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ЕЖЕМЕСЯЧНЫЙ НАУЧНЫЙ ЖУРНАЛ

Медицинские новости Грузии

საქართველოს სამედიცინო სიახლენი

GEORGIAN MEDICAL NEWS

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GMN: Georgian Medical News is peer-reviewed, published monthly journal committed to promoting the science and art of medicine and the betterment of public health, published by the GMN Editorial Board since 1994. GMN carries original scientific articles on medicine, biology and pharmacy, which are of experimental, theoretical and practical character; publishes original research, reviews, commentaries, editorials, essays, medical news, and correspondence in English and Russian.

GMN is indexed in MEDLINE, SCOPUS, PubMed and VINITI Russian Academy of Sciences. The full text content is available through EBSCO databases.

GMN: Медицинские новости Грузии - ежемесячный рецензируемый научный журнал, издаётся Редакционной коллегией с 1994 года на русском и английском языках в целях поддержки медицинской науки и улучшения здравоохранения. В журнале публикуются оригинальные научные статьи в области медицины, биологии и фармации, статьи обзорного характера, научные сообщения, новости медицины и здравоохранения. Журнал индексируется в MEDLINE, отражён в базе данных SCOPUS, PubMed и ВИНИТИ РАН. Полнотекстовые статьи журнала доступны через БД EBSCO.

GMN: Georgian Medical News – საქართველოს სამედიცინო სიახლენი – არის ყოველთვიური სამეცნიერო სამედიცინო რეცენზირებადი ჟურნალი, გამოიცემა 1994 წლიდან, წარმოადგენს სარედაქციო კოლეგიისა და აშშ-ის მეცნიერების, განათლების, ინდუსტრიის, ხელოვნებისა და ბუნებისმეტყველების საერთაშორისო აკადემიის ერთობლივ გამოცემას. GMN-ში რუსულ და ინგლისურ ენებზე ქვეყნდება ექსპერიმენტული, თეორიული და პრაქტიკული ხასიათის ორიგინალური სამეცნიერო სტატიები მედიცინის, ბიოლოგიისა და ფარმაციის სფეროში, მიმოხილვითი ხასიათის სტატიები.

ჟურნალი ინდექსირებულია MEDLINE-ის საერთაშორისო სისტემაში, ასახულია SCOPUS-ის, PubMed-ის და ВИНИТИ РАН-ის მონაცემთა ბაზებში. სტატიების სრული ტექსტი ხელმისაწვდომია EBSCO-ს მონაცემთა ბაზებიდან.

WEBSITE

www.geomednews.com

К СВЕДЕНИЮ АВТОРОВ!

При направлении статьи в редакцию необходимо соблюдать следующие правила:

1. Статья должна быть представлена в двух экземплярах, на русском или английском языках, напечатанная через **полтора интервала на одной стороне стандартного листа с шириной левого поля в три сантиметра**. Используемый компьютерный шрифт для текста на русском и английском языках - **Times New Roman** (**Кириллица**), для текста на грузинском языке следует использовать **AcadNusx.** Размер шрифта - **12**. К рукописи, напечатанной на компьютере, должен быть приложен CD со статьей.

2. Размер статьи должен быть не менее десяти и не более двадцати страниц машинописи, включая указатель литературы и резюме на английском, русском и грузинском языках.

3. В статье должны быть освещены актуальность данного материала, методы и результаты исследования и их обсуждение.

При представлении в печать научных экспериментальных работ авторы должны указывать вид и количество экспериментальных животных, применявшиеся методы обезболивания и усыпления (в ходе острых опытов).

4. К статье должны быть приложены краткое (на полстраницы) резюме на английском, русском и грузинском языках (включающее следующие разделы: цель исследования, материал и методы, результаты и заключение) и список ключевых слов (key words).

5. Таблицы необходимо представлять в печатной форме. Фотокопии не принимаются. **Все цифровые, итоговые и процентные данные в таблицах должны соответствовать таковым в тексте статьи**. Таблицы и графики должны быть озаглавлены.

