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CYSTS AND CYSTIC TUMORS IN THE JAWS: A CLINICO - PATHOLOGICAL STUDY

ЦИСТИЧНИ ЛЕЗИИ И ТУМОРИ ВО ВИЛИЦИТЕ: КЛИНИЧКО-ПАТОЛОШКА СТУДИЈА

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Abstract

Objective: The objectives of this study are to retrospectivelyanalyse large cysts and cystic tumors in the jaws that present overlapping features in radiographic differential diagnosis, to determinate their prevalence and tendency rates following surgical treatment, and to evaluate the relationship between lesion size and the likelihood of relapse. **Material and methods:** Hospital records of patients with large cysts and cystic tumors (>2 cm), surgically treated at the University Clinic for Surgery of the Face, Jaws and Neck - Maxillofacial Surgery in Skopje, over a period of 3 years were analyzed. Histopathological confirmation ofthe jaw cysts and cystic tumors was performed at the Institute of Pathological Anatomy in Skopje. All patients underwent preoperative 3D Cone Beam CT scanning/ orthopantomogram ('Panorex) (3D CBCT/OPG). The data were tabulated and statistically analyzed. **Results:** Among the 52 patients, 79% were diagnosed with cysts, while the remaining 21% had cystic tumors. Radicular cysts were the most common with 46%, and ameloblastomas were the most common with cystic tumors consisting of 13%. Cystic tumors in the jaws showed a statistically significantly higher tendency to relapse compared to cysts (p= 0.002966); Ameloblastomas showed a higher tendency to relapse than CGCT (p = 0.259796). Keratocysts relapse significantly more often than other cysts (p=0.043459). Large cysts relapse significantly more often than small ones (p=0.011). **Conclusion:** 3D CBCT/OPG are valuablediagnostic tools for evaluating large cysts and cystic tumors in the jaws, but the definitive diagnosis requires histopathological analysis. Odontogenic keratocysts and ameloblastomas are locally aggressive lesions with a high tendency for recurrence, and this feature should be taken into account when planning surgical intervention. **Keywords:** Cysts; cystic tumors; jaws; recurrence.

Апстракт

Цел: Целите на ова истражување се ретроспективна анализа на големи цисти и цистични тумори во вилиците кои се наоѓаат во меѓусебна радиографска диференцијална дијагноза, утврдување на нивната застапеност и склоност кон рецидивирање по хируршкиот третман, како и поврзаност на нивната големина со рецидивантноста. **Материјал и методи:** Анализирани се болничките истории на пациенти со големи цисти и цистични тумори (>2 см), оперирани на Универзитетската клиника за хирургија на лице, вилици и врат - Максилофацијална хирургија во Скопје, во временски период од 3 години. Виличните цисти и цистични тумори се хистопатолошки потврдени на Институтот за патолошка анатомија во Скопје. Кај сите пациенти предоперативно е реализирана компјутерска томографија/ортопантомограм (CBCT/OPG). Податоците се табеларно прикажани и статистички анализирани. **Резултати:** Од вкупно 52 пациенти, 79% имале цисти, а преостанатите 21% цистични тумори. Од големите цисти најчести беа радикуларните цисти со 46%, а од цистичните тумори најчести беа амелобластомите со 13%. Цистичните тумори во вилиците покажаа статистички значајно поголема склоност кон рецидивирање во однос на цистите (p= 0,002966); Амелобластомите покажаа поголема склоност кон рецидив отколку CGCT (p = 0,259796). Кератокистите рецидивираат значително почесто од другите цисти (p=0,043459). Големите цисти значително почесто рецидивираат од малите (p=0,011). **Заклучок:** CT/OPG се корисни дијагностички методи за големи цисти и тумори во вилиците, но дефинитивната дијагноза се поставува со хистопатолошка анализа. Одонтогени кератоцисти и амелобластомите се локално агресивни лезии со голема тенденција за рецидив, и оваа особина треба да се има во предвид при планирање на хируршката интервенција. **Клучни зборови:** Цисти; цистични тумори; вилици; рецидивантност.

Introduction

Many lesions in the jaws exhibit a radiographic appearance that resembles cysts, making diagnosis based solely on imaging a differential diagnostic dilemma. Jaw lesions encompass a wide spectrum and may originate from both dentogenic and non-dentogenic origin. The majority of this lesions are benign and some of them are malignant[1], which complicates the preoperative radiographic diagnosis and surgical treatment plan.

