PECULIARITIES OF ETIOLOGY, CLINICAL IMAGE AND TREATMENT OF PATIENTS WITH TUMORS OF THE JAWS, INCLUDING SALIVARY GLAND TISSUE

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Abstract

The article discusses the etiologic factors, peculiarities of clinical picture and treatment of patients with tumors of the jaws, which include the salivary gland tissue. Two cases of adenocystic tumors of the upper and lower jaws and adenocarcinoma in jaw's bony tissue are described. Histological preparations of the upper jaw of 7 embryos were conducted and some special features were evaluated: glandular epithelium was detected in the maxilla at 9 weeks of intrauterine life; development of cysts and tumors of the jaws with the inclusion of glandular tissue, that can be associated with their formation from embryonic remnants of salivary glands; epithelial pearls in the tissues of the jaws observed even in fetuses at 4 months of intrauterine development.

Keywords: *salivary gland, cyst, tumor, jaws, adenocarcinoma, Ki-67.*

1. INTRODUCTION

In the clinic of maxillofacial surgery, the diagnosis and treatment of intraosseous tumor-like and tumor formations are particularly difficult, as a significant part of these pathological formations contains epithelial structures, the origin of which is relativly unknown and controversial [1,2].

Thus, most researchers associate the formation of the epithelial lining of radicular cysts with its development from the remnants (Malyasse islets) of the epithelium of the dental plate [3-5].

In the medical literature, there are practically no explanations about the findings of glandular epithelium in cysts and tumors occurring in the bony tissue of jaws. Indications of heterotopicity (included in jaws, as well) of the laying of the parotid gland in an embryo at 6-7 weeks of development have no histological confirmation [6,7].

Nevertheless, the clinic image shows a number of intraosseous pathological formations that include the salivary gland tissue. This is a group of glandular odontogenic cysts (GOC), central (intramaxillary) mucoepidermoid tumor, adenocarcinoma, adenomatoid odontogenic tumor (adenoameloblastoma) [2,8,9].

The glandular-odontogenic cyst is a rather rare disease. Up to now, no more than 100 cases of this pathology have been described. For the first time, an odontogenic cyst with the presence of glandular epithelial tissue was called sialo-odontogenic by Padayache and Van Wyk in 1987. Later, Gardner *et al*. (1988) described it as a «glandular-odontogenic cyst» [10-12] .

Detection of salivary gland tissues in the pathological foci of the jaw bones remains unclear, requiring a special histological study of the features of the formation of jaws and clinical observations.

Goal. To study the histological features of the formation of the jaws of the human embryo and fetus, which could explain the appearance of the glandular epithelium in the jaws.

2. MATERIALS AND METHODS

Histological preparations of the upper jaw of 7 embryos and fetuses in terms of development from 5 to 16 weeks were made. A description of two clinical cases of adenocystic carcinomas of the upper and lower jaws is also provided.

3. RESULTS

In the Department of Maxillofacial Surgery of the "M.I.Pirogov"Vinnytsia Regional Clinical Hospital, two cases of adenocystic

carcinomas were detected between 2016 and 2022 [8] .

Clinical example 1. Patient K., 40 years-old, medical card № 13172, was hospitalized in the maxillofacial surgery department of the Vinnytsia Regional Clinical Hospital with a preliminary diagnosis of «cysts of the upper jaw in projection 3.1-2.1 and lower jaws in projection 3.5-3.8». On the panoramic X-ray taken on July 13, 2016, a bone cavity between 3.1-2.1 (indistinct) and between 3.5-3.8 - multi-chambered with inclusions of osteoid tissue is determined (Fig. 1).

Excochleation of cysts of the upper and lower jaw was performed under intubation anesthesia on 14.07.2016. During the operation, in addition to the removal of tissues of cystic formations, deepening of the bone walls was carried out with a burr and a cutter, to increase the ablasticity of the operation and prevent recurrence.

