UNIVERSIDADE ESTADUAL DE CAMPINAS
FACULDADE DE ODONTOLOGIA DE PIRACICABA

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# AVALIAÇÃO DO TIPO DE TRATAMENTO REALIZADO PARA AS LESÕES ÓSSEAS: CISTO ÓSSEO SIMPLES, LESÃO CENTRAL DE CÉLULAS GIGANTES E QUERATOCISTO ODONTOGÊNICO: *análise retrospectiva*

Dissertação de Mestrado apresentada à Faculdade de Odontologia de Piracicaba UNICAMP para a obtenção do Título de Mestre em Clínica Odontológica – Área de Concentração em Cirurgia e Traumatologia Buco-Maxilo-Faciais

Orientador: Prof. Dr. Márcio de Moraes

Este exemplar corresponde à versão final da Dissertação defendida pelo aluno, e orientada pelo Prof. Dr. Márcio de Moraes

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Prof. Dr. MARCIO DE MORAES

Profa. Dra. MARISA APARECIDA CABRINI GABRIELLI

Profa. Dra. LILIANE SCHEIDEGGER DA SILVA ZANETTI

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**Jim Elliot**

## RESUMO

O objetivo deste trabalho foi avaliar separadamente a eficácia do tratamento realizado pelo serviço de cirurgia bucomaxilofacial da FOP-UNICAMP em três lesões ósseas que podem acometer a região maxilofacial: cisto ósseo simples (COS), lesão central de células gigantes (LCCG) e queratocisto odontogênico (QO). 1) 12 casos de COS, sendo a curetagem o tratamento de escolha. Nenhuma alteração dentária ou sensorial foi percebida e não houve recorrência; 2) 20 casos de LCCG, sendo o tratamento de escolha baseado na característica de lesão: 6 foram tratados por meio de cirurgia (3 ambulatoriais e 3 hospitalares). As demais lesões (14) foram tratadas com injeção intra-lesional de triancinolona semanalmente, associada a calcitonina (5 casos) ou enucleação (2 casos). Não houve recorrência; 3) 53 casos (59 lesões) de queratocisto, sendo que 47 foram tratadas por meio de descompressão e 12 por meio de enucleação. Ocorreu recidiva em 8 casos (6 por descompressão e 2 por enucleação). Todas estas foram tratadas em um segundo momento com enucleação/curetagem, associadas a ostectomia periférica. Não houve recorrência após esta segunda abordagem. De acordo com a metodologia empregada neste estudo concluímos que os tratamentos adotados se mostraram efetivos e com resultados semelhantes aos de outros trabalhos na literatura, sendo que a escolha do tratamento a ser realizado deve levar sempre em consideração o tipo e tamanho da lesão, bem como as condições clínicas/anatômicas e radiográficas da lesão, assim como a colaboração do paciente.



Palavras-Chave: tratamento conservador, cisto ósseo simples, lesão central de células gigantes, queratocisto odontogênico

## ABSTRACT

The objective of this study was to evaluate separately the effectiveness of the treatment by oral and maxillofacial surgery service by FOP-UNICAMP in three bone lesions that may affect the maxillofacial region: simple bone cyst (SBC), central giant cell lesion (CGCL) and odontogenic keratocysts (OQ). 1) 12 cases of SBC, and curettage treatment of choice. No dental or sensory changes were noted and no recurrence, 2) 20 cases of CGCL, and the treatment of choice based on characteristic lesions: six were treated by surgery (3 hospital and 3 outpatient). The remaining injuries (14) were treated with intra-lesional triamcinolone weekly associated with calcitonin (5 cases) or enucleation (two cases). No recurrence, 3) 53 cases (59 lesions) of OK, and 47 were treated by decompression and enucleation through 12. Relapse occurred in 8 cases (6 per second for decompression and enucleation). All these were treated in a second time with enucleation / curettage associated with periferic ostectomy. There was no recurrence after this second approach. According to the methodology used in this study, the standard treatment proved effective, with results similar to those of other studies in literature, and the choice of treatment to be performed must always take into account the type and size of the lesion, as well as clinical conditions/anatomical and radiographic lesion, as well as the collaboration of the patient.



Key Words: conservative treatment, simple bone cyst, central giant cell lesion, odontogenic keratocysts

## SUMÁRIO

# 1. INTRODUÇÃO

O estudo das lesões que acometem a cavidade bucal e as regiões anexas representa um importante capítulo da Odontologia, em virtude do importante papel do cirurgião-dentista em seu diagnóstico e tratamento. Várias lesões ósseas, de origem odontogênica ou não, podem se manifestar primariamente ou exclusivamente nos ossos da região maxilofacial. Estas lesões podem se apresentar de diferentes formas clínicas e radiográficas. Desta maneira, o diagnóstico dessas lesões ósseas, juntamente com a evolução clínica, poderá definir qual o melhor tipo de tratamento a ser executado.

Basicamente, as lesões ósseas dos maxilares são divididas em:

- cistos odontogênicos;
- cistos não-odontogênicos;
- tumores odontogênicos
- tumores não-odontogênicos;
- lesões inflamatórias dos maxilares;
- doenças metabólicas e genéticas[1]

Como descrito anteriormente, cada doença óssea possui um específico plano de tratamento, baseado no tipo de lesão e nas evoluções clínica e radiográfica da mesma. Desta forma, analisamos 3 lesões ósseas, incluindo as características gerais e os tipos de tratamento disponíveis para cada uma destas leões.

## 1. Cisto Ósseo Simples

### 1.1 ) Considerações gerais

Os cistos da região maxilofacial podem ser divididos em cistos verdadeiros ou pseudo-cistos, sendo estes últimos, lesões que não apresentam revestimento epitelial, entretanto recebem a denominação de "cistos" por alguns autores, devido a suas características expansivas e por possuírem uma cavidade[1]. Os pseudo-cistos são lesões tais como o cisto ósseo aneurismático, o cisto ósseo estático e o cisto ósseo simples (COS)[2].

O COS é uma lesão incomum, apresentando uma prevalência de 1% dos cistos não odontogênicos dos maxilares. Essa lesão é encontrada mais freqüentemente durante a segunda década de vida, e sua presença após esse período é incomum. Ocorre quase que exclusivamente na mandíbula, com predileção pela região de corpo e sínfise mandibular[3].

Por se tratar de uma lesão assintomática e de evolução silenciosa, é quase sempre descoberta em exames radiográficos de rotina. Deste modo, a radiografia desempenha uma função importante, tanto no diagnóstico, quanto na proservação desta lesão, ambas fundamentadas particularmente nesse exame complementar[4,5].

Embora muitas teorias tenham surgido para explicar a origem do COS, sua etiopatogenia ainda permanece desconhecida, refletindo assim, numa variedade de nomes encontrados na literatura como "cisto ósseo hemorrágico"[4], "cisto ósseo traumático"[6], "cisto ósseo solitário"[7] "cisto de extravasamento"[8],"cisto ósseo idiopático"[9], "cisto ósseo simples"[10], entre outros. As três hipóteses mais difundidas são:

*a)crescimento ósseo anormal. Isso porque geralmente o cisto se encontra perto de centros cartilaginosos, durante a fase de crescimento;*

*b)degeneração tumoral, como por exemplo, o granuloma central de células gigantes;*

*c)hemorragia intramedular a partir de um trauma local, no qual ocorre falha na organização do coágulo e consequentemente liquefação do mesmo (mais aceito atualmente)*[5, 11].

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**1.2)Tratamento**

Diversas formas de tratamento estão citadas na literatura para o COS. As formas variam desde a instituição de um acompanhamento radiográfico da lesão, à utilização de uma abordagem cirúrgica para exploração da cavidade, conforme mostrado no quadro abaixo (Quadro 1).

| Tipo de tratamento | Autor e ano |
|---|---|
| Acompanhamento | Sapp, 1990[3] Blum, 1955[12]; Szerlip, 1966[13]; |
| Exploração cirúrgica + Curetagem | Kaugars & Cale, 1987[4]; Fridrichsen, 1993[14]; Sharma, 1967[15]; Gowgiel, 1979[16] DeTomasi & Hann, 1985[17]; Whinery, 1955[18]; Stimson & McDaniel, 1989[19] |
| Exploração cirúrgica | Harris, 1972[20]; Narang & Jarrett, 1980[21]; Fredman & Beigleman,1985[22]; Winer & Doku,1978[23]; Chiba et al., 2002[24] |
| Exploração cirúrgica + endodontia | Oliveira et al., 2000[25] ; Newton & Zunt, 1987[26] |
| Sangue autógeno | Biewald, 1967[27] |
| Osso autógeno | Bennett & Chilton 1945[28]; Robinson et al., 1967[29] |
| Osso homógeno | Lindsay e Martin, 1966[30] |
| Hidroxiapatita + Osso autógeno + sangue autógeno | Dellinger et al., 1998[31] |
| Gelfoam | Thoma, 1955[32] |
| Tratamento endodôntico | Patrikiou et al., 1981[33]; Ruiz-Hubard & Harrison, 1987[34] |
| Aspiração com agulha | Blum, 1955[12] |

**Quadro 1. Tipos de tratamento encontrados para o Cisto ósseo simples**

Dentre todos os tratamentos encontrados na literatura, os mais empregados foram:

- acompanhamento radiográfico (sem intervenção cirúrgica)
- exploração cirúrgica com ou sem presença de curetagem das paredes ósseas;
- abertura e preenchimento cavitário utilizando enxerto ósseo.