6. Фотографии должны быть контрастными, фотокопии с рентгенограмм - в позитивном изображении. Рисунки, чертежи и диаграммы следует озаглавить, пронумеровать и вставить в соответствующее место текста **в tiff формате**.

В подписях к микрофотографиям следует указывать степень увеличения через окуляр или объектив и метод окраски или импрегнации срезов.

7. Фамилии отечественных авторов приводятся в оригинальной транскрипции.

8. При оформлении и направлении статей в журнал МНГ просим авторов соблюдать правила, изложенные в «Единых требованиях к рукописям, представляемым в биомедицинские журналы», принятых Международным комитетом редакторов медицинских журналов - http://www.spinesurgery.ru/files/publish.pdf и http://www.nlm.nih.gov/bsd/uniform_requirements.html
В конце каждой оригинальной статьи приводится библиографический список. В список литературы включаются все материалы, на которые имеются ссылки в тексте. Список составляется в алфавитном порядке и нумеруется. Литературный источник приводится на языке оригинала. В списке литературы сначала приводятся работы, написанные знаками грузинского алфавита, затем кириллицей и латиницей. Ссылки на цитируемые работы в тексте статьи даются в квадратных скобках в виде номера, соответствующего номеру данной работы в списке литературы. Большинство цитированных источников должны быть за последние 5-7 лет.

9. Для получения права на публикацию статья должна иметь от руководителя работы или учреждения визу и сопроводительное отношение, написанные или напечатанные на бланке и заверенные подписью и печатью.

10. В конце статьи должны быть подписи всех авторов, полностью приведены их фамилии, имена и отчества, указаны служебный и домашний номера телефонов и адреса или иные координаты. Количество авторов (соавторов) не должно превышать пяти человек.

11. Редакция оставляет за собой право сокращать и исправлять статьи. Корректура авторам не высылается, вся работа и сверка проводится по авторскому оригиналу.

12. Недопустимо направление в редакцию работ, представленных к печати в иных издательствах или опубликованных в других изданиях.

При нарушении указанных правил статьи не рассматриваются.

REQUIREMENTS

Please note, materials submitted to the Editorial Office Staff are supposed to meet the following requirements:

1. Articles must be provided with a double copy, in English or Russian languages and typed or compu-ter-printed on a single side of standard typing paper, with the left margin of **3** centimeters width, and **1.5** spacing between the lines, typeface - **Times New Roman** (**Cyrillic**), print size - **12** (referring to Georgian and Russian materials). With computer-printed texts please enclose a CD carrying the same file titled with Latin symbols.

2. Size of the article, including index and resume in English, Russian and Georgian languages must be at least 10 pages and not exceed the limit of 20 pages of typed or computer-printed text.

3. Submitted material must include a coverage of a topical subject, research methods, results, and review.

Authors of the scientific-research works must indicate the number of experimental biological species drawn in, list the employed methods of anesthetization and soporific means used during acute tests.

4. Articles must have a short (half page) abstract in English, Russian and Georgian (including the following sections: aim of study, material and methods, results and conclusions) and a list of key words.

5. Tables must be presented in an original typed or computer-printed form, instead of a photocopied version. **Numbers, totals, percentile data on the tables must coincide with those in the texts of the articles.** Tables and graphs must be headed.

6. Photographs are required to be contrasted and must be submitted with doubles. Please number each photograph with a pencil on its back, indicate author's name, title of the article (short version), and mark out its top and bottom parts. Drawings must be accurate, drafts and diagrams drawn in Indian ink (or black ink). Photocopies of the X-ray photographs must be presented in a positive image in **tiff format**.

Accurately numbered subtitles for each illustration must be listed on a separate sheet of paper. In the subtitles for the microphotographs please indicate the ocular and objective lens magnification power, method of coloring or impregnation of the microscopic sections (preparations).