Jaw cysts have a radiographic appearance of unilocular or multilocular radiolucent lesions of varying size and shape[2]. Cysts and cystic lesions in the jaws may be associated with an impacted, or unerupted tooth[3]. The most common radiographic dilemma of jaw lesions associated with an impacted tooth is between cysts, but also between cysts and odontogenic tumors, such as follicular and odontogenic keratocysts (OKC), and ameloblastoma as an odontogenic tumor[3,4].

Unilocular lesions not associated with an impacted tooth are oftenindicative residual cysts, primordial odontogenic keratocysts, and ameloblastomas, odontogenic myxomas, traumatic cysts, and idiopathic bone cavities. Multilocular radiographic presentations are most commonly suggestive of odontogenic primordial keratocysts and tumors such as ameloblastomas, odontogenic myxomas, central giant cell tumor (CGCT), and central A-V (arteriovenous) hemangioma.

Cystic lesions vary in size; some of them, although benign, are locally aggressive, grow tosignificant dimensions, and have a high tendency to recur. Among these lesions, odontogenic keratocysts and ameloblastomas are considered the most aggressive and have a high recurrence rate[5].

The goal of surgical treatment is complete removal of cysts and cystic tumors to prevent recurrence and ensure minimal postoperative morbidity. The most commonly used surgical techniques in the treatment of cystic lesions in the jaws are: Enucleation Partsch II cystectomy or curettage as the most commonly used surgical treatment, Partsch I cystotomy and En bloc resection in recurrent large cysts and cystic tumors[5,6,7,8,9,10]. In large odontogenic cysts, where there is a risk of jaw fracture during their complete removal, the Evocyst method has also been described as a treatment, which involves the application of intracystic negative pressure through a hand-made device. According to the study by Castro-Núñez et al. this method demonstrated excellent results in terms of filling the defect with newly formed bone, with a high rate of osteogenesis in less than 3 months, which is significantly faster compared to conventional techniques that require up to 12 months for complete healing[7].

The objectives of this study are to evaluate large cysts and cystic tumors in the jaws that present radiographically differential diagnosis, to determine their prevalence, and their recurrence after surgical treatment, and to assess the relationship between the size of the cysts and cystic tumors and the ability to recur.

Material and methods

The study represents a retrospective analysis of 52 patients with large cysts and cystic tumors (>2 cm), surgically treated at the University Clinic for Surgery of the Face, Jaws and Neck - Maxillofacial Surgery in Skopje, in the period between January 2020 and April 2024. All jaw cysts and cystic tumors were postoperatively histopathologically confirmed at the Institute of Pathological Anatomy in Skopje. Preoperative radiodiagnostics with 3D Cone Beam CT scanning or orthopantomogram (Panorex) (3D CBCT/OPG) was performed. The dimensions of the cysts and tumors were measured in the PlanmecaRomexis[5.3.5.80] program. The obtained results are tabulated and statistically analysed, and the significance of the differences between the groups was determined using the Chi Square test and Fisher exact test. The inclusion criterion was that the patients had undergone surgery 12 months before the conclusion of the study on April 1, 2024.

Results and discussion

Cysts and cystic lesions of the jaws oftenpresent with similar clinical and radiographic features but the definitive diagnosis reliant on histopathology analysis. Accuratepreoperative diagnosis is crucial for selecting the appropriate surgical approach, as certain cystic lesions are locally aggressive and have a high recurrence rate[11].

In our study, cysts were foundin 41 patients (79%) while cystic tumors were diagnosed in 11 patients (21%) (Table 1).

Table 1. Prevalence of cysts and cystic tumors in the jaws.

Diagnosis	Number (N)	Percentage (%)
Cysts	41	79%
Cystic tumors	11	21%
Total	52	100%

Fisher's exact test determined confirmed that cysts were significantly more prevalent than cystic tumors at $p<0.05$ (Table 2).

Table 2. Prevalence of cysts and cystic tumors in the jaws. Fisher's exact test < 0.00001. The result is significant for $p<0.05$.

Diagnosis	Cysts	Cystic tumors	Total
Cysts	41	0	41
Cystic tumors	0	11	11
Total	41	11	52

Figure 1. *Basal cell nevus syndrome (Gorlin-Goltz Syndroma): multiple basaliomas, epidermal cysts, and multiple OKCs.*

These findingswith epidemiological date from the Republic of North Macedonia and studies such as Rees et al.[12] on a Chilean population that at 4777 patients with cysts and odontogenic tumors and with the results in the study by Nayak et al.[13]. where odontogenic cysts are significantly more prevalent than odontogenic tumors. This difference in the percentage prevalence of cysts and cystic tumors could be due to the pathogenetic mechanism; cystic tumors are numerically significantly rarer because their development depends on neoplastic mechanisms, which occur much less frequently compared to the inflammatory and developmental processes in the jaws that cause odontogenic and non-odontogenic cysts[14,15].