Blum (1955)[12] e Szerlip (1966)[13] apresentaram casos de COS, sendo que após o diagnóstico clínico e radiográfico optaram pelo acompanhamento da lesão. Esses autores avaliaram as lesões através de radiografias por um período de cinco anos e observaram que houve resolução completa da lesão sem a necessidade de intervenção cirúrgica.

Bennett e Chilton (1945)[28] relataram um caso de COS que foi tratado através de enxerto ósseo autógeno. A grande dimensão da lesão foi fator determinante na escolha do tratamento. Para os autores, a utilização do enxerto em lesões de grandes dimensões é mais indicada, pois acelera o processo de reparo.

Lindsay e Martin (1966)[30] apresentaram um caso de COS, tratado com abertura de uma janela na parede externa do cisto e colocação de enxerto ósseo homógeno. Nesse caso, o autor afirma que a presença de necrose dos dentes associados a lesão auxiliou na osteólise e formação da cavidade cística, os dentes foram removidos durante o procedimento cirúrgico. A utilização desse tratamento, segundo os autores deve ser realizada em lesões de grandes dimensões.

Patrikiou et al. (1981)[33], avaliaram métodos diferentes de tratamento em um paciente que apresentava dois cistos ósseos simples mandibulares. O exame radiográfico revelou duas áreas radiolúcidas, uma grande do lado esquerdo da mandíbula, bem circunscrita com contorno nítido entre as raízes dos dentes envolvidos e outra pequena no lado direito, redonda e bem circunscrita. A lesão do lado esquerdo recebeu tratamento convencional com exploração cirúrgica e no lado direito foi realizada a endodontia dos dentes que estavam envolvidos na lesão. Os autores observaram que após um período de seis meses havia um

aumento da reabsorção óssea no lado onde tinha sido realizada a endodontia, ao contrário do lado oposto, que se mostrava preenchida com trabeculado ósseo.

Magliocca et. al. (2007)[35] tratou dois pacientes que apresentaram a lesão em região de côndilo mandibular. O tratamento foi o mesmo para os dois casos, onde, sob anestesia geral e acesso extra-bucal os côndilos foram encontrados. Após isso, exploração cirúrgica e curetagem da região foram feitas afim de que houvesse estimulação de sangramento. Os pacientes foram acompanhados por meio de radiografias. Nenhuma queixa foi relatada pelos pacientes em um acompanhamento a longo prazo.

Ballester et al. (2009)[36] realizaram um estudo retrospectivo de 21 COS. O diagnóstico foi baseado na anamnese, exame clínico e exames complementares. Radiografias panorâmica e periapical foram obtidas em todos os casos, juntamente com a tomografia computadorizada, conforme decidido pelo cirurgião. Todas as lesões foram submetidas a exploração cirúrgica, e as cavidades apresentavam-se vazias em 90,5% dos casos. Em apenas dois pacientes um conteúdo vascular foi visto no interior da lesão. Dois pacientes apresentaram parestesia pós-operatória do nervo alveolar inferior, havendo melhora da parestesia em até 2 semanas pós-operatórias. Todos os pacientes mostraram reparação óssea completa.

## 2. Lesão Central de Células Gigantes

### 2.1) Considerações gerais

Anteriormente, qualquer lesão óssea que apresentasse células gigantes era diagnosticada como tumor de células gigantes (TCG). A indistinção aumentava pelo reconhecimento de lesões ósseas com numerosas células gigantes multinucleadas histologicamente semelhantes, senão idênticas, em pacientes portadores de hiperparatireoidismo[36]. A reavaliação das lesões denominadas como TCG separou muitas delas em novas categorias. Um exemplo foi uma lesão interpretada por Jaffe[37] (1953) como uma resposta a agressão, e designada de granuloma de células gigantes reparador. O termo reparador foi abolido, após o reconhecimento de que muitas dessas lesões não apresentam esta natureza

reparadora; de fato, alguns patologistas substituem inclusive o termo “granuloma” por “lesão”, sendo assim, a melhor designação é dada por Lesão central de células gigantes(LCCG).

A LCCG é uma das lesões benignas de origem conjuntiva que provoca significativas controvérsias na literatura. A despeito dos esforços concentrados para esclarecer a etiopatogenia, ainda permanecem dúvidas sobre estas lesões. De semelhante modo, ainda permanece uma discussão sobre a forma de tratamento mais adequada, e sua possível relação com o TCG. A LCCG é composta por fibroblastos fusiformes num estroma contendo quantidades variáveis de colágeno. Inúmeros canais vasculares pequenos estão evidentes lado a lado da lesão. Macrófagos carregados de hemossiderina são notados com freqüência, bem como eritrócitos extravasados. Células gigantes multinucleadas estão presentes ao longo do estroma de tecido conjuntivo. As células gigantes podem estar espalhadas uniformemente; todavia ficam freqüentemente agregadas ao redor dos vasos. As células de inflamação não são proeminentes, e, quando vistas, provavelmente são de natureza secundária. Focos de osteóide podem estar presentes, dispersos pelo estroma[38].

**2.2) Tratamento**

O tratamento cirúrgico para a LCCG pode incluir a exérese por curetagem[39-41] ou ressecção em bloco[42-44]. Em alguns casos, a curetagem pode ser complementada com crioterapia[44] ou ostectomia periférica[43].

Esta lesão também é tratada por muitos autores por meio de abordagens não cirúrgicas, como a administração de doses sistêmicas de calcitonina, a aplicação intra-lesional de corticosteróides e métodos menos comuns como a administração de α-interferon[46].

Os índices de recidiva variam substancialmente na literatura, com números que vão de 0% a 49%[39,40,47,48,49]. As lesões consideradas agressivas apresentam uma maior tendência a recidiva[40,48,49]. Esta tendência a recidiva também está associada a pacientes mais jovens[39,49]. Bataineh et al. (2002)[51] avaliaram o resultado do tratamento cirúrgico da LCCG em mandíbula, analisando

retrospectivamente todos os casos tratados em um período de 9 anos. Dezoito pacientes foram tratados por meio de um procedimento cirúrgico padronizado, que consistia em ressecção da lesão associada a ostectomia periférica, preservando a continuidade do bordo inferior da mandíbula. Os tecidos moles em contato com a lesão também foram removidos. Todos os pacientes foram acompanhados por um período de 1-9 anos (média de 3,9 anos), com um caso de recidiva e 11% de parestesias permanentes de lábio inferior. Os autores concluíram que esta modalidade de tratamento é satisfatória, com um restabelecimento funcional pós-operatório favorável e baixo índice de recidiva.

O tratamento com administração intra-lesional de corticosteróide é preconizado por diversos autores[51-57]. Os protocolos incluem 6 injeções com intervalos semanais, por seis semanas, de não mais que 1 ml de triancinolona por 1 cm radiográfico da lesão – associados a partes iguais de anestésico local[51,52,53].

Uma outra modalidade de tratamento clínico da LCCG, introduzida na literatura por Harris (1993)[59], é representada pela administração de calcitonina[58-63]. A calcitonina é um hormônio com um efeito direto de inibição de osteoclastos, causando um aumento do influxo de cálcio para os ossos. É produzida pela influência de baixas concentrações séricas de cálcio, pelas células C na tireóide e em menor quantidade nas paratireóides e timo. Há dois tipos principais de calcitonina disponíveis para o uso terapêutico: a calcitonina de salmão e a humana. Como a calcitonina tem um efeito de inibição direto sobre osteoclastos, é empregado no tratamento de doenças com aumento na atividade osteoclástica, como a doença de Paget e em algumas metástases ósseas. Uma unidade de calcitonina é definida como a quantidade necessária para induzir hipocalcemia em ratos sob condições experimentais. Em humanos, no entanto, o efeito da calcitonina de salmão é mais forte que a de origem humana; em voluntários saudáveis, 50UI de calcitonina de salmão parece ser equipotente a 75-90UI de calcitonina humana[63]. Contudo, a calcitonina humana parece ter menos propriedades antigênicas. Após administração subcutânea, a maior concentração plasmática é obtida em 1 hora; A meia-vida é de 70-90

minutos[61]. A dose empregada para o tratamento da LCCG é empírica, derivada do tratamento da doença de Paget e de osteoporose pós-menopausa[64].