7. Please indicate last names, first and middle initials of the native authors, present names and initials of the foreign authors in the transcription of the original language, enclose in parenthesis corresponding number under which the author is listed in the reference materials.

8. Please follow guidance offered to authors by The International Committee of Medical Journal Editors guidance in its Uniform Requirements for Manuscripts Submitted to Biomedical Journals publication available online at: http://www.nlm.nih.gov/bsd/uniform_requirements.html
http://www.icmje.org/urm_full.pdf
In GMN style for each work cited in the text, a bibliographic reference is given, and this is located at the end of the article under the title "References". All references cited in the text must be listed. The list of references should be arranged alphabetically and then numbered. References are numbered in the text [numbers in square brackets] and in the reference list and numbers are repeated throughout the text as needed. The bibliographic description is given in the language of publication (citations in Georgian script are followed by Cyrillic and Latin).

9. To obtain the rights of publication articles must be accompanied by a visa from the project instructor or the establishment, where the work has been performed, and a reference letter, both written or typed on a special signed form, certified by a stamp or a seal.

10. Articles must be signed by all of the authors at the end, and they must be provided with a list of full names, office and home phone numbers and addresses or other non-office locations where the authors could be reached. The number of the authors (co-authors) must not exceed the limit of 5 people.

11. Editorial Staff reserves the rights to cut down in size and correct the articles. Proof-sheets are not sent out to the authors. The entire editorial and collation work is performed according to the author's original text.

12. Sending in the works that have already been assigned to the press by other Editorial Staffs or have been printed by other publishers is not permissible.

Articles that Fail to Meet the Aforementioned Requirements are not Assigned to be Reviewed.

ავტორთა საყურადღებოდ!

რედაქციაში სტატიის წარმოდგენისას საჭიროა დავიცვათ შემდეგი წესები:

1. სტატია უნდა წარმოადგინოთ 2 ცალად, რუსულ ან ინგლისურ ენებზე,დაბეჭდილი სტანდარტული ფურცლის 1 გვერდზე, 3 სმ სიგანის მარცხენა ველისა და სტრიქონებს შორის 1,5 ინტერვალის დაცვით. გამოყენებული კომპიუტერული შრიფტი რუსულ და ინგლისურენოვან ტექსტებში - **Times New Roman (Кириллица)**, ხოლო ქართულენოვან ტექსტში საჭიროა გამოვიყენოთ **AcadNusx.** შრიფტის ზომა – 12. სტატიას თან უნდა ახლდეს CD სტატიით.

2. სტატიის მოცულობა არ უნდა შეადგენდეს 10 გვერდზე ნაკლებს და 20 გვერდზე მეტს ლიტერატურის სიის და რეზიუმეების (ინგლისურ, რუსულ და ქართულ ენებზე) ჩათვლით.

3. სტატიაში საჭიროა გაშუქდეს: საკითხის აქტუალობა; კვლევის მიზანი; საკვლევი მასალა და გამოყენებული მეთოდები; მიღებული შედეგები და მათი განსჯა. ექსპერიმენტული ხასიათის სტატიების წარმოდგენისას ავტორებმა უნდა მიუთითონ საექსპერიმენტო ცხოველების სახეობა და რაოდენობა; გაუტკივარებისა და დაძინების მეთოდები (მწვავე ცდების პირობებში).

4. სტატიას თან უნდა ახლდეს რეზიუმე ინგლისურ, რუსულ და ქართულ ენებზე არანაკლებ ნახევარი გვერდის მოცულობისა (სათაურის, ავტორების, დაწესებულების მითითებით და უნდა შეიცავდეს შემდეგ განყოფილებებს: მიზანი, მასალა და მეთოდები, შედეგები და დასკვნები; ტექსტუალური ნაწილი არ უნდა იყოს 15 სტრიქონზე ნაკლები) და საკვანძო სიტყვების ჩამონათვალი (key words).