Histopathologically, in our study, radicular, residual, follicular cysts and OKC were confirmed, one of which is part of Basal Cell Nevus syndrome or Gorlin-Goltz Sy (Figure 1); and ameloblastomas and GCT as cystic tumors

Table 3. Histopathological spectrum of cysts and cystic tumors in the jaws.

Diagnosis	Number (N)	Percentage (%)
Radicular cysts	23	44%
Residual cysts	8	15%
Follicular cysts	7	13%
Odontogenic keratocysts (OKC)	3	6%
Ameloblastoma	7	13%
Giant cell tumor (GCT)	4	8%
Total	52	100%

Table 4. Recurrence of jaw cysts and cystic tumors. χ^2=8.8283 p=0.002966. The result is significant at p<.05.

Recurrence	Cysts	Cystic tumors	Total
Recurred	8	7	15
Did not recurred	30	3	33
Total	38	10	48

- of which 1 (one) is part of Cherubism and is not included in the study. In percentage terms, radicular cysts were the most common, and OKC was the least common (Table 3). Our results are in accordance with numerous studies that investigated the prevalence of odontogenic cysts in different populations[16,17,18,19].

Statistic analysis using Chi Square test determined that cystic tumors in the jaws were significantly more likely to recur compared to cysts, at p<0.05 (Table 4); some cystic tumors recurred multiple times (Figure 2).

Of the 41 patients with cysts, 3 patients had less than 12 months since their last surgery and were excluded from the statistical analysis for recurrence, i.e., a total of 38 patients with cysts were included in the statistical analysis for recurrence. The Chi-Square test determined that keratocysts (OKC) recurred significantly more than other cysts for p<0.05 (Table 5), which is in accordance with the numerous data from the available literature that investigated the recurrence rate of OKC. Although these results may have some value in predicting the risk of recurrence after surgery, the results of these studies should be viewed with caution due to the limited number of subjects. Blanas et al. reported a recurrence rate of OKC of 17%–56%[20], while Malas et al. from 28.2%[21].

The high recurrence of OKC in the literature is the thin cystic epithelium[22], incomplete removal of the cyst[23] or the

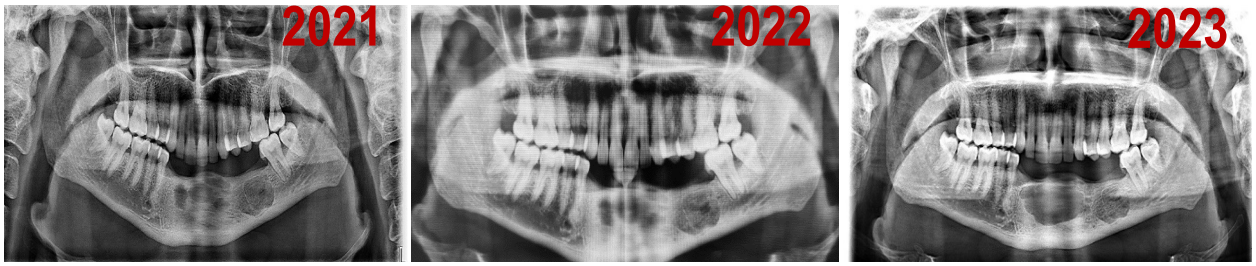

Figure 2. *OPG of ameloblastoma in the mandible that has recurred multiple times.*

Table 5. Cyst recurrence. χ^2=4.0775 p=0.043459. The result is significant for p<0.05.

	OKC	Other cysts	Total
Recurred	2	6	8
Did not recurred	1	29	30
Total	3	35	38

Table 6. Recurrence among cystic tumors; χ^2=1.2698 p=0.259796. The result is not significant for p<.05.

	Ameloblastoma	GCT	Total
Recurred	5	2	6
Did not recurred	1	2	4
Total	6	4	10

Table 7. Percentage of recurrences in cystic tumors of the jaws

Diagnosis	Recurred (%)	Did not recurred (%)	Total
GCT	50%	50%	100%
Ameloblastoma	83%	17%	100%

Table 8. Relationship between cyst size and recurrence. Median: 33 χ^2=6.3409 p=0.011. The result is significant for p<.05.