## 3. Queratocisto Odontogênico

### 3.1 Considerações gerais

Os cistos de origem odontogênica são aqueles que apresentam um revestimento derivado do epitélio produzido durante o desenvolvimento do dente, podendo ser derivado dos restos de Malassez, do epitélio reduzido do esmalte e do restos da lâmina dental (restos de Serres) como o queratocisto odontogênico (QO).

Os QO foram inicialmente chamados de “cistos primordiais” devido a sua aparição em áreas onde havia uma agenesia dental[65]. Acreditava-se que o germe dentário ao invés de formar um dente gerava uma lesão cística. Entretanto, áreas radiolúcidas uni ou multiloculares, cujos conteúdos, quando analisados microscopicamente, apresentavam características idênticas a estes cistos, ocorriam em regiões dos maxilares onde todos os dentes estavam presentes, fazendo com que essa hipótese não se sustentasse[65].

### 3.2) Tratamento

Atualmente existe uma grande controvérsia entre os cirurgiões a respeito do melhor tratamento para os QO e sobre o que constitui um tratamento conservador ou radical[66,]. A maioria considera enucleação, curetagem, descompressão e marsupialização como tratamentos conservadores enquanto a ressecção em bloco e a ostectomia periférica, seguida ou não por enxerto ósseo é uma intervenção radical e geralmente aplicada aos QO recorrentes[67].

O argumento dos que defendem uma abordagem mais radical é a possibilidade de recorrência[66]. Por outro lado os que defendem a utilização de tratamentos conservadores relatam como principal vantagem a preservação de estrutura óssea, tecidos moles e dentes associados aos QO, além de que estes procedimentos geralmente são menos traumáticos para o paciente, reduzindo ou eliminando gastos com medicação e hospitalização[68,69].

Autores como Bataineh e Alqudah (1998)[66], relatam o tratamento de 32 QO por meio de ressecção marginal, observando um índice de recorrência de 0% durante um período de proservação que varia de 2 a 8 anos. Ele relata que uma abordagem mais radical diminui os riscos de recidiva, uma vez que há remoção de todo o epitélio da lesão. Desta maneira, requer menor cooperação do paciente. Além disso apenas um procedimento cirúrgico é realizado.

Entretanto, ao buscarmos na literatura encontramos vários estudos em que o tratamento padrão foi realizado por meio da descompressão e um longo período de acompanhamento foi feito e, mesmo assim, baixas taxas de recorrência foram apresentadas. Desta forma, estes autores concluem que o tratamento conservador por meio da descompressão se mostrou eficaz[70,71, 72].

A descompressão é uma técnica em que se utiliza um dispositivo cilíndrico (como a borracha de um conta-gotas ou um dreno cirúrgico no interior da cavidade cística), com a finalidade de manter uma comunicação continua entre o meio bucal e o interior do cisto. Usualmente ao utilizar esta técnica vai ocorrer uma união do epitélio da parede do cisto e a mucosa, tendo como resultado final a exteriorização da lesão com a vantagem de ter a certeza de que a cavidade sempre estará permeável. Adicionalmente o dispositivo colocado facilita a irrigação da cavidade para o paciente, sendo de grande ajuda para evitar o acúmulo de restos de alimentos e microorganismos que possam propiciar uma infecção secundaria[69,70,71, 72].

## 4. Materiais e Métodos

Esta pesquisa foi submetida à avaliação do Comitê de Ética em pesquisa, da FOP – Unicamp, tendo sido aprovada sob os protocolos N°:

- 174/2006, (anexo 1)
- 071/2006 (anexo 2)
- 057/2004 (anexo 3)

## 4.1 Material

Todos os prontuários pertencentes ao arquivo da Área de Cirurgia Buco-Maxilo-Faciais da FOP-Unicamp foram avaliados, no período compreendido de janeiro de 1995 a julho de 2011. Foram selecionados apenas os prontuários de pacientes com as seguintes lesões ósseas:

- ✓ *cisto ósseo simples*
- ✓ *lesão central de células gigantes*
- ✓ *queratocisto odontogênico*

O diagnóstico definitivo foi confirmado pelo laudo anatomopatológico, emitidos pela Área de Patologia da mesma Instituição.Todos os prontuários foram preenchidos por alunos da Pós-Graduação em Clínica Odontológica – Área de concentração em Cirurgia e Traumatologia Buco-Maxilo-Faciais, sob supervisão constante dos professores que compõem esta Área, que também participaram de todas as etapas do tratamento instituído. Foi apresentado aos pacientes um termo de consentimento livre e esclarecido, no qual o mesmo autorizava seu tratamento e a utilização dos dados do seu prontuário para fins de pesquisa ensino e divulgação em jornais e revistas científicas, respeitando-se o Código de Ética.

Todos os prontuários de pacientes atendidos com diagnóstico definitivo de uma dessas lesões e confirmado por análise histológica foram incluídos na amostra, estando os pacientes em qualquer fase do tratamento. A coleta de dados, foi armazenada em uma planilha do programa Microsoft Excel 2007® otimizando a coleta de informações referentes à identificação do paciente, anamnese, exame físico, hipóteses diagnósticas, características clínicas e radiográficas da lesão, exames complementares, data da instituição do tratamento inicial, tipo de biópsia empregada, tipo de tratamento, evolução, presença de recidivas, tempo de proservação.

## 4.2 Método

A análise dos prontuários e a coleta dos dados foram realizadas pelo mesmo examinador, considerando as seguintes variáveis:

- gênero
- idade
- aspectos clínicos
- aspectos radiográficos
- tratamento e proservação
- recidiva

**CAPÍTULO 1**

# Treatment analysis of simple bone cyst treated by oral and maxillofacial surgery area of the Piracicaba Dental School from 1999 to 2011

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# Treatment analysis of simple bone cyst treated by oral and maxillofacial surgery area of the Piracicaba Dental School from 1999 to 2011


**ABSTRACT**

The purpose of this study is to evaluate retrospectively the cases of simple bone cyst (SBC), treated by the Oral and Maxillofacial Surgery Area of the Piracicaba Dental School - University of Campinas, between January 1999 and July 2011. It has been evaluated 10.543 clinical handbooks, where 12 patients presented SBC. All the cases occurred in patients that were in the second decade of life, with mean age of 15.2 years. Mandible was involved in 100% of the cases, with high incidence on the symphisis (55%), followed by mandibular body (36%) and mandibular ramus (9%). Six patients reported history of trauma that occurred between 2 to 9 years prior to the diagnosis of the lesion. All the patients were submitted to an incisional biopsy associated to a surgical exploration of the cystic cavity, which has represented the definitive treatment. The average time of proservation was 35,7 months, the shortest and the longest period of accompaniment had been 7 and 85 months respectively, period in which was not observed any recurrence. The treatment through exploratory surgery, carried through the moment of the biopsy, it was effective in all the cases of this study. The results of this study had contributed for the characterization of the SBC and they helped us to conclude that: a) the etiology of the SBC might be a trauma, with unrelated to gender or race; b) the SBC is a rare injury, that has high incidence on the inferior jaw of the patients on the second decade of life; c) the discovery of SBC occurs during the routine examinations; the injury is not the complaint of the patient; d) the treatment of the SBC, through the surgical exploration, has revealed itself effective and safe.



Key words: Treatment, Bone, Surgery, Epidemiology.

## Introduction

The simple bone cyst (SBC) is an uncommon injury, with a high incidence of 1% of non-odontogenic cysts of the jaws. This injury is most often seen during the second decade of life, and its presence after this period is unusual. It occurs almost exclusively in the jaw with a predilection for the mandibular body and symphysis[1], local trauma has been the more accepted cause. It is an osseous disease that on radiographic examination seems to be an apical periodontitis of endodontic origin. Caution is required over the establishment of the diagnosis to avoid the root canal treatment and, also during surgical exploration, to prevent pulpal neurovascular bundle rupture[1].

According to DeTomaso and Hann, 1985[2], the typical clinical findings usually attributed to the SBC include the presence of a radiolucent area, well-defined as unilocular, usually with sharp edges, especially among the roots of the premolars and mandibular molars[3,4], the presence of associated dental elements of vitality, absence of tooth mobility, normal aspect of the overlying soft tissue, usually with no symptoms and lesion. It is essentially an empty cavity.

Radiographically, the lesion appears as a radiolucent area that may or may not be well circumscribed. Margins are sometimes cortical in nature. The appearance of blurred between the teeth is a pathognomonic feature of this injury[5]. Due to the fact it is an asymptomatic lesion and has silent evolution, it is often discovered during the routine radiographs. Thus, radiography plays an important role in the diagnosis of SBC. Zegarelli *et al*. 1966[6], conducted a study which definitively proved the diagnosis of SBC, through the inspection and surgery in 17 cases. In all cases, the cyst appeared as an intra-bone cavity, completely surrounded by the bone. In 8 patients, the cavity was completely empty, there were seven aero-blood fluids and, in two of them, was found the presence of hemorrhagic fluid. There was no lining epithelial tissue, which was confirmed by sending small fragments for microscopic examination, revealing the absence of the connective tissue and epithelial tissue. Among many theories, according to Harnet *et al*,. 2008[41], 3 predominate: 1) an abnormality of osseous growth - some authors suspect that SBC may represent an “out of control” remodeling osseous area; 2) a

degenerating tumoral process - this theory of a tumoral degeneration process is based on clinical observations mostly reported in osteodystrophic pathological conditions, such as fibrous dysplasia and central giant cell granuloma; 3) a particular factor triggering hemorrhagic trauma[43].