5. ცხრილები საჭიროა წარმოადგინოთ ნაბეჭდი სახით. ყველა ციფრული, შემაჯამებელი და პროცენტული მონაცემები უნდა შეესაბამებოდეს ტექსტში მოყვანილს.

6. ფოტოსურათები უნდა იყოს კონტრასტული; სურათები, ნახაზები, დიაგრამები - დასათაურებული, დანომრილი და სათანადო ადგილას ჩასმული. რენტგენოგრამების ფოტოასლები წარმოადგინეთ პოზიტიური გამოსახულებით **tiff** ფორმატში. მიკროფოტოსურათების წარწერებში საჭიროა მიუთითოთ ოკულარის ან ობიექტივის საშუალებით გადიდების ხარისხი, ანათალების შეღებვის ან იმპრეგნაციის მეთოდი და აღნიშნოთ სურათის ზედა და ქვედა ნაწილები.

7. სამამულო ავტორების გვარები სტატიაში აღინიშნება ინიციალების თანდართვით, უცხოურისა – უცხოური ტრანსკრიპციით.

8. სტატიას თან უნდა ახლდეს ავტორის მიერ გამოყენებული სამამულო და უცხოური შრომების ბიბლიოგრაფიული სია (ბოლო 5-8 წლის სიღრმით). ანბანური წყობით წარმოდგენილ ბიბლიოგრაფიულ სიაში მიუთითეთ ჯერ სამამულო, შემდეგ უცხოელი ავტორები (გვარი, ინიციალები, სტატიის სათაური, ჟურნალის დასახელება, გამოცემის ადგილი, წელი, ჟურნალის №, პირველი და ბოლო გვერდები). მონოგრაფიის შემთხვევაში მიუთითეთ გამოცემის წელი, ადგილი და გვერდების საერთო რაოდენობა. ტექსტში კვადრატულ ფჩხილებში უნდა მიუთითოთ ავტორის შესაბამისი N ლიტერატურის სიის მიხედვით. მიზანშეწონილია, რომ ციტირებული წყაროების უმეტესი ნაწილი იყოს 5-6 წლის სიღრმის.

9. სტატიას თან უნდა ახლდეს: ა) დაწესებულების ან სამეცნიერო ხელმძღვანელის წარდგინება, დამოწმებული ხელმოწერითა და ბეჭდით; ბ) დარგის სპეციალისტის დამოწმებული რეცენზია, რომელშიც მითითებული იქნება საკითხის აქტუალობა, მასალის საკმაობა, მეთოდის სანდოობა, შედეგების სამეცნიერო-პრაქტიკული მნიშვნელობა.

10. სტატიის ბოლოს საჭიროა ყველა ავტორის ხელმოწერა, რომელთა რაოდენობა არ უნდა აღემატებოდეს 5-ს.

11. რედაქცია იტოვებს უფლებას შეასწოროს სტატია. ტექსტზე მუშაობა და შეჯერება ხდება საავტორო ორიგინალის მიხედვით.

12. დაუშვებელია რედაქციაში ისეთი სტატიის წარდგენა, რომელიც დასაბეჭდად წარდგენილი იყო სხვა რედაქციაში ან გამოქვეყნებული იყო სხვა გამოცემებში.

აღნიშნული წესების დარღვევის შემთხვევაში სტატიები არ განიხილება.

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ANATOMICAL VARIABILITY OF THE ALVEOLAR PROCESS OF THE MAXILLA BASED ON MULTISLICE COMPUTED TOMOGRAPHY DATA

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Abstract.

Modern research methods, widely implemented in routine medical practice, open new horizons for the study of anatomical structures. The maxilla is one of the regions of the human skull that shows significant variability with age and gender. This is due to the peculiarities of tooth eruption and age-related changes in the periodontium and adjacent structures, which undoubtedly affect the structure of the alveolar process, sometimes drastically altering it over time.

Aim: The aim of our study was to determine the anatomical variability of the alveolar process of the maxilla based on multislice computed tomography data.