Histologically, a diagnosis of «adenocystic tumors of the upper and lower jaws» was established. In the International histological classification of WHO № 5 (1971), this type of tumor corresponds to point 4 - adenomatoid odontogenic tumor (adenoameloblastoma), however, an immunohistochemical study taking into account the BCL -2 oncoprotein and the high proliferative activity of the Ki-67 antigen, evidenced that the histological picture corresponds to cystic carcinoma of the salivary glands. Taking into account the deepening of the bone walls with burr during the operation (dredging method), radiation therapy with follow-up was chosen for further treatment. The patient underwent a postoperative course of radiation therapy at a dose of 40 Gy. No recurrence of the tumor was detected during follow-up over the next year.

Fig. 1. Panoramic radiograph of the jaws of patient K., 40 years-old. In the body of the lower jaw on the left side in the projection of 35-38 teeth, a multi-chambered cavity filled with tumor and osteoid tissue is determined. The edges of the bone cavity are limited by the rim of sclerosis. The cystic cavity on the upper jaw is less clearly defined, but it covers teeth 14, 13, 12.

Clinical case 2. Patient P., 55 years-old, came for consultation at the maxillofacial surgery clinic of the Vinnytsia Regional Clinical Hospital regarding a «radicular cyst of the upper jaw on the left in area 2.6» - institution's diagnosis, which was referred to the patient. During the examination, in the area of 2.6 of the tooth, an oval-shaped protrusion of the cortical plate with relatively clear boundaries, about 1 cm in diameter, was found, in the center of which softening was palpable (due to the absence of the cortical plate). On the intraoral radiograph of the alveolar process of the upper jaw on the left side in area 2.6, thinning of the bone tissue of a rounded shape with practically clear edges with a diameter of up to 1.5 cm was visualized. The niche of the left maxillary sinus was clearly observed, without pathological changes. Extraction of 2.6 tooth and cystectomy were performed under sedation. The histological conclusion is «adenocarcinoma with a moderate degree of differentiation and inflammatory infiltration» (Figs. 2, 3).

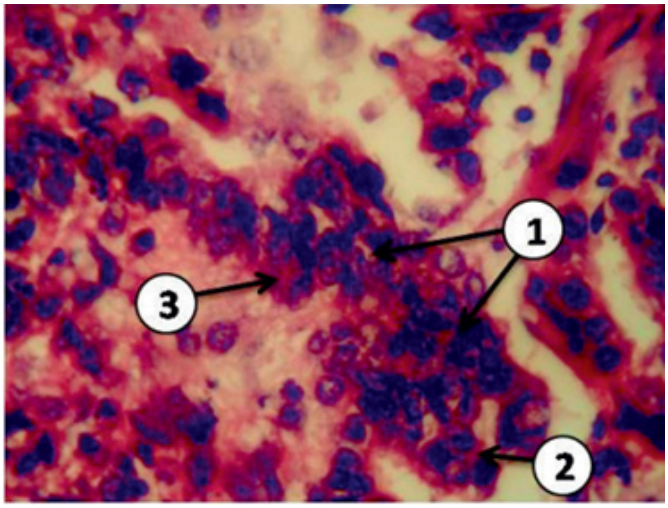

Fig. 2. Fragment of adenocarcinoma with a moderate degree of differentiation and inflammatory infiltration. Objective x 40. Eyepiece x 10. Hematoxylin - eosin (HE). 1-nuclear polymorphism, 2 – solid structures, 3 – eosinophilic secretion

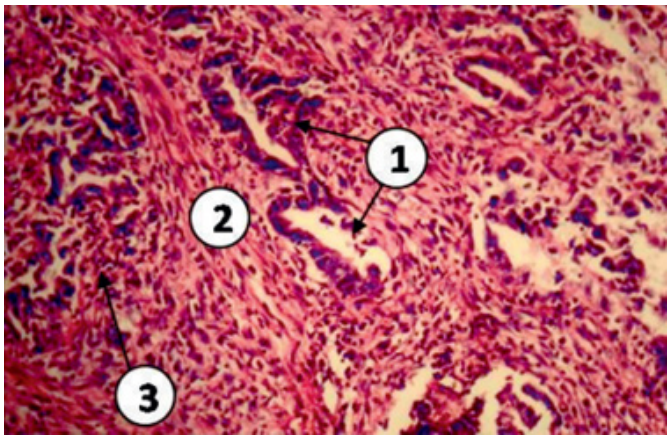

Fig. 3. Fragment of adenocarcinoma with a moderate degree of differentiation and inflammatory infiltration. Objective x 10. Eyepiece x 10. Hematoxylin - eosin (HE). 1 - salivary glands with hyperchromic epithelium, 2 - fibrous tissue, 3 - inflammatory cell elements