Several treatment options have been proposed. However, the recommended treatment is surgical exploration because it confirms the clinical and radiographic diagnosis after inspection of the cavity, which in most cases is either empty or full of a sero-sanguineous fluid. During surgical exploration, the cavity may be filled of blood, which can be later replaced by bone tissue [7]. The purpose of this study was to evaluate the epidemiological characteristics of cases of SBC, treated by the division of Oral and Maxillofacial Surgery of the Piracicaba Dental School – UNICAMP from 1999 to 2011.

**Material and Methods**

This research was submitted to the evaluation of the Research Ethics Committee of FOP - UNICAMP, and was approved under the protocol n. 174/2006. Of all patients seen during the period of January 1999 to July 2011, we selected only the records of the patients with SBC whose final diagnosis was confirmed by histopathological report, issued by the Division of Pathology of the same institution. The patients were presented to a term of informed consent, which allows the same treatment and use of data in their medical records, for research teaching and disclosure in newspapers and journals. All charts of patients treated with definitive diagnosis of simple bone cyst confirmed by histopathology were included in the sample, with patients at any stage of treatment.

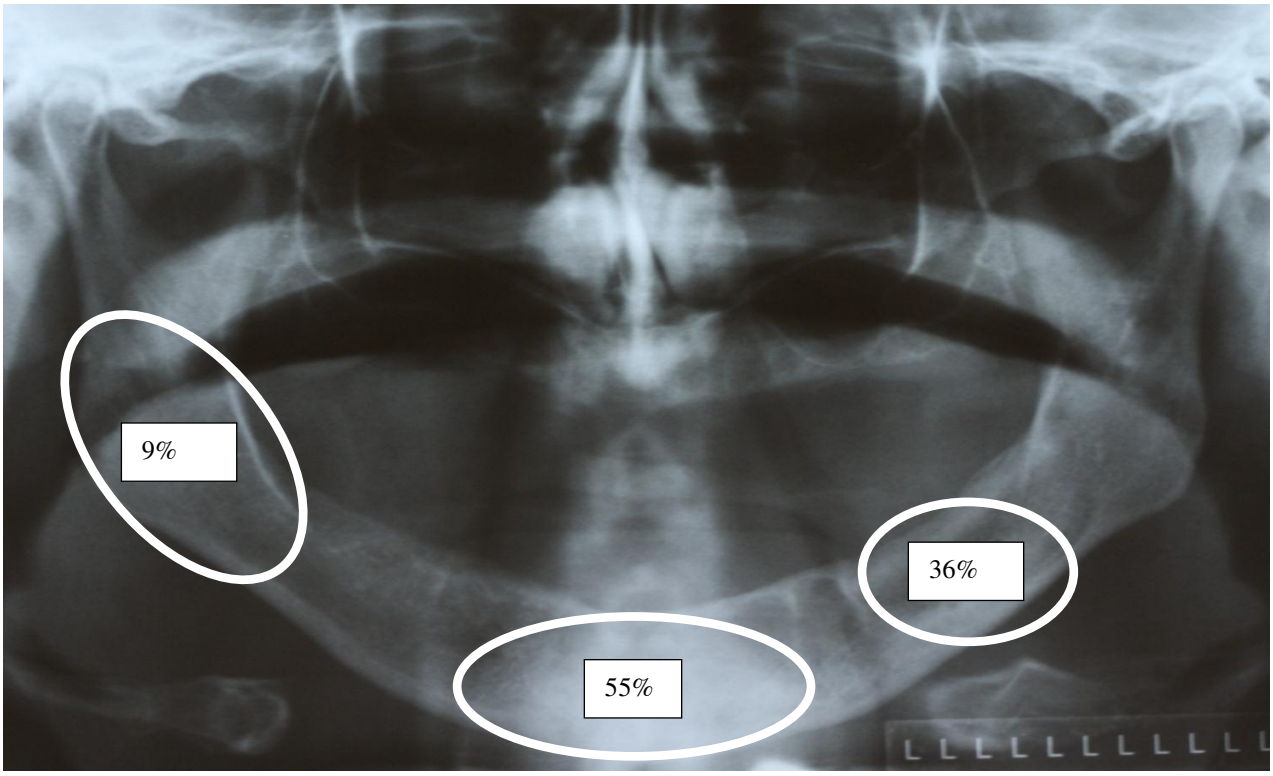


**Figure 1**. The region of the circle does not correspond specifically to the side, but the sum of right and left sides

## Results

Twelve patients had been seen (6 women and 6 men), as shown in the table below. The average age of patients was 15.2 years; the oldest and the youngest were respectively 18 and 12 years. All patients were diagnosed with simple bone cyst, confirmed by sending samples obtained by histopathology. According to the location, it seems that all injuries occurred in the mandible, with the following proportion: 55% symphysis, followed by the body with 36% and finally branch with 9% (figure 1). The presence of the symptom pain was reported in only one case. No other symptoms were reported by patients. However, a swelling in the region of the cyst was observed in 3 cases, only noticed after the visualization of the lesion in radiographs. The only case of pain related to the SBC was presented by a patient who presented swelling associated with injury. The radiographic appearance of radiolucency and unilocular was constant in all cases. A sclerotic halo was observed in most cases. The average size of the lesions was 32.8 mm X 19.4 mm. The history of previous trauma was reported in 06 cases, a period that

ranged from two to nine years. There was no relation between the size of the lesion and the time elapsed in the history of trauma. The treatment performed for all cases was a surgical exploration and curettage of bone cyst walls. The presence of paresthesia after the completion of surgical exploration was not confirmed in any case. The average was 35.7 months, with the lowest and highest preservation period of 7 and 85 months respectively. During the follow-up (figure 2 and 3) period previously established, the presence of recurrence was not observed (table 1 and 2).

*Table 1 - general characteristics*

| case | gender | age | region | location | Size (mm) | pain | radiographic aspect | Proserv. (months) | trauma |
|---|---|---|---|---|---|---|---|---|---|
| 1 | M | 15 | symphysis | Median | 30 X 17 | no | Unilocular radiolucent | 5 | 4 years |
| 2 | M | 18 | body | right | 20 X 17 | no | Unilocular radiolucent | 30 | no |
| 3 | F | 12 | symphysis | Median | 24 X 20 | no | Unilocular radiolucent | 19 | 9 years |
| 4 | F | 16 | ramus | right | 29 X 17 | no | Unilocular radiolucent | 63 | no |
| 5 | F | 15 | symphysis | Median | 30 X 17 | no | Unilocular radiolucent | 21 | no |
| 6 | M | 15 | symphysis | Median | 23 X 21 | no | Unilocular radiolucent | 34 | no |
| 7 | F | 16 | symphysis | Median | 50 X 20 | no | Unilocular radiolucent | 10 | 7 years |
| 8 | F | 14 | symphysis | Median | 50 X 20 | no | Unilocular radiolucent | 19 | no |
| 9 | M | 14 | body | left | 24 X 22 | yes | Unilocular radiolucent | 7 | no |
| 10 | F | 15 | body | right | 51 X 20 | no | Unilocular radiolucent | 24 | 3 years |
| 11 | M | 18 | body | right | 30 X 23 | no | Unilocular radiolucent | 81 | 2 years |
| 12 | M | 15 | body | left | 25 X 16 | no | Unilocular radiolucent | 5 | 4 years |

*Table 2 - treatment and recurrence*

| nº cases | treatment | Recurrence % |
|---|---|---|
| All cases | curettage | 0 |

## Discussion

Regarding the location, the mandible was affected in 100% of our cases and 06 cases were located in the region of the symphysis like Ballester *et al.* 2009[43]. Those data is in agreement with the literature reviewed. Hansen *et al*. 1974[11], in the evaluation of 66 cases, found out that for lesions in the jaw, there was a high incidence of injuries involving the symphysis region.

Regarding the age, 100% of the cases were diagnosed in individuals who were in the second decade of life. Similar results were observed in the literature, showing that the second decade of life is the most prevalent period for these lesions[1,7,12,13,14,15,45].

