THE NEW ARMENIAN MEDICAL JOURNAL
Vol.6 (2012), No 1, p. 15-19

INVESTIGATION OF ANATOMICAL AND TOPOGRAPHICAL PECULIARITIES OF LINGUAL DORSAL SURFACE MUCOSA PATTERN IN THE EARLY AND REMOTE POSTMORTAL PERIOD

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ABSTRACT

The investigation on the pattern of dorsum linguae mucosa is suggested here for person identification.

The age and sex dynamics of the changes in the pattern of dorsum linguae can be revealed by color of the mucous membrane of tongue, by location, size, and shape of papillae linguales as well as by variants of folding. The dorsum linguae mucosa changes in case of some diseases of internal organs. As a rule, pathological processes developing in the stomach, liver, and pancreas lead to organic and functional disorders not only of the oral cavity mucosa, but also those of a tongue. Different ethnic groups have differences in appearance and individual peculiarities of the tongue structure.

The forensic practice shows that the putrefactive transformed corpses or their dissected parts are frequent objects for the forensic experts' investigation.

The study of tongues in 290 corpses of both sex was done at different periods after death, beginning from the first days to one month. If studied during the first three days after death, tongue mucosa was throughout glossy, it was pale-pink in color, and the mucosa of dorsal surface was covered with fur of various colors, the intensity of which increased towards the root of the tongue. In seven days after death the mucosa of tongue was glossy throughout, the transforming in mucosa color from pale-pink to dirty-green with a yellowish tint was recorded; the dorsal surface folding, the shape and size of the tongue had not changed practically.

The observed group of 290 corpses included 185 male and 105 female subjects. According to age they were divided into three groups: I group involved subjects from 18 to 30 years old, II group from 31 to 50, III group – from 51 to 80. The cause of death (disease or violent death) was diagnosed for all the corpses.

In a period starting from the 10th day until the third week after death, the mucous membrane of the tongue had the grayish-brown color all over; gradually it was turning into dirty-brown and looked slightly turbid. The tongue somewhat increased in size due to rigor mortis, it was flattened, and became scalloped at the edges.

Starting from the third week after death to a period of one month, the color of tongue was changing all over from a dirty-brown-green to dirty-dark-brown. Only valleculate papillae remained without pronounced putrefactive changes in the mentioned period after death. Their number on both sides could be easy determined; smoothing of torus surrounding the papilla was mentioned. A sharp increase in putrefactive transformation of tongue after 2 months of postmortal period was marked. The structural elements were practically indistinguishable.

Data obtained can be used in forensic identification of unidentified corpses.

KEYWORDS: mucous membrane of the tongue, postmortal period, papillae of the tongue, dynamics of structural changes.

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The investigation on pattern of *dorsum linguae* mucosa, anatomical location of which makes its study accessible by both visual methods and by means of various optical devices is suggested for person identification [*Ayub Fuad, 1993; Pashinyan G.,*

Tuchik E., 1994; Pashinyan G. et al., 1996; Gazhva S., 2000; Sklyaruk A., 2005; Sidneva O., 2006].

The complex of criteria is defined [*Gazhva S., 2000; Sklyaruk A., 2005; Sidneva O., 2006*] that takes into account the color of the mucous membrane of tongue, location, the size and shape of papillae, the variants of folding, which allowed determining the age and sex dynamics in changes of the *dorsum linguae* pattern. A set of criteria is also defined for diseases of internal organs, taking into account the changes in mucosa of the back of tongue; the influence of ethnic differences in the appearance on the individual features of the tongue structure are determined. There is no doubt that changes in the oral mucosa are closely connected with the diseases of internal organs, since there is a close anatomical-and-physiological functional relationship between the organs of gastrointestinal tract and the oral cavity [*Pashinyan G., Tuchik E., 1994; Pashinyan G., et al., 1999a*; *1999b*]. Pathological processes developing in the stomach, liver, and pancreas, as a rule, lead to organic and functional disorders not only of the oral mucosa, but also those of a tongue.

The practice of forensic medical examination shows that putrefactive transformed corpses or their dissected parts are frequent objects of investigation for the forensic medical examiners, thus greatly complicating the solution of many problems of law enforcement authorities [*Clark D., 1990; Pashinyan G., Zharov V., 1990; Belyaeva E., 1992; 1993; Tomilin V. et al., 1996; Chemekov R., 1999; Manin A., 2004; Zolotukhin V., 2006*].

In connection with the above mentioned, we had a task to study the degree of preservation of anatomical-and-topographical parameters of mucosa of the dorsal surface of tongue, depending on the time of death.

The study of tongues in 290 corpses of both sex was performed in order to solve this task. The observed group included 185 male corpses and 105 female ones. According to age, they were divided into three groups: I group involved subjects from 18 to 30 years, II group from 31 to 50 years, III group from 51 to 80 years. The cause of death (disease or violent death) was diagnosed for all the corpses.

The Table below presents distribution of cadaveric material.Usually, the tongue is soft and delicate, its movements are free and not constrained, and it is pink in color. The normal tongue is also moderately humid and is covered with a thin white layer of fur.

Table.

Distribution of cadaveric material

Sex	Number	Age
Male	35	18–30
	77	31–50
	73	51–80
Female	19	18–30
	37	31–50
	49	51–80

Tongues withdrawn after section were kept isolated in Petri dishes at room temperature and 40-60% air humidity for 18-20 hours. The color of the *dorsum linguae* mucosa, the state of fur, its intensity and spreading, presence or absence of pigmentation of the tongue were fixed. The angle of terminal groove geometric dimensions, location, and number of vallate papillae were defined. To study the condition of the mucous membrane of the tongue in dynamics of the postmortal period, the anatomical-and-topographic features of the tongue were investigated using the visual inspection and "SONY" digital camera for registration of images at different time-windows after death.