No postoperative radiation therapy was performed. During postoperative observation along 6 months, there was no recurrence of the tumor.

In order to establish the pathogenesis of the development of pathologies of the upper jaw, including the tissues of the salivary glands, a study of histological preparations of the upper jaws of 7 embryos was conducted, the following features being revealed: in the middle of the fifth week of intrauterine development of the embryo, the primary palate (premaxilla) is represented by the median location of the condensed mesenchyme (Fig. 4). This structure is a remnant (derivative) of the frontal process - the central source of the upper jaw, located between the middle nasal processes (the other two are paired maxillary processes of the 1st (mandibular) gill arch). Later on, fusion of these appendages forms the hard palate, and the stomodeum is divided into the oral and nasal cavities.

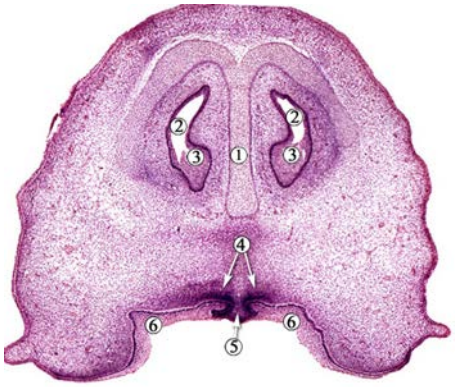

Fig. 4. Horizontal section of the head of a human embryo, 7.0 mm parietal-coccygeal length **(middle of the 5th week of intrauterine development). Hematoxylin-eosin. Objective x 8. Eyepiece x7: 1 – beginning of the cartilage capsule; 2 – rudiments of nasal conchas; 3 – epithelial plug; 4 – mesenchyme condensation in the area of the incisor bone bud; 5 – primary palate; 6 – multilayered flat nonkeratinized epithelium of the stomodeum**

A well-defined basal membrane of the epithelial lining of the stomodeum is demonstrated (Fig. 4, item 6) (primary oro-nasal cavity), and condensation of the underlying mesenchyme (Fig. 4, item 4), which is the source of bone tissue formation.

At the end of the eighth week (Fig. 5), epithelial bodies formed from layers of epithelium are observed in the area of the seam