It is believed that the SBC is related to a process that begins from a local trauma[8]. In this theory, it is assumed that the cyst develops as a result of an intraosseous hematoma, caused by a trauma, in an area of spongy bone, where the failure in the organization of the clot, results in liquefaction and subsequent formation of a cystic cavity. The flaw in the organization would cause necrosis of bone trabecular. The removal of the trabecular bone and the organization of the clot are delayed due to the lack of reactive tissue on the surface of the cyst. Then the osteoclasts become differentiated in the opposite surface and remove the necrotic bone tissue. In the same time, undergo blood clot liquefaction, preventing the organization of the local tissue, which causes the formation of the cyst[9].

The presence of sero-bloody content was observed in 04 cases, and there was no correlation between the presence of content with trauma histories. According to Blum, 1929[8], the presence of fluid content is attributed to the theory-traumatic bleeding, where the hematoma formed after a trauma may subsequently undergo lysis and become an empty hole. The presence of painful symptoms is

unusual for SBC[16,17,18], occurring only with one patient. It has been attributed to the presence of painful symptoms, the bone lesions that have spread[19]. During bone growth, the nerves that are in proximity to the cystic cavity, can be compressed and generate a table of pain symptoms[20]. The largest lesion found in our study was 50 mm long horizontal (mediolateral) by 22 mm of vertical extension (from the bottom edge of the alveolar ridge of the jaw). The occurrence of large lesions is an unusual finding[21] and these lesions may represent the evolutionary stage reached[14]. In our study, all cases of SBC has been presented unilaterally. The occurrence of bilateral mandibular SBC is rare[22].

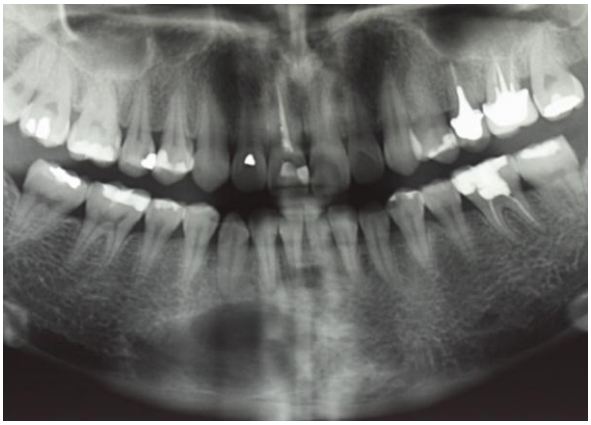

***Figure 2. Preoperative***

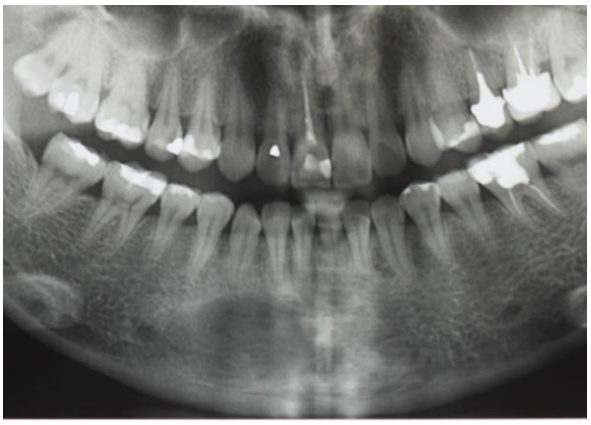

***Figure 3. postoperative – 60 days***

According to McDaniel and Stimson 1989[23], the lack of teeth is vitality associated with SBC and it was seen in approximately 10-15% of the cases. The loss of teeth is vitality associated with the injury after treatment is uncommon[24], but can occur due to the trauma during the treatment. Based on the proximity of the lesion with the root of the teeth, Ruiz-Hubard & Harrison (1987)[37] believe that periapical inflammation secondary to pulpal necrosis interferes in the process of diagnosis of SBC, endodontic treatment and promotes the encouragement to start the process repair in the bone cavity. To Zunta and Newton, 1987[36], the endodontic treatment of SBC should be considered before, during or after surgery. For them, the commitment associated with endodontic tooth SBC can prevent the occurrence of bony healing. The lack of vitality presented as the main reason for

performing this treatment is not justified. As verified by Patrikiou *et al*., 1981[22] and Oliveira *et al*., 2000[18], endodontic therapy, known as the only form of treatment, was ineffective, and the growth of the lesion progressed normally, requiring surgical treatment. In our study it wasn't observed the presence of devitalized teeth associated with injury, or in the pre-operative or post-operative, with no indication of endodontic therapy occurred in any of the cases presented. Although it has been confirmed in 50% of the sample to previous trauma, it was the only factor that might be associated with the emergence of SBC. The origin of SBC from initial injury seems to be the triggering factor in this injury [7,8,25]. The lack of confirmation in other cases of trauma does not rule out the possibility that there may have been a subtle or trauma that the patient does not remember that it occurred. In the literature also seems to be a consensus that intramedullary hemorrhage is essential for the formation of SBC and occurring from the initial trauma[8,13,26].

As for treatment it is observed in the literature that many forms are used to bring better results[12,27,28,29]. The injection of autologous blood within the bone cavity to stimulate osteogenesis as proposed by Precious and McFadden, 1984[30], is based on the hypothesis that the precursors of fibroblasts that are circulating in the blood undergo a transformation by a mechanism not yet clarified. However, we do not believe that this method has any advantage over surgical exploration. The bleeding that occurs during the surgery from the walls of the bone and surgical access, forms a clot that is organized and ossification within a period from 6 to 24 months[23], being enough to promote the filling of the cavity bone. Various forms of treatment were applied for the treatment of SBC. For many scholars, this lesion behave as self-limiting injuries and they are capable of a spontaneous and complete remission. This view is supported by the fact that the SBC is rarely seen in older patients, above the third decade of life[32]. A view, shared by Blum, 1955[17], and Szerlip, 1966[10], found series of cases that presented spontaneous resolution without surgical intervention. In fact, to Blum, 1932[12], a needle aspiration is a possible treatment for SBC, it is believed that the penetration of the needle during the aspiration in the bone cavity could produce a bleeding with subsequent clot formation, this would stimulate connective tissue and capillary activity for bone

regeneration. The apparent ability of SBC a spontaneous healing process leads to some questions about its exact nature, as demonstrated by Stark and Sapp, 1990[33]. However, surgical exploration followed by curettage of the bony walls shows to be the most used for SBC[7,31,34,5,35,23]. To Kaugars and Cale, 1987[7], surgical exploration is sufficient to promote resolution of the lesion, which can be observed radiographically after a few months complete filling of the cystic cavity. Oliveira *et al*. 2000[18], reports the surgical exploration of the SBC as an aggressive procedure to be applied on children. But, like Magliocca *et al*., 2007[39], we do not believe that surgical exploration consists in an aggressive procedure, as well as fundamental, for the diagnosis that presents little morbidity compared to other procedures in the oral cavity. It is also reported in the literature that surgical exploration's disadvantages include the possibility of devitalized teeth or injuries to adjacent nerves that may be passing across the cavity[36,40]. However, we believe it is desirable wherever we find a radiolucent lesion with cystic features, we establish the histopathologic diagnosis of this lesion through a biopsy, which will confirm the diagnosis and avoid an extensive intervention, likely if the injury would have expanded. Therefore, we recommend surgical exploration and histological examination to confirm the diagnosis, even in cases where there is a clinical and radiographic diagnosis of SBC. Some questions are raised about the real need for endodontic treatment of dental elements after surgical treatment.

According to Rodrigues and Estrela, 2008[42], the treatment consists of surgical exploration, curettage of the osseous socket and its subsequent filling with blood. The clinical and radiographic control of the healing process is essential, which in the present clinical case was performed during 6 months. The recurrence of the SBC of the jaw is rarely reported in the literature[32], unlike the injuries that occur in extra-cranial skeleton, which are common. In our study there was no presence of recurrence within the follow-up period. The radiographic monitoring as a treatment option without surgical exploration is not recommended, as advocated by Stark and Sapp, 1990[33], because the final diagnosis of SBC is only done through the exploration of the lesion[13], so the error in diagnosis may be notable [7]. The association of SBC with cement-osseous dysplasia as shown by Melrose

*et al*., 1976[38] is a rare situation. And the differential diagnosis is based on the presence of multiple foci radiopac that are often found inside the lesions, in cement-osseous dysplasia. We believe that all SBC should be treated with surgical exploration, because through this method, besides being an effective treatment, allows the collection of material for histopathological examination to confirm the final diagnosis, which is a critical step because is through this examination along with clinical and radiographic setting forth the type of injury, choosing the best method of treatment of diseases. Although surgical exploration has been shown to be effective, proactive observation by X-ray examinations at set intervals of time is essential because it allows you to perform a follow-up resolution of the lesion or, when present, diagnose recurrences. Further studies on SBC, in order to seek information that might characterize a final and consensual manner, are important because, along with the previous studies, they will allow a better understanding of the behavior of these lesions to be able to define a protocol for appropriate conduct.

