

# Follicular Jaw Cysts

Zdenko Šarac<sup>1</sup>, Berislav Perić<sup>2</sup>, Irina Filipović-Zore<sup>3</sup>, Tomislav Čabov<sup>3</sup> and Josip Biočić<sup>2</sup>

<sup>1</sup> Department of Oral and Maxillofacial Surgery, Faculty of Medicine, University of Mostar, Mostar, Bosnia and Herzegovina

<sup>2</sup> Department of Oral and Maxillofacial Surgery, University Hospital Dubrava, School of Dental Medicine, University of Zagreb, Zagreb, Croatia

<sup>3</sup> Department of Oral and Maxillofacial Surgery, University Hospital Center Rijeka, School of Medicine, University of Rijeka, Rijeka, Croatia

## ABSTRACT

*The aim of this study was to examine the occurrence, localization, size, ways of diagnosing and treatment of a follicular jaw cyst. Assessment of the patients' motives and their earlier health status was recorded, as well as their postoperative clinical course. Most of the patients were admitted because of pain, swelling, trismus, or other difficulties associated with cyst formation. Follicular cysts with persisting primary predecessor had an asymptomatic development, and were discovered after orthodontic examination or by chance. In most cases pathohistological finding and description of the formation have coincided with each other ( $p < 0.05$ ). Cysts of different sizes were treated by different surgical approaches, most commonly alveolotomy and cystectomy in small cysts, while alveolotomy and cystectomy with suction or iodine tampon in large cysts. Cooperation of a dentist, an oral surgeon, a pathologist, and other specialists can lead to early diagnose and prevention of further growth of a follicular jaw cyst, thus preventing substantial bone damage.*

**Key words:** follicular cyst, impacted tooth, retained tooth

## Introduction

Development of both disease of teeth and surrounding tissue of a jaw can lead to odontogenic jaw cysts, cavities covered by the epithelium<sup>1,2</sup>. Jaw and oral tissues cysts have been classified using different criteria by many authors<sup>1,3-5</sup>. First classification of odontogenic tumors, jaw cysts, and associated lesions has been created using WHO classification from 1971, as a result of five-year research conducted by international group that included primarily oral pathologists, but also pathologists of other specialties, who all had an intention to give histological types of lesions<sup>4</sup>. Final classification, along with new knowledge, comments, and suggestions regarding previous classification, was made and published in the second edition of the same work, in 1992<sup>5</sup>.

Jaw cysts usually have unspecific clinical appearance. Some cysts have asymptomatic periods of growth and development. Smooth, painless, inconsistent swellings with tissue above that appears normal is suggestive for the cyst formation and may equally mean that the underlying tissue is benign and malignant<sup>6</sup>. Cysts lesions must be carefully analyzed and differentiated from normal anatomic structures using radiological finding. It is important to determine the size of the lesion. By observing the

edge of the lesion, essential data on lesion behavior can be determined, as well as its histological character assumed. Majority of lesions associated with crown of an unerupted tooth are either odontogenic cysts or benign tumors. Nowadays, surgical methods are exclusively used in cysts therapy. There are many of them, and a relevant method depends on size and localization. Each cyst formation, after its shelling, needs to be taken for a pathohistological finding. Final confirmation of diagnosis can be done based on symptoms and clinical results in pathohistological finding, but surprises are also possible. In clinical and pathological studies, as well as based on histology, pathohistological similarity of some heterogeneous phenomenon is sometimes implied<sup>7</sup>.

Clinically and radiological unerupted tooth is an essential characteristic in diagnosis of follicular jaw cysts. Some other diseases can contribute to teeth uneruption<sup>3,8</sup>. Developing cysts can occur in any phase of tooth crown development, from enamel organ to formed tooth crown. Due to possibility of occurrence of developing jaw cysts in two or even three phases of tooth crown development, those cysts are called follicular<sup>3</sup>.

Follicular jaw cysts can occur in the area of incisive edge of front teeth, biting surface in lateral teeth, or on approximal surfaces of teeth crown. Unilocular translucency, inside which teeth crown is seen, can be found in radiological findings. Follicular jaw cysts can grow undetected, and thus cause significant bone wounds. Occasional radiological findings can be suggested during regular dental examinations, and indicate the developing jaw cysts.

The purpose of this study was to explore appearance, location, size of follicular jaw cysts, ways of their diagnosis, types of surgical therapy, and correspondence of histological findings and their descriptions.