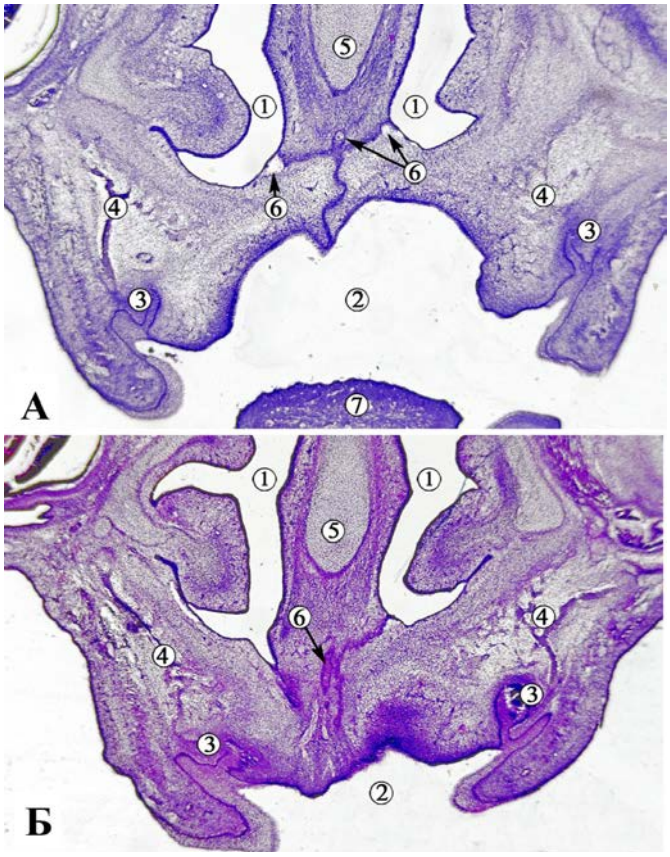

Fig. 5 . Frontal section of the head of a human embryo, 30.0 mm parietal-coccygeal length **(end of the 8th week of intrauterine development). Hematoxylin-eosin. Objective x 8. Eyepiece x7: 1 – nasal cavity; 2 – oral cavity; 3 – dental rudiments; 4 – bone tissue; 5 – nasal septum; 6 – epithelial bodies**

At the beginning of the ninth week of intrauterine development (Fig. 6) near cellular plates (Ffig. 6, p. 2) epithelials interspersed among loose connecting tissue (its source being the mesenchyme) of the upper jaw were found.

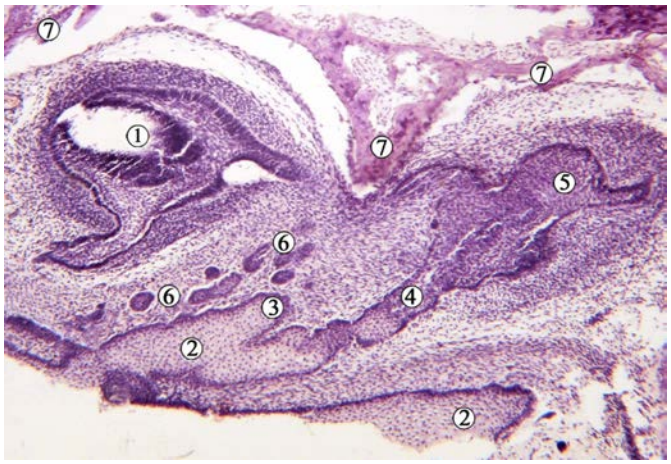

Fig . 6. Oblique-longitudinal cut areas of the upper jaws fetus human, 31.0 mm parietal-coccygeal length **(beginning of the 9th week intrauterine development). Hematoxylin - eosin. Objective x 8. Eyepiece x7: 1 – dental rudiment; 2 – multilayered flat nonkeratinized epithelium of the oral cavity; 3 – neck of the enamel organ; 4 – vestibular (dental) plate; 5 – placement of a permanent tooth; 6 – glandular epithelium in the thickness of the mesenchyme; 7 – bone tissue**

On the 9th week (Fig. 7), a definitive pseudomultilayered cubic or columnar ciliated epithelium appears, which replaces the single-layered flat one. Remains of exfoliated epitheliocytes are observed in the nasal cavity, as well as in the canal leading to the oral cavity.

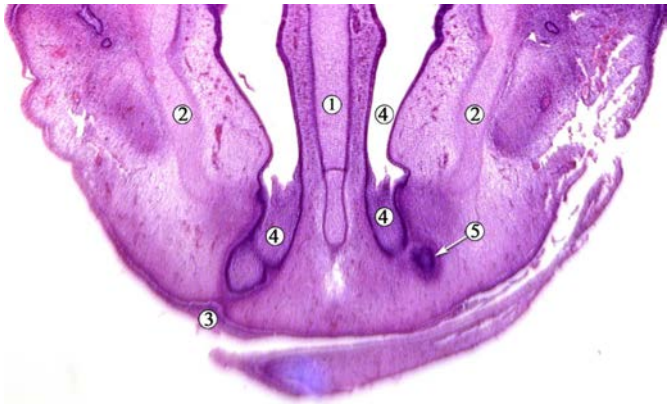

Fig. 7 . Frontal section of the upper jaw of a human fetus, 35.0 mm parietal-coccygeal length **(9th week of intrauterine growth). Hematoxylin-eosin. Objective x 8. Eyepiece x7: 1 – beginning of the nasal septum; 2 – cartilaginous nasal capsule; 3 – multilayered flat nonkeratinized epithelium of the oral cavity; 4 – nasal cavity lined with pseudo-multilayer cubic epithelium, with remnants of the "epithelial crust" of the nasal cavity (in the process of fusion of the frontal process and processes of the maxillary (first) gill arch); 5 – fragment of the "epithelial crust" among the mesenchyme of the bud of the upper jaw**