Materials and Methods: The research was conducted based on the results of 400 spiral computed tomography scans of males and females aged 18 to 95 years with detection of the anatomical variability of the alveolar process.

Results: The average height of the alveolar process was 14.3±0.99x10^-3 m. The thickness of the wall also showed considerable variability. It was maximal in the middle part and minimal in the lateral part of the wall, measuring 1.905±0.021x10^-3 m and 1.15±0.011x10^-3 m, respectively.

Conclusions: We determined its thickness, density, and identified teeth whose roots are connected to the maxillary sinus. The thickness of the alveolar process correlates with the volume of the sinus, showing a strong negative correlation (r=-0.92). Thus, with larger sinus sizes, the alveolar process has a smaller thickness. According to calculations, there is a correlation between the upper facial index and the size of the alveolar process (r=0.64). In dolichocephalic individuals, the longitudinal size is greater than in brachycephalic individuals, where the transverse size of the alveolar process prevails.

Key words. Alveolar process, multislice computed tomography, bone density, bone thickness, anatomy.

Introduction.

Modern research methods, widely implemented in routine medical practice, open new horizons for the study of anatomical structures [1]. Anatomical structures that were previously accessible only through cadaveric material [2] can now be studied non-invasively, preserving the informativeness of the research and sometimes even enhancing its quality [3]. Considering the negative aspects associated with the use of cadaveric material [4], such as the potential destruction of certain structures over time, the latest diagnostic methods are extremely important in both theoretical medicine (e.g., creating 3D models for student education) [5] and practical medicine (e.g., determining the anatomical features of a specific body area when planning surgical interventions) [6].

The maxilla is one of the regions of the human skull that shows significant variability with age and gender [7]. This is due to the peculiarities of tooth eruption and age-related changes in the periodontium and adjacent structures, which undoubtedly affect the structure of the alveolar process, sometimes drastically altering it over time.

One of the most promising research methods that can aid in studying the anatomy of the alveolar process is multislice computed tomography (MSCT) [8]. This method not only allows for sectional examination of the anatomical area but also enables the construction of a 3D model of the alveolar process for better spatial understanding of the relationships between all its structures and the dental arch. [9]. Additionally, MSCT has an undeniable advantage over other research methods due to the presence of a densitometric scale, which allows for the assessment of bone density. This, in turn, can help prevent potential complications that may arise, for example, during implantation, due to reduced bone density in the alveolar process.

Given all the above, the aim of our research was to determine the anatomical variability of the alveolar process of the maxilla based on multislice computed tomography (MSCT) data.

Materials and Methods.

The study was conducted based on the results of 400 spiral computed tomography (CT) scans of men and women aged 18 to 95, categorized into groups according to the World Health Organization classification [10]. The distribution of the studied individuals by group is presented in Table 1. These individuals had no complaints related to ENT organs, and the CT scans were conducted for reasons unrelated to ENT pathology (e.g., suspected stroke, which was not confirmed, among other reasons). The presence of data suggesting pathological changes in the paranasal sinuses, pediatric age, and pregnancy were grounds for exclusion from the study.

Table 1. *Distribution of studied individuals by age and gender.*

Age Group	Me	Women	Total
Young age (18-44 years)	53	55	**108**
Middle age (45-59 years)	64	63	**127**
Elderly age (60-74 years)	46	44	**90**
Senior age (75-89 years)	22	23	**45**
Long-livers (over 90 years)	16	14	**30**
Total	**201**	**199**	**400**

All this people didn't have some diseases of ENT-organs, that's why there were no pathological findings according the MSCT data.

The material collection was based at the Kharkiv Research Institute of General and Emergency Surgery and Merefa Central District Hospital from 2018 to 2021. The conducted work complies with the requirements of the Helsinki Declaration of

the World Medical Association "Ethical Principles for Medical Research Involving Human Subjects." All participants were informed about the study and gave written informed consent for participation.