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**CAPÍTULO 2**

# Retrospective evaluation of conservative treatment in central giant cell Lesion by the Piracicaba Dental School from 1996 to 2011

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# Retrospective evaluation of conservative treatment in central giant cell Lesion by the Piracicaba Dental School from 1996 to 2011

**Abstract**

The central giant cell lesion is a benign jaw's lesion, accounting for less than 7% of all benign jaw's lesions. Its origin is unknown, but it has been suggested that genetic factors may be implicated. The central giant cell lesion demonstrates a variable clinical behavior, ranging from slowly growing painless swelling to rapidly expanding aggressive tumors, characterized by pain, local bone's destruction, root displacement or resorption and a significantly high recurrence rate. Surgical treatment represented by curettage with peripheral ostectomy or not is the most widely used procedure. However, other treatment options, such as intralesional corticosteroids, daily calcitonin administration or α-interferon, are advocated. The recurrence rate may be high (ranging from 0% to 49%), and it seems to depend on the clinical behavior, the treatment employed, and anatomic site involved. The aim of this study was to report the results of long-term follow up of the management of central giant cell lesion. A retrospective analysis was conducted from January 1996 to July 2011, analyzing all cases of the Oral and Maxillofacial Area at Piracicaba Dental School. The sample was represented by 20 patients (9 Females; 11 males), with a mean age of 18.5 (ranging from 5 – 59) years, and the maxilla was involved in half of the cases. Regarding the treatment modality, the choice was based on characteristic lesions: six were treated by surgery (3 hospital and 3 outpatients). The remaining injuries (14) were treated with intra-lesional triamcinolone weekly associated with calcitonin (5 cases) or enucleation (two cases). The mean time of treatment with corticosteroids was 3.84 (±3.87) months, but in two cases calcitonin daily administration was initiated. The mean time of treatment with calcitonin was 18.8 (±7.94) months, but in one case calcitonin did not seem to be effective. No case of recurrence was observed after a mean follow-up of 38.22 (ranging from 3 – 174) months.

Key-Words: Giant cell lesion, Treatment, Surgery, Glucocorticoids, Calcitonin

## Introduction

The central giant cell lesion (CGCL) is a benign osteolytic lesion whose nature is controversial and may be reactive, inflammatory, or neoplasic[1,2]. It is defined by the World Health Organization (WHO) as an intraosseous lesion consisting of cellular fibrous tissue containing multiple focus of hemorrhage, aggregations of multinucleated giant cells and occasionally trabeculae of bone cortical[3]. The CGCL affects predominantly young female adults[4,5], and is a highly uncommon lesion, representing less than 7% of non-neoplastic lesions of the jaws. As for location, it occurs more frequently in the mandible and in the anterior region[4,6]. However, the CGCL does not only occur in the jaw. It is also found in other parts of the body as in ethmoid sinus, temporal bone of the metacarpal, humerus, rib, pelvis, femur and tibia[7, 8,9,10].

The lesion has a quite variable clinical behavior. At one end, it manifests itself as small lesion that shows no signs of aggression. At the other extreme, it is presented as multilocular lesions with large and frequent recurrences after enucleation and / or curettage, and there are often rapid growth, root resorption, paresthesia and pain. These differences in clinical behavior often influence the decision on the most appropriate to the case treatment modality and act as parameters to anticipate the evolution and prognosis of the case[11-16].

Radiographics features of CGCL are variable, and can be confused with several other injuries. The majority presents itself as an expansive radiolucent area, unilocular or multilocular, often crossed by bony septs[21]. Teeth displacement and / or root resorption are also findings that may be found[14] predominantly in large lesions, in approximately 13.5% of the cases[22]. The margins of the lesion are described as well as defined in 56% of cases, poorly defined at 30% and diffuse in the remaining 14% [18]. In the mandible, the CGCG can expand or even perforate the cortical bone. In the maxilla, the descriptions reported ranging from unilocular radiolucency to multilocular, with borders that can be well or poorly defined[4, 22, 23].

Lesions with histological features similar to how the TCG, the brown tumor of hyper-parathyroidism, the cherubism and aneurysmal bone cyst, previously confused, are currently recognized and addressed more specifically. Given this

new perspective, the differential diagnosis of this injury often includes laboratory examinations of serum parathyroid hormone, alkaline phosphatase, and examinations of DNA analysis. Histologically, it is composed of spindle-shaped fibroblasts in a stroma containing variable amounts of collagen. Numerous small vascular channels are evident alongside the lesion. Hemosiderin-laden macrophages are noted frequently, as well as extravasated erythrocytes. Multinucleated giant cells are present throughout the stromal tissue. Giant cells can be spread evenly, but are often clustered around the vessels. The inflammation cells are not prominent, and, when seen, are probably secondary in nature. Foci of osteoid may be present dispersed throughout estroma[17].

Several treatment modalities, both surgical and nonsurgical, are proposed for the treatment of CGCG. The methods of surgical treatment vary from curettage, with or without peripheral ostectomy, cryotherapy, or even en bloc resection. Nonsurgical treatment is represented by the administration of drugs such as steroids, calcitonin, α-interferon and radiotherapy, the latter being more frequent in the medical literature[18-27].

The recurrence rates vary widely in the literature, with numbers ranging from 0% to 49% [4,12,28,30,31,32]. The lesions considered aggressive are more likely to recur[11, 28.30]. Greater tendency to relapse is also associated with younger patients[4, 28.29].

**1.Surgical**

Different types of treatment can be chosen, depending on the evolution of the injury and the present location. The results of surgical treatment of maxillary CGCL was described by Rawashdeh et al. at 2006[33]. The sample consisted of 12 patients with ages followed by a period of 2-9 years (mean 5 years). All patients were treated by curettage until healthy bone was found. In patients who had cortical bone perforation, the procedure was modified by performing peripheral ostectomy of about 2-3 mm and to ensure the removal of the entire affected mucosa. We observed recurrence in two patients, one was recorded in two episodes, also treated by curettage. The authors concluded that surgical treatment

by curettage and peripheral ostectomy is a satisfactory method of treatment, with a low recurrence rate.

Bataineh et al. 2002[16] evaluated the results of surgical treatment in the CGCL jaw in hindsight of all cases treated during a period of nine years. Eigtheen patients were treated using a standardized surgical procedure, which consisted of marginal resection of the lesion with peripheral ostectomy, preserving the continuity of the bottom edge of the jaw. The soft tissues in contact with the lesion were also removed. All patients were followed for a period of 1-9 years (mean 3.9 years) with a single relapse and 11% of permanent paresthesia of lower lip. The authors concluded that this modality of treatment is satisfactory, with a functional rehabilitation of post-operative recovery and low recurrence rate.

In a study involving 83 patients by de Lange and Akker, 2005[22], in all cases patients were treated by enucleation and / or curettage except 3 cases, getting a recurrence rate of 26.3%. These 3 cases were treated by administration of calcitonin, and were represented by young patients (4, 11 and 13 years of age) showing aggressive lesions, and none of the patients presented signs or symptoms of recurrence after a follow-up period of 7 years.

Tosco et. al., 2009[26] report their experience with en bloc resection of 18 wide CGCL which had not been previously treated medically. Immediate reconstruction was carried out for all cases and in one, a fibula free flap was used to reconstruct the mandible. No recurrence was observed. After complete healing of the graft, prosthetic rehabilitation via implants was performed. This allowed the best functional and aesthetic results.

**2.Corticosteroids**

Treatment with intra-lesional administration of corticosteroid is recommended by several authors[34-40]. The protocols include six injections over 6 weeks, with one injection each week for no more than 1 ml of triamcinolone acetonide for 1 cm of radiographic injury - associated with equal parts of local anesthetic[34-40]. Nogueira et. al[35]. related 21 cases of central giant-cell granuloma of the jaw were treated with intralesional injection of corticosteroids. The treatment

protocol adopted was intralesional injection of 20 mg/ml triamcinolone hexacetonide diluted in an anaesthetic solution of 2% lidocaine/epinephrine 1:200,000 in the proportion 1:1; 1.0ml of the solution was infiltratedfor every 1 $cm^3$ of radiolucid area of the lesion, totalling 6 biweekly applications. Ten patients had aggressive lesions and 11 nonaggressive. Two patients showed a negative response to the treatment and underwent surgical resection, 4 showed a moderate response and 15 a good response. 8 of the 19 who had a moderate-to-good response to the drug treatment underwent osteoplasty to reestablish facial aesthetics.

In these cases, only mature or dysplastic bone was observed, with the presence or absence of rare giant multinucleated cells. Abdo *et al.*, 2005[41] reported the treatment of a female patient, 14 years old, with a recurrence of CGCL in the anterior mandible, which had previously been treated by enucleation. The patient received a weekly administration, showing signs of healing after four applications. There were no signs of recurrence after 18 months.