A three-dimensional computer reconstruction was obtained from a series of histological sections of a fragment of the upper jaw from a 9 week-old human fetus (Fig. 8). Reconstruction permitted to determine the spatial form incisor bone, which has the form of a «comma», and its dimensions are 2.6x0.6 mm. Also visualized is the lobe-nasal organ (Jacobson) (blue color) and a fragment of the epithelium in the seam between the bones (green color).

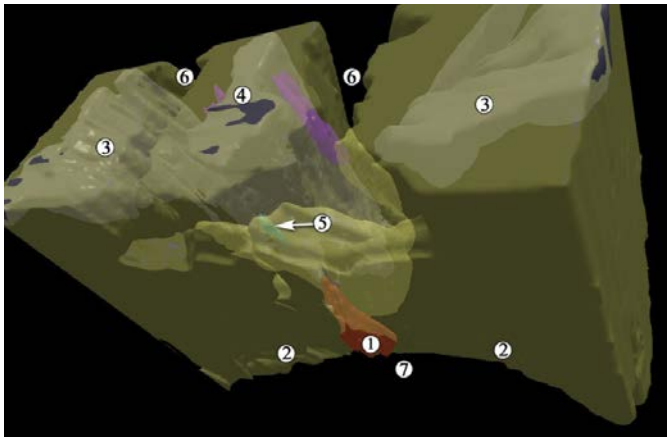

Fig. 8. Three-dimensional computer reconstruction of a series of histological sections of a fragment of the upper jaw of a 9 week-old human fetus. Posterior lower-right projection. Magnification**: x40: 1 – incisor bone; 2 – beginning of the alveolar process of the upper jaw; 3 – bone tissue of the upper jaw; 4 – nasal septum; 5 – epithelial body; 6 – nasal cavity; 7 – oral cavity**

On the 10th week of intrauterine development, it was obtained a preparation in the area where the front edge of the nasal septum connects to the upper jaw (Fig. 9) - the nasolabial suture, where the duct is located.

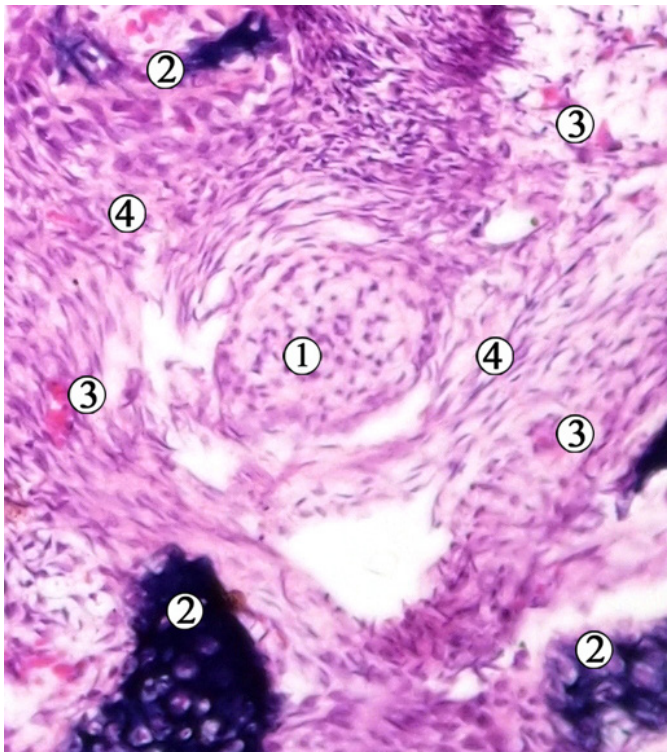

Fig. 9. Fragment of the upper jaw of a human fetus, 48.0 mm parietal-coccygeal length **(10th week of intrauterine development). Hematoxylin-eosin. Objective x 20. Eyepiece x7: 1 – epithelial body; 2 – bone tissue; 3 – blood vessels; 4 – loose connective tissue**

At the beginning of the 4th month of intrauterine development, the epithelial bodies that ended up in the seam area (originating from the mesoderm) are determined as remains of the covering epithelium (Fig. 10).

