5 fasciae as is in the textbook of V. N. Shevkunenko. It is enough to know the synonyms of the fascial leaves and consider their clinical significance in the spreading of infection, for opening the cervical phlegmons and performing the surgical approaches.

References

1. Kovanov VV, Anikina TI. Khirurgicheskaia anatomiia fastsii i kletchatochnykh prostranstv cheloveka [Surgical anatomy of fasciae and cellular spaces of the human]. Moscow: Medgiz; 1961. 205 p. Russian.
2. Sokolov NV, Lapkov DM. Kratkoe rukovodstvo po khirurgicheskoi anatomii [Concise guidelines of surgical anatomy]. Kazan (Russia): [publisher unknown]; 1935. 235 p. Russian.
3. Shevkunenko VN, editor. Kurs operativnoi khirurgii s anatomo-topograficheskimi dannymi. Tom 2. [Course of operative surgery with anatomo-topographic data. Vol. 2]. Moscow: Biomedgiz; 1934. 419 p. Russian.
4. Shevkunenko VN, editor. Kratkii kurs operativnoi khirurgii s topograficheskoi anatomiei [Concise course of operative surgery and topographic anatomy]. Leningrad: [publisher unknown]; 1951. 598 p. Russian.
5. Lysenkov NK, Bushkovich VI. Uchebnik normalʹnoi anatomii cheloveka. Izd. 4-e. [Manual of normal anatomy of human]. 4th ed. Leningrad: Medgiz; 1943. 350 p. Russian.
6. Lysenkov NK, Bushkovich VI, Prives MG. Uchebnik normalʹnoi anatomii cheloveka [Manual of normal anatomy of human]. Leningrad: Medgiz; 1958. 784 p. Russian.
7. [Voronezh State Medical University named after N. N. Burdenko] [Internet]. Voronezh (Russia): The University; c2015-2017. [Department of Otorhinolaryngology: History]; [cited 2017 Mar 20]. Available from: http://vrngmu.ru/academy/structure/otorinolaringologiya/3336/ Russian.
8. Samarin AP. Issledovanie fastsii i soedinitelʹnotkannykh promezhutkov shei [Investigation of fasciae and connective tissue spaces of the neck] [dissertation]. Odessa: [Odessa University]; 1912. 249 p. Russian.
9. Petrovskii BV, editor. Bolʹshaia Meditsinskaia Entsiklopediia [Great Medical Encyclopedia] [Internet] 3rd ed.; Online version. Moscow: [Soviet Encyclopedia]; 1974-1989. 30 vol. [cited 2017 May 5]. Available from: http://бмэ.орг/index.php Russian.
10. Vasilʹev KK. ["Semashko model". The professor Samuil Borisovich Dubrovinsky's (1885-1975) recollection about the organizers of the health system and social hygienist N.A. Semashko and his colleagues - Z.P. Soloviov and A.N. Sysin]. Sumsʹkii Istoriko-Arkhivnyi Zhurnal. 2011;14-15:43-52. Russian.
11. Kabak SL, Denisov SD. Fastsii i kletchatochnye prostranstva shei [Neck fasciae and cellular tissue spaces]. Zdravookhranenie (Minsk, Belarus). 2014;7:16-22. Russian.