At examination of the tongue during the first three days after death mucosa was throughout glossy, pale-pink in color. Dorsal surface mucosa was covered with fur of various colors, the intensity of which increased towards the root of the tongue Figure 1).

Figure 1. *Post mortem day 3.*

The valleculate papillae were located along the terminal groove, their number varied. In most cases, they were located equally in each half of the tongue.

The filiform papillae occupied practically the entire surface of the tongue. In most cases, they were conic and looked like the eminence of the mucous membrane. These papillae were thicker at the tip of tongue forming compact areas, where they were randomly spread at a certain distance from each other, but on the back of tongue they lay in rows. The base of papillae, 0.2-0.3 *mm* in diameter, was rounded, with sharp tops. There were also the filiform papillae with impressed apexes, resembling rectangle, oval, or triangle. They were covered with substantial amount of non-desquamated epithelium, mostly whitish, which formed irregularities on the surface. In the central part the filiform papillae were more pronounced and relatively larger.

The fungiform papillae were located mainly at the tip and the lateral surface, as well as on the back of the tongue and terminal groove. On the back of the tongue their size was greater than at the tip. Papillae were oval or rounded in shape with sharp edges, towering above the filiform papillae. The foliate papillae more frequently took the form of folds and were located in the lateral parts of posterior half of the tongue.

Such a morphological pattern mainly preserved within seven days of postmortal period (Figure 2).

A week after death the mucosa of tongue was throughout glossy. The changes in mucosa color from pale-pink to dirty-green with a yellowish tint were recorded. The dorsal surface folding, the shape and size of the tongue had not actually changed. The amount, color, and localization of the fur were rather difficult to define. The degree of expressiveness of filiform papillae was also poorly defined. However, the relief elements of dorsal surface of the tongue were rather clearly visualized. Significant changes in the pattern were not revealed.

From day 10 to 20 after death, the mucous membrane of the tongue (Figure 3) was all over grayish-brown in color, gradually turning into a dirty-brown one and appeared to be slightly turbid. The tongue somewhat increased in size due to the

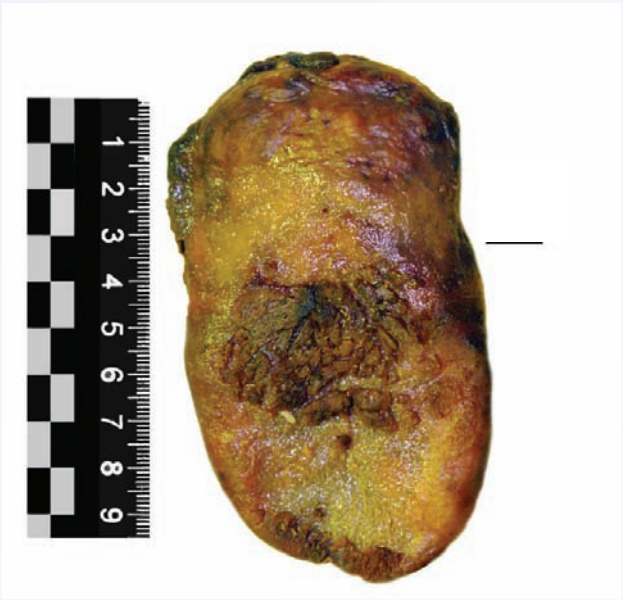

Figure 3. *Post mortem day 18.*

complete *rigor mortis*, it was flattened, and became scalloped at edges. The foliate papillae folds were clearly identified; it was easy to determine their number, both right and left. The fungiform papillae looked as red dots of different diameter. The valleculate papillae were arranged V-shaped, in parallel to the terminal groove. The tubercle around papillae was preserved.

If postmortal period made 20 to 24 days (Figure 4), the mucosa of tongue acquired a dirty-brown-green color throughout. When touched, the mucosa easily exfoliated as dirty-brown grafts with fringed edges. The entire surface was covered with a dirty-gray-yellow mucoid fur, which stretched as fila-

Figure 2. *Post mortem day 7.*

Figure 4. *Post mortem day 24.*

ments if touched by forceps. Putrefactive blisters were not found.

After removal of fur from the surface of tongue, among the structural elements red spots of fungiform papillae were clearly seen in their usual localization. The valleculate papillae remained without any visible changes.

In 25-30 days after death, the mucosa of tongue had significant putrefactive changes in all parts. The color of mucosa was dirty-dark-brown. Over the entire surface, there were small-foci defects, through which the muscle layer was viewed in the form of decaying dark-brown mass. All the structural elements of mucous membrane of the dorsal surface of tongue were almost indistinguishable in practice. Only the valleculate papillae remained without pronounced putrefactive changes in the mentioned period after death. Their number on both sides could be determined without great efforts; smoothing of torus surrounding the papilla was recorded.

Sharp increase in putrefactive transformation of tongue was marked after 2 months of postmortal period. The mucosa had significant defects; it was of dirty-gray color with multiple putrefactive blisters. The tongue muscle was flabby, pappy. The structural elements were practically indistinguishable.

Summarizing the above mentioned, it can be stated that in a period up to one month after death the anatomical-and-topographic features of the mucous membrane of tongue retain their diagnostic value and can be used for person identification. Moreover, morphometric dimensions of tongue, the number of vallate papillae and the angle of terminal groove, which remain relatively longer than other structural elements of tongue and are the main temporal indicators of pathological changes of the tongue, are the most significant features.

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