**3.Calcitonin**

Another way of clinical treatment of CGCL, introduced in literature by Harris in 1993[42], is represented by the administration of calcitonin[5,29,42]. Calcitonin is a hormone with a direct osteoclasts effect of inhibition, causing an increased influx of calcium into the bones, thus it is used to treat diseases with increased osteoclast activity, such as Paget's disease and bone metastases in some examples/patients. There are two main types of calcitonin available for therapeutic use: salmon and human calcitonin. Calcitonin is a unit defined as the amount required to induce hypocalcemia in rats under experimental conditions. In humans, however, the effect of salmon calcitonin is stronger than that of human origin and in healthy volunteers; 50 IU of salmon calcitonin appears to be equipotent to 75-90UI human[43] calcitonin. However, the human calcitonin appears to have less antigenic properties. After subcutaneous administration, the highest plasma concentration is achieved in one hour, half-life is 70-90 minutes[43]. The dose used for the treatment

of CGCL is empirical, derived from the treatment of Paget's disease and postmenopausal osteoporosis[5].

Harris,1993[42], was a pioneer in using this drug, administered calcitonin in four patients with GCCL, in a period of 12 to 34 months. Among the four cases, three showed complete resolution of the lesion and no recurrence after five years of monitoring; the other case was not accompanied for this time, but showed significant reduction in size after one year. The treatment of two patients with mandibular CGCL was described by Pogrel *et al.* 1999[5]. The first patient had a lesion in the 4th episode of recurrence, with a history of pathologic fracture of the jaw in its evolution. The second had a lesion of rapid growth, previously treated unsuccessfully with intra-lesional administration of corticosteroids according to the protocol Jacoway and Terry, 1994[36]. Both patients had normal levels of Ca, P, alkaline phosphatase and PTH. They were treated by subcutaneous administration of 100 IU of calcitonin for an average period of 20 months; in one case, the route of administration was changed to intra-nasal 10 months after taking their doubled dose. Regression of the lesion was found only in the presence of fibrous tissue biopsy. The patients showed no evidence of recurrence after an average follow up of 13.5 months. De Lange *et al.* 1999[29], reported the treatment of CGCL in four patients. The patients were aged 4-18 years and had jaw injuries, predominantly in the anterior, and in one patient the lesion represented a 5th episode of recurrence. The examinations of calcium, phosphate and PTH were normal. In one of the patients, it was previously tried treatment with intra-lesional administration of methylprednisolone, with no significant therapeutic effect. All patients were treated with human calcitonin by subcutaneous injection of 50-100 IU daily, subcutaneous administration was replaced by nasal administration in one patient, and the dose was doubled. The patients showed regression on the table, showing no signs of recurrence at least 1 year of follow up (ranging from 10 months to 3 years).

Lietman & Levine (2005)[44] reported the treatment of a female patient, 9 years old, with a right mandibular angle CGCL, who had two in her clinical surgical removal, treated with intra-lesional administration of corticosteroids, and subsequently interferon α-2. However, the injury did not appear to respond

favorably to previously established treatments. It was then initiated subcutaneous administration of calcitonin 100 IU / day, with the resolution of the situation after one year, and no signs of recurrence 3 years after stopping treatment.

**4.Other treatments**

Some authors recommend subcutaneous administration of interferon-α for some months[27]. Anti-angiogenic activity of α-interferon was discovered in laboratory investigations in the late 80's. It is used successfully for the treatment of large hemangiomas or vascular tumors of different organs. The reason for the use of this drug is related to a possible vascular nature of the CGCL. It was hoped to have an involution of the lesion from the anti-angiogenic properties of interferon[27]. However, this fact is not always documented. Lietman & Levine (2005)[44] employed this drug in a lesion with a diagnosis of GCT in the jaw, not getting an adequate clinical response which led to a revision in diagnosis. Serum levels of endothelial growth factor (VEGF), a marker for GCT, were not elevated, it was not detected by immunohistochemistry the expression of factor VIII, a protein produced by endothelial cells that suggests intense vascularity. It was then obtained a diagnosis of CGCL, which was adequately treated with subcutaneous administration of calcitonin. Some authors recommend the ionizing radiation for the treatment of CGCL[18], especially for 45 cases of lesions with difficult resection, when the patient refuses to undergo surgery or recurrence; however, the possibility of radio-resistance or sarcomatous transformation should be considered[45]. Arda et al. (2003)[46] defends the anti-angiogenic protocol with interferon-α by the lack of predictability of the efficacy of radiotherapy CGCL, and the risk of sarcomatous transformation involving its employment.

**Material and Methods**

This research was submitted and is under the Ethics in Research of FOP-UNICAMP, protocol No. 071/2006. We used the records from the files of the Area of Oral and Maxillofacial Surgery FOP-UNICAMP of all patients seen during the period from January 1996 to July 2011, when the definitive diagnosis of CGCL was

confirmed by histopathological report, conducted by the Division of Pathology of the same institution. All charts were filled by students from the Postgraduate Dental Clinic - Concentration Area in Surgery and Maxillofacial, under constant supervision of the teachers who are part of the area. They participated directly and indirectly in all stages of the provided treatment. All charts of patients treated with definitive diagnosis of giant cell granuloma confirmed by histopathology and tests for exclusion of hyperparathyroidism were included in the sample, with patients at any stage of treatment. Exclusion criteria were considered by inadequate to fill the chart, the lack of consent for data use or abandonment of treatment. Data were tabulated on a spreadsheet program - Microsoft Excel for Windows ® XP 1, where they were subjected to descriptive analysis. Patients were separated according to gender, age, type of lesion, type of treatment and recurrence.

Twelve patients (9 females, 11 males), with a total of 20 CGCL, attended by the Department of Piracicaba Dental School at University of Campinas between 1995 and 2011. In this study, the age range was 5 to 59 years (average, 18.5 years). All the CGCL were diagnosed by histologic examination by the Department of Oral Pathology. All lesions were discovered by radiographic images, and the preoperative diagnoses of CGCL were obtained with biopsied specimens, confirmed postoperatively by histopathologic report. Besides surgical treatment, some forms of medical treatment were taken by our department, among them are the intra-lesional administration of corticosteroids, administration by nasal spray of salmon calcitonin, and a combination of both types of treatment, when necessary. Surgical treatment was performed in both ambulatory and hospital environment, and the anesthetic method determined this decision. Larger lesions with difficult surgical access and / or close to vital structures were treated under general anesthesia in a hospital environment. On the other hand, less complex cases were treated under local anesthesia in an outpatient setting.

After intra and extraoral antisepsis and sterile drapes were affixed with the patient adequately anesthetized, a needle aspiration was performed on the lesion, for estimating its nature. After this maneuver and adequate incision and exposure of the lesion, it was carefully released with the aid of curettes Luke, trying to

remove it entirely. Where peripheral ostectomy was planned, spherical drills coupled with large low speed engines were used - under constant irrigation with saline. The flaps were repositioned and sutured with silk or absorbable sutures 3-0/4-0. The postoperative medication was represented by analgesics, mouthwash with chlorhexidine 0.12% and anti-inflammatory drugs. Patients were evaluated clinically and radiographically usually in seven (with the sutures removed in due course - if indicated), 14, 30, 90 and 180 days. In the last two returns, it was commonly requested panoramic radiograph control. After this period, patients were reassessed every year, with observed variations in the commitment of patients to attend to returns. Corticosteroid treatment represented the first choice in cases where medical treatment was instituted. After intra and extra-oral antisepsis and affixed sterile fields, equal amounts of hexacetonide triamcinolone (Triancil ®, Apsen Pharmaceuticals, São Paulo, Brazil) and 2% lidocaine with epinephrine 1:100,000 (ALPHACAINE ®, DFL, Rio de Janeiro, Brazil) were associated and managed with the aid of a needle 13 or 25 X 4.5 mm X 7 mm. A dose of approximately 1 ml per cm, calculated in radiolucency of the panoramic radiograph, was administered within the lesion through multiple punctures, with intervals of 7 days between each application, and developments in the case were accompanied by appropriate clinical and radiographic findings. The degree of cooperation from patients, in some cases, interfered with the regularity of visits. After radiographic confirmation of bone healing, the applications were discontinued. Patients treated with calcitonin were instructed to apply it daily and at the same time, in the form of nasal spray salmon calcitonin 200 IU (200 Miacalcic ®, Novartis Biociências SA, São Paulo, Brazil), for a minimum of 1 year.

**Results**

Among the 20 cases studied (table 1), 9 were females and 11 males, as shown in the table below. The age range was 5 to 59 years (mean 18.5 years). Six cases were treated surgically. Three under general anesthesia and reconstruction with iliac crest (two cases) and tibia (one case). The two cases that were reconstructed with iliac crest underwent complementary treatment with distraction

osteogenesis The others three cases were treated under local anesthesia by enucleation (one case) and curettage (2 cases). The 14 remaining cases were treated conservatively, by corticosteroid and local anesthetic. In 5 of 14 patients, intra-lesional administration of corticosteroids was performed concomitantly with the administration of calcitonin nasal spray form, because treatment with intra-lesional application of corticosteroids did not lead to an adequate clinical response (chart 1). The average duration of conservative treatment with corticosteroids was 3.84 (± 3.87) months. In one case, there was no clinical response desired, and after 13.2 months of conservative treatment, it was decided to establish the surgical treatment. The average length of treatment with calcitonin was 18.8 (± 7.94) months.