## Materials and Methods

Thirty patients with clinical diagnosis of a follicular cyst or a cyst connected with retained or impacted tooth participated in the research. Following parameters were used: patient's age, disease history with diagnosis description, operative protocol, panoramic radiograph, pathohistological findings, as well as clinical preoperative, operative, and postoperative observations.

Sixteen male (age from 5 to 75; average age 32) and fourteen female examinees (age from 10 to 64; average age 22) participated in the research. Changes were localized in an upper or a lower jaw. Frequency was observed for each tooth. Size of a cyst was classified on the basis of the panoramic radiograph, intra-operative finding or pathohistological judgment (cysts with size up to 3 cm were classified as small and those over 3 cm as large). Examinees were divided according to the method of treatment: 1 – alveolotomy and cystectomy; 2 – alveolotomy and cystectomy with suction, iodine tampon, or one of the rhinological methods; 3 – alveolotomy, cystectomy, apicoectomy of several other teeth included in the change; and 4 – other types of therapies.

All clinical diagnosis were compared to pathohistological ones. Patients' motives for coming to the examination were assessed (1 – finding by chance and orthodontic instruction, 2 – swelling, pains, trismus, difficulties, and 3 – other different reasons).

Changes along erupted primary (milk) tooth according to its frequency were classified (1 – Findings without primary predecessor; 2 – Findings with primary predecessor).

Previous patient's health condition was examined (general and specific diseases, former surgeries, allergies to anesthesia or medicine intolerance), as well as present problems. In accordance with their findings, patients were divided into two categories: 1 – healthy patients, 2 – patients with previous disease in their anamnesis.

After surgical removal, the material for pathohistological analysis was fixed into formalin, and sent for analysis to the Institute of Pathology of the School of Medicine, University of Zagreb. Following pathohistological diagnosis were classified: 0 – there is no pathohistological diagnosis or description, 1 – Cyst finding is clearly indicated by pathohistological diagnosis, 2 – there was des-

cription and all implies to a follicular cyst, but pathohistological diagnosis of a cyst is not clearly indicated. 3 – other pathohistological diagnoses.

Different categories of the pathohistological description were classified: 0 – there is no pathohistological description, 1 – connective membrane and stratified squamous non-keratinized epithelium, 2 – parakeratotic cells in description, 3 – other unexpected elements in description.

In the postoperative period, and based on documentation and already described findings, patients with normal findings were separated from those with possible complications or cyst recidivism (1 – normal postoperative finding, and 2 – complications in postoperative finding).

Examined changes were assessed by the radiological analysis on a diascope. Readings referred to the central or lateral cyst finding (0 – without RTG finding, 1 – central cyst, 2 – lateral cyst).

All data collected during the research were analyzed using statistical program SPSS for Windows 10.0. Except from descriptive methods that were used to describe examined variables, an  $\chi^2$ -test was also used in order to analyze statistically significant difference among particular variables ( $p < 0.05$ ).

## Results

Sixteen male patients (53.3%) and 14 female patients (46.7%) participated in the research. Estimates were made that 20 cysts (66.7%) were classified as small cysts, and ten of them (33.3%) as large ones.

Follicular cyst was located in the upper jaw in 5 patients (16.7%), and 25 patients (83.3%) had a cyst in the lower jaw. Methods of alveolotomy and cystectomy were performed on 19 patients (63.3%). Methods of alveolotomy and cystectomy with suction, iodine tampon or radical operation were performed on 7 patients (23.3%). Apicoectomy of some other adjacent teeth was necessary to perform on two patients (6.7%), and various different therapies were chosen for treatment of two more patients (6.7%). Swelling, pains, trismus, and ancylostoma were reasons for coming in case of 17 patients (56.7%). Finding by chance and orthodontic instruction motivated 13 patients (43.3%) to come to the oral surgery office. Persisting primary predecessor with follicular jaw cyst was found in 6 patients (20%), and 24 (80%) of them did not have the primary predecessor. Diagnosis of follicular cyst was confirmed by the pathohistological finding in 17 patients (65.0%). Diagnosis was made by 8 descriptive findings (30.8%), but it was not indicated clearly. Only one patient (3.8%) was given different diagnosis. Elements which are unique to the follicular jaw cyst were classified in 23 cases (88.5%) using the pathohistological description. In 2 cases (7.7%) description showed parakeratotic cells which are uncharacteristic for the diagnosis, and in one case (3.8%) it showed finding of other but clinically expected elements in the pathohistological description. Twentyseven patients (90%) did not have any postoperative complications, and only three of them