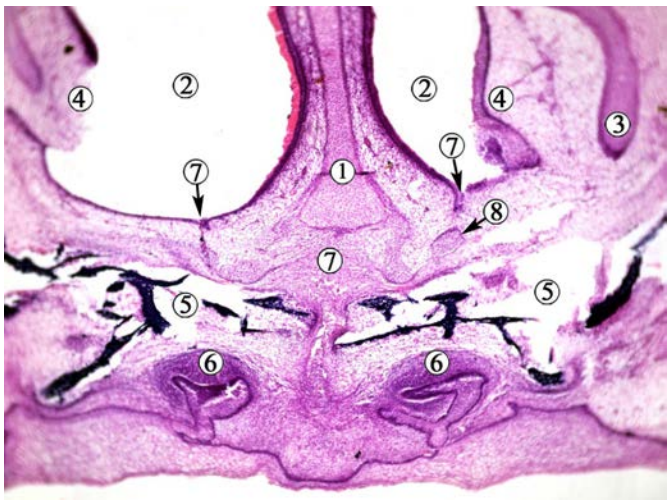

Fig. 10. Frontal section of the upper jaw, 88.0 mm parietal-coccygeal length **fetus (beginning of the 4th month of intrauterine development). Hematoxylin-eosin. Objective x 8. Eyepiece x7: 1 – nasal septum; 2 – nasal cavity; 3 – cartilaginous capsule of the nose; 4 – lower nasal concha; 5 – bone tissue; 6 – rudiments of teeth; 7 – naso-maxillary suture (as a result of fusion of the embryonic sources of the upper jaw – frontal process and paired maxillary processes of the 1st (mandibular) gill arches); 8 – epithelial body**

Thus, salivary gland cells were found in the preparation of a 9 week-old human fetus, and epithelial bodies that can become sources of the development of pathologies of the frontal area of the upper jaw - from the end of the 8th week to the beginning of the 4th month, inclusively.

4. DISCUSSION

Probably, the origin of the glandular epithelium found in the pathological foci of the jaws is from embryonic remains. As known, these cells are usually found in embryos and fetuses during the formation of jaws at 2-3 months of intrauterine life. From the 3rd month on, the process of involution of the glandular epithelium begins in the fetus [7]. Probably, these deposits of glandular epithelium can be preserved in a number of cases until the adult age of a person, just like the epithelium of the islets of Malyasse. In a number of animals (snake reptiles, mammals - Haitian jawtooth -) the epithelium of the jaw glands produces poison.

Thus, data of the histological study of the bone and epithelial structures of the upper jaw of human embryos and fetuses indicates the presence in them not only of the epithelial remains of the dental plate, the mucous membrane of the mouth and nose, but also the glandular epithelium of the embryonic salivary glands. These histological findings can explain the detection of salivary gland tissue in cysts and tumors of the jaws, including malignant ones.

5. CONCLUSIONS

1. Glandular-odontogenic cysts and tumors containing salivary gland tissue can also be observed in the bones of the jaws.
2. In histological preparations of the upper jaw of embryos and fetuses, glandular epithelium

is detected during the examination of bone tissue at 9 weeks of intrauterine life.

3. Detection of cysts and tumors of the jaws with the inclusion of glandular tissue can be associated with their development from embryonic remnants of the salivary glands.
4. Epithelial inclusions (pearls) in the tissues of the jaws were observed in histological preparations even in fetuses at 4 months of intrauterine development, which is a potential source of the evolutionary cysts of the jaws.

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