The study was conducted using the Toshiba Aquilion 4 [11], computed tomography scanner (Japan), which is a multislice CT scanner capable of simultaneously collecting data from 4 slices of 0.5 mm thickness, characterized by high operational performance with a full rotation time of up to 0.4 seconds. It provides high-resolution multislice scanning with high throughput. A slice thickness of 2 mm was used for the study of the paranasal sinuses. The high image quality of this device is combined with a low radiation dose due to the highly efficient use of X-ray radiation.

Statistical processing was performed using methods of variation statistics. The normality of the distribution was determined using the Shapiro-Wilk test, which showed that the samples were close to a normal distribution. Statistical indicators are presented in the format M±σ, where M is the arithmetic mean, σ is the standard deviation, and the Student's t-test. Correlation analysis was carried out using Spearman's rank correlation coefficient. A statistical difference between the studied indicators was considered significant at $p < 0.05$.

The uncertainty of bone density was determined according to the basic algorithms presented in our previous works [12,13].

Results and Discussion.

The average height and width of the alveolar process were calculated to be $14.3\pm0.99\text{x}10^{-3}$ m and $85.6\pm2.2\text{x}10^{-3}$ m, respectively, across different age groups. It was expected that the height of the alveolar process decreases with age by 13.9% and that this indicator depends on gender. In women, the height of the alveolar process is 11.44% less than in men. An interesting finding was the dependence of the structure of the alveolar process on the degree of pneumatization of the maxillary sinus. In the majority of cases (83%), the width prevails over the height, but in 17% of cases, the height exceeds the width. A strong direct correlation ($r=0.82$, $p=0.0045$) was found between the volume of the sinus and its width. The height of the alveolar process is also a very important indicator because, for successful dental implantation, the height of the alveolar process should not be less than 8x10^-3 m.

In almost all the studied individuals, this indicator was greater than 8x10^-3 m (94%). Only in 5% of cases was it less than 8x10^-3 m, and in 1% of cases, it was exactly 8x10^-3 m.

Thus, the average height of the alveolar process was $14.3\pm0.99\text{x}10^{-3}$ m. The largest number of subjects with the thinnest alveolar processes was in the elderly group.

The following types of maxillary sinus recesses were identified: alveolar – 106 (26.5%); palatal – 2 (2%); and zygomatic – 4 (1%). The types of recesses are shown in Figures 1 and 2.

Figures 1-2 shows the types of recess, which were indicated during the study. It is known that the lower wall of the maxillary sinus is formed by the alveolar process of the maxilla (processus alveolaris maxillae) and is represented by a plate measuring $31.2\pm0.33\text{x}10^{-3}$ m. Therefore, the study of maxillary sinus variants is impossible without investigating the spatial relationship of the teeth. In most cases (78%), the roots of the

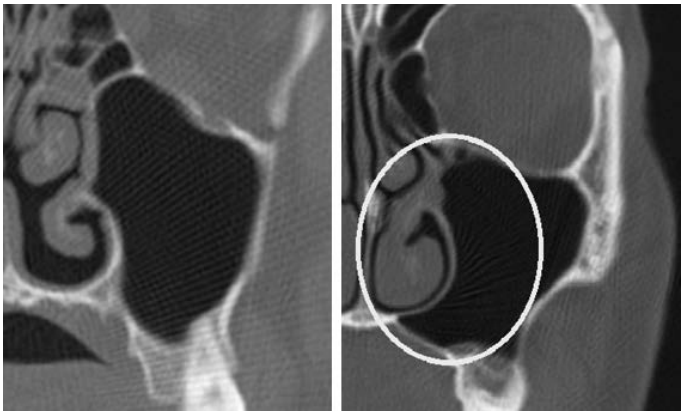

Figure 1. *CT Axial Slice and Coronal Reconstructions. Types of Maxillary Sinus Recesses (Pockets). Alveolar and palatine Recesses. The lower wall of the maxillary sinus is formed by the alveolar process of the maxilla (processus alveolaris maxillae).*