**TABLE 1**  
SIGNIFICANCE OF DIFFERENCE IN EXAMINED VARIABLES

| Variables                                    | Value  | Degrees of freedom | p      |
|--|--------|--------------------|--------|
| Primary tooth – Motive for coming            | 4.887  | 1                  | 0.027  |
| PHD finding – PHD description                | 27.064 | 4                  | <0.001 |
| Size of the cysts – Type of surgical therapy | 12.524 | 3                  | 0.006  |

(10%) had some complications in the postoperative finding. Presence of a central follicular cyst was radiologically confirmed in 11 findings (64.7%), and a lateral variant of the follicular jaw cyst was present in 6 findings (35.3%).

During this research, statistically significant difference was found between the existence of a cyst with or without primary predecessors, and patient's motives for coming to the examination ( $p < 0.05$ ) (Table 1). In other words, majority of patients with a cyst without primary predecessor came to an oral surgeon because of the symptoms of pain, swelling, trismus, or some other difficulty which occurred due to cyst formation, whereas a cyst with primary predecessor was most often diagnosed by chance ( $p < 0.05$ ).

Statistically, significant difference was found between different categories of PHD findings and their descriptions ( $p < 0.05$ ) (Table 1), that is, PHD finding and description of the formation matched in the majority of cases. In that way, PHD cyst findings or finding that implies follicular cyst is most commonly pathohistologically described with connective membrane and stratified squamous non-keratinized epithelium, and other pathological diagnosis are described as unexpected elements in description ( $p < 0.05$ ).

Statistically significant difference was also determined in the method of therapy depending on the size of a cyst ( $p < 0.05$ ; Table 1). Surgical procedures alveolotomy and cystectomy were, most often, performed in cases of small cysts, while methods of alveolotomy and cystectomy with suction or iodine tampon were performed in cases of large cysts ( $p < 0.05$ ).

There was also a certain difference between patients' motive to come to the examination and to initiate localization of a cyst, but it was at the verge of being insignificant ( $p > 0.05$ ). In other words, upper jaw cysts were largely discovered by chance, while patients with lower jaw cysts more often complained of pain, swelling, trismus, and some other cyst connected difficulties ( $p > 0.05$ ).

In the same way, there was a certain difference between localisation of a cyst and its size, which was also at the verge of being insignificant ( $p > 0.05$ ). In other words, cysts in the upper jaw were, most often, small, while lower jaw contained almost the same number of large and small cysts ( $p > 0.05$ ).

## Discussion

This research showed that follicular cysts were diagnosed to almost the same number of male and female pa-

tients, so the opinion that a follicular jaw cyst occurs more frequently in male patients was not confirmed<sup>9–11</sup>.

Follicular cysts, which occur in children, grow much faster. The larger the cyst gets, the smaller is its annual growth in diameter<sup>12</sup>. Ten years is required for a cyst to grow two centimeters in diameter<sup>13</sup>. Two thirds of cysts in this research were small. One third of patients with diagnosed follicular cyst were younger than 18.

Frequency of occurrence of follicular jaw cysts with an impacted tooth varies according to the research from 0.6 to 3.9%, and it most often occurs at the age from 10 to 40<sup>9,14–16</sup>.

Almost 80% of follicular jaw cysts in this research occurred in the lower jaw; half of them had diameter up to 3 cm, and other half a diameter larger than 3 cm ( $p > 0.05$ ). Only small cysts were found in the upper jaw ( $p > 0.05$ ). Distribution of cysts is possible at various localizations, but they most commonly occur as follows: the region of the lower third molar, the third molar in the upper jaw, the canine in the upper jaw, and region of premolar in the upper jaw<sup>17</sup>. Research of other authors show occurrence of odontogenic cysts in the lower jaw<sup>18,19</sup>.

In comparison with cysts localized in the upper jaw, majority of patients with a follicular cyst in the lower jaw complained of pain, swelling, and trismus, for which reasons they came to dentist ( $p > 0.05$ ). Descriptive finding can be interpreted by the fact that nervus alveolaris inferior is located in the lower jaw, and that the size of a cyst can cause certain sensations of the above-mentioned nerve, but its growth can also cause movement of structures with more corticalis in a difficult way.