	„Large cysts“	„Small cysts“	Total
Recurred	6	2	8
Did not recurred	8	22	30
Total	14	24	38

presence of satellite cysts[24]. Jung et al. conducted an epidemiological study where they examined the relationship between the size of keratocysts and the differences between different therapeutic approaches in terms of keratocyst recurrence. The authors found that recurrence increases with increasing lesion size, indicating a significant association between these 2 (two) parameters. In addition, enucleation after decompression showed a higher recurrence rate (35.8%) compared to enucleation (27.1%), but this difference was not statistically significant. However, a significant correlation was found between the recurrence of OKC and the parameters examined, such as lesion size, multilocular form, and type of surgical intervention[25]. These findings emphasize the need for careful monitoring of patients with OKC, especially those with larger and multilocular lesions, in order to timely diagnose possible recurrence. Pylkkö et al. confirmed the association of OKC recurrence with the presence of satellite cysts. Namely, in patients with histopathologically confirmed satellite cysts, OKC recurred in 50% of cases, while in patients without satellite cysts this percentage was 17%[26].

Of the 11 cystic tumors, one patient with a cystic tumor had less than 12 months since their last surgery and was excluded from the statistical analysis. Of the 10 patients with cystic tumors, 6 were ameloblastomas and 4 were Giant cell tumors (GCT). The Chi-Square test determined that ameloblastomas and GCT have a high propensity for recurrence (Table 6), but of these, ameloblastomas recurred more frequently with 83% versus 50% recurrence in GCT (Table 7).

In their study Ajila et al. determined recurrence after conservative surgical treatment of ameloblastomas of 64.9% (148/228), and after radical surgical treatment 12% (25/207). From their results it was concluded that the main factors contributing to recurrence are multilocularity of the tumor, follicular histological type and conservative treatment method. Based on this systematic review, the authors recommend a radical approach for the treatment of solid/multicystic ameloblastomas in order to reduce the recurrence rate[27]. The high recurrence rate after conservative surgical treatment of ameloblastomas compared to recurrence after radical surgical treatment has been confirmed in most available studies[28,29,30]. Cystic tumors even

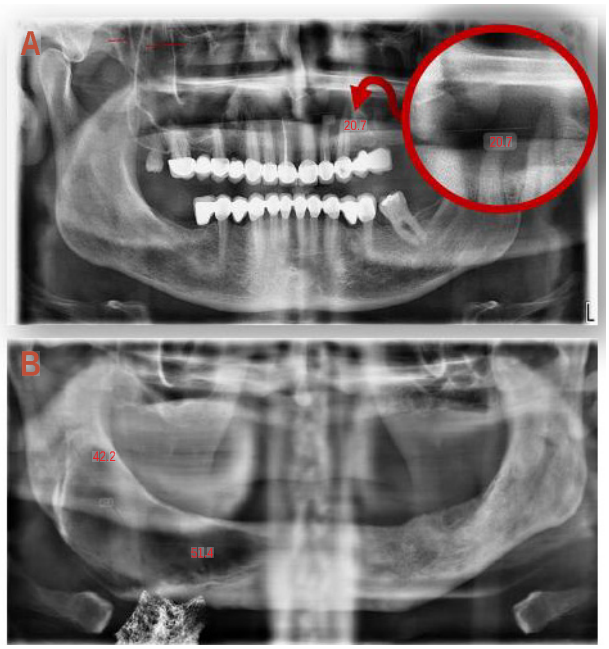

Figure 3. ***A:*** *Radiographic view of a radicular cyst with the smallest measured dimension in the study of 21 mm.* ***B:*** *Radiographic view of a residual cyst with the largest measured dimension in the study of 94 mm.*

recur multiple times. According to available data, regardless of the location of the GCT, partial resection or curettage is associated with a high recurrence rate, which can reach up to 70%, on the other hand, wide resection is associated with a significantly lower recurrence rate, of about 7%[31].

The largest residual cyst had a dimension of 94 mm (Figure 3). Large cysts demonstrated a significantly higher recurrence rate than small cysts, i.e. the larger the cysts, the greater the possibility of recurrence (Table 8).

The relationship between these two parameters was also confirmed by Fidele et al., who found that keratocysts with larger dimensions recurred significantly more than keratocysts with smaller dimensions[24].

Conclusion

Radiographic features play an important role in narrowing the differential diagnosis, and guiding the treatment of jaw cysts and cystic tumors. Histopathological findings are the "gold standard" in establishing a definitive diagnosis. Cysts are significantly more common than cystic tumors, and OKC has a significantly higher tendency to recur than other jaw cysts. Cystic tumors in the jaws recur significantly more often than cysts, and among them, ameloblastomas recur more often than GCT. Large cysts are more likely to recur.

The results of our study indicate the need for careful planning of surgical intervention for cystic lesions in the upper and lower jaw with the ultimate goal of avoiding recurrence of the lesion.

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