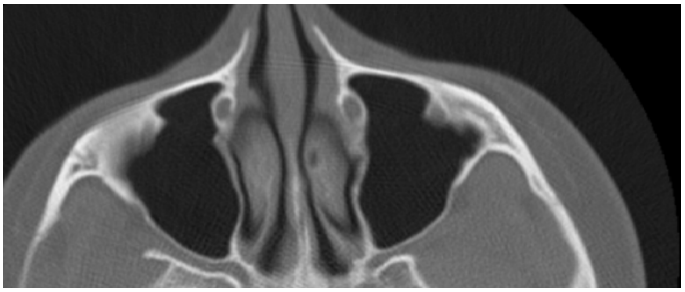

Figure 2. *Zygomatic Recess. The lower wall of the maxillary sinus is formed by the alveolar process of the maxilla (processus alveolaris maxillae).*

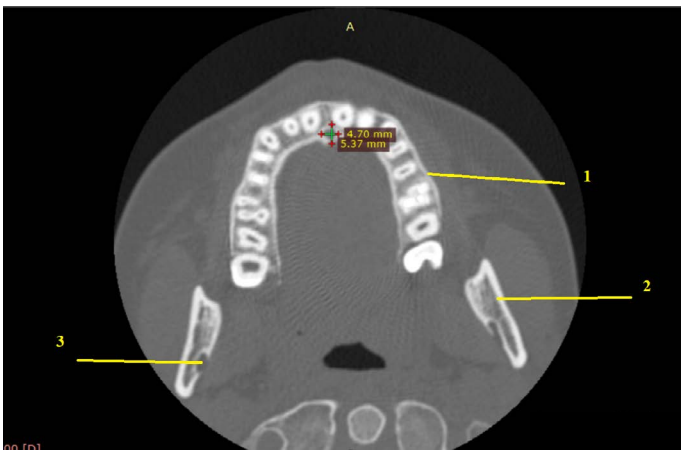

Figure 3. *CT Axial Slice. 1 – Alveolar process , 2 – Mandibular arch 3 – Mandibular canal. The dimensions of the incisive canal are indicated by numbers.*

upper teeth do not open into the sinus. However, in these cases, 7% had a wall thickness not exceeding 1x10^-6 m³. For most subjects, the thickness of the lower wall between the tooth roots and the sinus cavity was 1-13x10^-6 m³.

In 95% of cases, the lower wall is adjacent to the roots of the upper teeth. The roots of the first and second premolars are most frequently found in the sinus cavity (99%), while wisdom teeth are the least frequently found (1%). The thickness of the wall also varies significantly, being maximal in the middle part and

minimal in the lateral part, measuring 1.905±0.021x10^-9 m and 1.15±0.011x10^-9 m, respectively.

In Figure 3, the alveolar process, mandibular arch, and mandibular canal are shown. The dimensions of the incisive canal are indicated by numbers.

The thickness of the alveolar process correlates with the volume of the sinus, showing a strong negative correlation (r=-0.92). Thus, with larger sinus sizes, the alveolar process has a smaller thickness (see Figure 3). According to calculations, there is a correlation between the upper facial index and the size of the alveolar process (r=0.64). In dolichocephalic individuals, the longitudinal size is greater than in brachycephalic individuals, where the transverse size of the alveolar process prevails. The overall standard uncertainty of measuring the density of the lower wall of the maxillary sinus was determined.

Analyzing the data from Table 3 reveals that the likely distribution of value Y falls within the range of ±U relative to the measured value y, with the confidence level of values Y in this interval determined by the probability (confidence level) p = 0.95.