Alveolotomy and cystectomy using Partsh II method is the most usual method of treating patients who have the diagnosis of follicular jaw cyst, which was proven during this research ( $p < 0.05$ ). This procedure was performed in cases of small cysts, while suction or iodine tampon was performed in cases of large cysts ( $p < 0.05$ ).

Patients who have large jaw cysts expectedly came to examination having pains, swellings, and other difficulties. Many authors imply to stationary and asymptomatic finding of impacted teeth<sup>17</sup>. Follicular jaw cysts can show no symptoms for a long period of time, but they can lead to movements of not only impacted but also adjacent teeth or anatomic structures. Percentage of diagnosed follicular cysts by chance or after orthodontic examination shows the significance of cooperation between orthodontist and oral surgeon and its importance for determining a correct diagnose at the early stage and for planning of a therapy. This research proved that patients

who complain to have certain difficulties, which are connected with a follicular cyst, usually do not have a primary predecessor, while patients without above-mentioned symptoms and with cysts found by chance have a primary predecessor ( $p < 0.05$ ). Majority of patients with primary predecessor were extremely young people with classified small cysts. It was very important to make radiologically panoramic finding in cases when patients had unerupted teeth<sup>20</sup>.

By studying histological interpretation of dental follicularis, which often occurred around impacted third molar, various authors found out the following: only 53% of samples were histologically interpreted in the regular way, description without diagnosis was given for 17% examinees, 10% of them did not have diagnosis at all, and 20% of them had an incorrect diagnosis<sup>21</sup>. This research proved that in majority of cases PHD finding corresponded to PHD description ( $p < 0.05$ ), that means that cysts were described by connective membrane and stratified squamous non-keratinized epithelium, which shows good diagnosis preciseness.

There is a large histological similarity of lesions and odontogenic cysts, which implies the necessity of careful examination of all cyst membranes<sup>7</sup>. Case of Roberts and colleagues shows clinical examination of the tissue along impacted second molar which is completely compatible

with follicular cysts. Some histological authors exclude possibility of odontogenic tumor or malignant condition. However, histology shows stratified squamous epithelium<sup>22</sup>. Two findings in our research were classified as keratocysts, which is obviously a pathohistological interpretation, and a finding of squamous epithelium can be characteristic for follicular cysts.

Odontogenic tumor was diagnosed in one case of this research. Finding and therapy were comparative with the research where odontom in the upper jaw was recognized as more common, along with tooth eruption after the therapy which completely corresponded to ours<sup>23</sup>.

Larger percentage of patients who participated in this research did not have any complications in postoperative period. Conclusion is that this pathology can be successfully solved by surgery.

## Conclusion

There is an indication for carrying out regular in-depth stomatological examinations, and occasional radiological findings while examining a patient. Cooperation of a stomatologist, an oral surgeon, a pathologist, and other specialists can lead to early diagnose and prevention of growth of a follicular jaw cyst as well as significant bone damage.

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Z. Šarac

Department of Maxillofacial Surgery, Faculty of Medicine, University of Mostar, Bijeli brijeg bb, Bosnia and Herzegovina  
e-mail: z-sarac@hotmail.com

## FOLIKULARNE CISTE ČELJUSTI

### SAŽETAK

Cilj ovog istraživanja bio je istražiti pojavnost, lokalizaciju, veličinu i postupke dijagnosticiranja i liječenja folikularnih cista čeljusti. Procijenjeni su motivi i raniji zdravstveni status pacijenata, kao i njihov postoperativni klinički tijek. Većina pacijenata primljena je zbog bolova, oteklina, trizmusa, ili drugih poteškoća povezanih sa formiranjem cista. Folikularne ciste sa postojećim primarnim prethodnikom razvijale su se asimptomatski i otkrivene su nakon ortodontskog pregleda ili slučajno. U većini slučajeva patohistološki nalaz i opis formiranja međusobno su se podudarali ( $p < 0,05$ ). Ciste različitih veličina tretirane su različitim kirurškim postupcima, male ciste najčešće alveolotomijom i cistektomijom, dok su alveolotomija i cistektomija usisavanjem ili jod tamponiranje korišteni za tretiranje velikih cista. Suradnja stomatologa, oralnog kirurga, patologa i ostalih specijalista može dovesti do rane dijagnoze i prevencije daljnjeg rasta folikularne ciste čeljusti, odnosno spriječiti značajnije oštećenje kosti.