Table 2. *The total standard uncertainty of measuring the density of the lower wall of the maxillary sinus.*

Name	**Lower Wall of Maxillary Sinus**			
	Left		**Right**	
	min	max	min	max
U_p (Hu)	220,18	306,74	197,62	310,20

Table 3. *The results of measurements of the density of the lower wall of the frontal and maxillary sinuses, taking into account the extended uncertainty (Y = y ± Uextend).*

Name	**Lower Wall of Maxillary Sinus**			
	Left		**Right**	
	Min	**Max**	**min**	**max**
U_{extend} (Hu)	440,36	613,49	395,00	620,41
Y (Hu)	-57,71± 440,36	1101,51± 613,49	96,28± 395,00	1028,69± 620,41

Anatomical variations in the paranasal sinuses are quite common, found in over 90% of patients with sinusitis or as incidental findings during routine examinations. Moreover, the progression of inflammatory processes in the paranasal sinuses (PNS) largely depends on the morphological characteristics of this region [14]. Therefore, each individual patient requires a personalized approach to diagnosis and treatment. According to Dong et al. [15], inflammatory processes in the PNS not only involve pathological changes in the sinus mucosa but also affect the bone tissue of its walls, resulting in significant changes such as bone alteration marked by demineralization, trabecular disappearance, focal sclerosis, and cortical bone plate destruction [16]. The extent of these changes likely correlates with the severity of the pathological process. Hence, patients with chronic rhinosinusitis merit attention not only from otolaryngologists but also from dentists.

The proposed research can be further expanded by introducing new data calculation methods [17-19] and predicting potential complications. It is also important to note that studies of this kind are significant not only in otolaryngology, maxillofacial surgery [20-22], and ophthalmology but also in other fields of medicine. Research on the variant anatomy of a given area can become a valuable resource for any medical discipline and can be successfully incorporated into both the practical and scientific work of physicians across various specialties. The proposed research can not only provide a detailed study of human skull anatomy but also suggest optimal, minimally invasive, and effective treatment approaches for related diseases. More importantly, it can develop preventive measures to reduce the incidence and recurrence of these conditions [23-26].

Our study focuses on calculating minimum density [27], which is crucial for predicting complications. We also computed this parameter using uncertainty calculations. This research holds practical value for physicians across different specialties. In all cases, CT scans should be considered the gold standard for diagnosing nearly all forms of rhinosinusitis, especially chronic cases. Understanding the structural features and spatial relationships of adjacent structures to the alveolar process can aid in surgical planning and mitigate complications. Information on changes in maxillary sinus wall density, particularly the lower wall, will benefit dentistry and maxillofacial surgery by preventing the inadvertent introduction of filling materials into the sinus and the onset of odontogenic inflammatory processes. Furthermore, this data is essential for selecting the optimal dental implantation technique.

During our investigation, we analyzed density and thickness indicators of alveolar bone tissue. These metrics are crucial for assessing the risk of maxillary sinus perforation during tooth extraction. Alveolar process thickness is pivotal for determining the need for sinus lifting as a preparatory step for subsequent surgeries. Additionally, reduced bone tissue thickness may indicate severe destructive changes within the sinus (based on the Global Osteitis Scale) [28, 29]. Additionally, to inflammatory changes, other pathological condition could influent for processes in that area, such as disturbance of microcirculation [30], metabolic disorders [31], diseases of connective tissue [32], hormonal changes [33, 34], harmful habits [35]. Certainly, we cannot exclude influence of undiagnosed pathological condition. Implementation of computer vision systems and artificial intelligence [36, 37] could allow consider more factors for detection of individual peculiarity for medical help.

Conclusion.

We determined its thickness, density, and identified teeth whose roots are connected to the maxillary sinus. The thickness of the alveolar process correlates with the volume of the sinus, showing a strong negative correlation (r=-0.92). Thus, with larger sinus sizes, the alveolar process has a smaller thickness. According to calculations, there is a correlation between the upper facial index and the size of the alveolar process (r=0.64). In dolichocephalic individuals, the longitudinal size is greater than in brachycephalic individuals, where the transverse size of the alveolar process prevails.

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