Among the total sample, no cases of CGCL recurrence were found, regardless of treatment modality applied. In cases where medical treatment was instituted, the restoration of a normal trabecular bone or the remaining of a small radiolucent and well-defined area after completion of treatment and biopsy were considered as the resolution of the case. Therefore, the recurrence rate found for the sample was 0%, and the cases that still remain in treatment were excluded from this analysis. None of the patients were discharged, and are clinically and radiographically analyzed every year.

The average time of follow up was 38.22 months, ranging from 3 to 174 (± 51.68) months (figure 1 and 2). The shortest time of follow up was observed in one patient showing a small CGCL, treated surgically by curettage associated with peripheral ostectomy.

*Table 1 (general characteristics)*

| case | Size (cm) | radiographic aspect | Tooth displacement | Dental resorption | location | region |
|---|---|---|---|---|---|---|
| 1 | 2,4 | unilocular | no | no | right | maxilla |
| 2 | 2,8 | multilocular | yes | no | right | jaw |
| 3 | 3,6 | unilocular | no | no | right | maxilla |
| 4 | 5 | unilocular | no | no | right | maxilla |
| 5 | 1,7 | unilocular | yes | no | right | maxilla |
| 6 | 3,5 | unilocular | no | yes | right | maxilla |
| 7 | 0,8 | unilocular | no | no | left | maxilla |
| 8 | 2,9 | unilocular | yes | no | right | jaw |
| 9 | 3,2 | unilocular | no | no | left | jaw |
| 10 | 6,5 | unilocular | yes | no | left | jaw |
| 11 | 2,3 | unilocular | yes | no | left | maxilla |
| 12 | 2,8 | unilocular | yes | no | left | maxilla |
| 13 | 2,6 | unilocular | no | no | right | jaw |
| 14 | 6,4 | multilocular | no | yes | left | maxilla |
| 15 | 3,3 | multilocular | no | no | right | jaw |
| 16 | 4,7 | unilocular | no | no | symphysis | jaw |
| 17 | 8,3 | multilocular | no | no | right | jaw |
| 18 | 8,0 | multilocular | no | no | right | jaw |
| 19 | 2,1 | unilocular | no | no | left | maxilla |
| 20 | 10,1 | unilocular | yes | no | left | jaw |

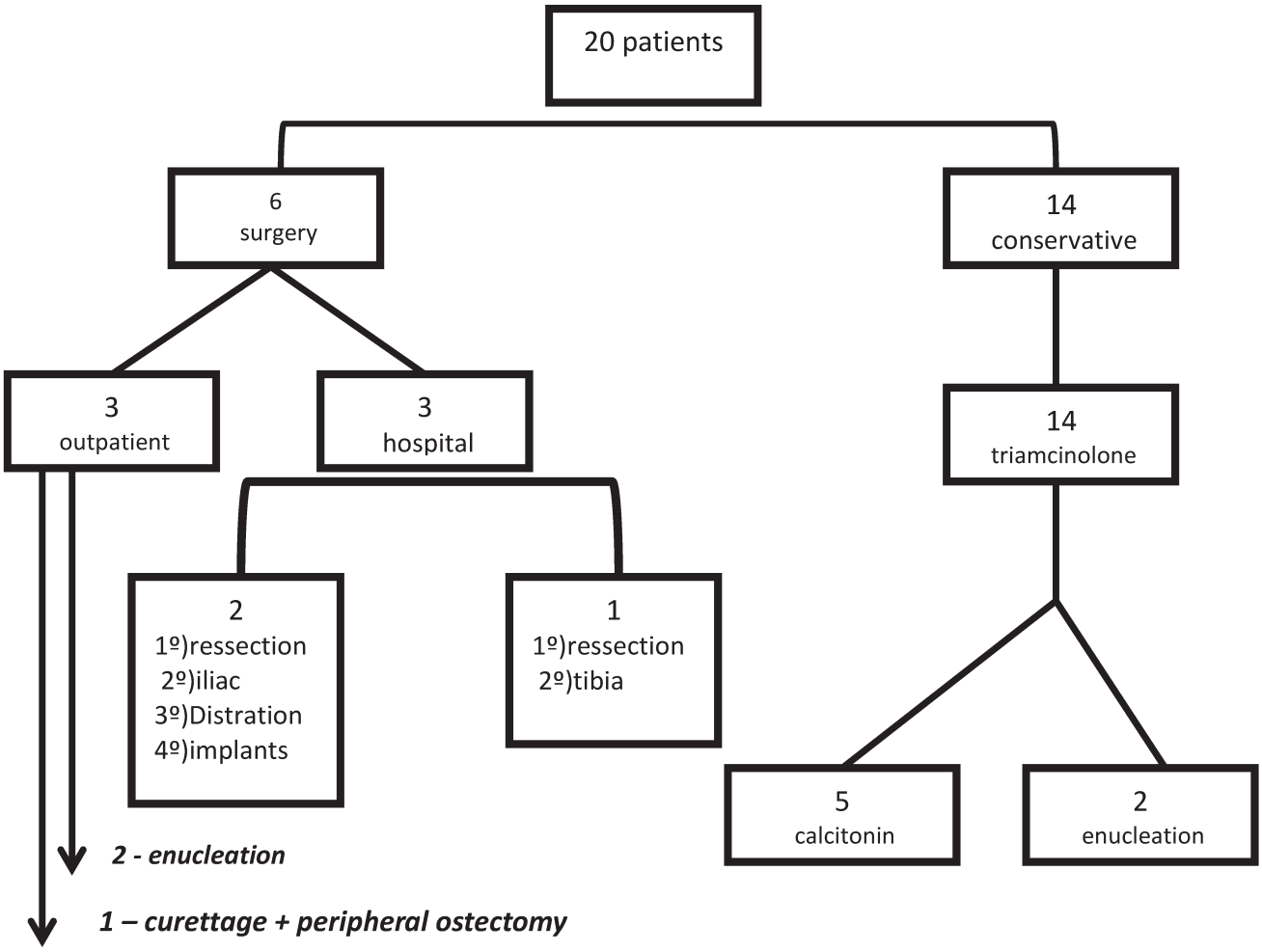
## Discussion

The restorative nature of CGCL, although quoted by Jaffe, 1953[2], and defended by two other authors, does not seem plausible, compared to numerous reports in the literature describing the clinical behavior of this lesion and evolution. However its low incidence is a factor that hinders a greater understanding of this injury, since there are no well-designed prospective studies with representative samples and with well-defined groups separated according to the type of CGCL - aggressive or not. The distribution of CGCL according to age in the first 2 decades of life is consistent with literature showing a higher incidence of this lesion in young

adults, although it can occur at any age[3, 5.18]. There were no cases of CGCL in individuals of yellow color. The highest incidence of this lesion, about 75% of cases, occurred in white individuals.

The literature reports a higher prevalence of CGCL[5,12,19] in females[3]. However, the total cases analyzed (20), the highest prevalence of GCCG occurred in male subjects (55%), which is not consistent with other studies in the literature, even in a small percentage differential. However, the sample size does not allow speculation about a partiality between genders.

In contrast to the literature by some authors[3, 25], the CGCL distributed more frequently in the maxilla (55%) than in the mandible (45%). However, it showed a distribution similar to that described in these bones in the literature, primarily, affecting the anterior part of jaw, and being distributed uniformly in the jaw[19, 25].



The most appropriate approach to the treatment of CGCL is the subject of extensive discussion in the literature. CGCL, especially when it manifests itself aggressively, is a lesion difficult to manage, as their behaviors are difficult to predict, they are locally destructive and having high recurrence rates. Because it is an uncommon lesion, there are few studies with a large sample of patients and longer periods of follow-up. Additionally, the exact cellular origin and biology of this tumor are unknown. Besides being a locally destructive lesion with a high rate of recurrence, the pain is also a plausible symptom in patients with CGCL. Then, the time between the initiation of treatment and clinical response is an important factor for judging the best treatment option. At this point, surgery is of great importance, since the results are obtained immediately.

In our sample, six cases treated by surgical approach. In three cases we performed a more conservative approach to surgery by curettage and enucleation, in the case of small lesions (<5cm) and slow clinical progression. Rawashdeh *et al,.* 2006[33], related a sample consisted of 12 patients with ages followed by a period of 2-9 years (mean 5 years). All patients were treated by curettage until healthy bone was found. In patients who had cortical bone perforation, the procedure was modified by performing peripheral ostectomy of about 2-3 mm and to ensure the removal of the entire affected mucosa. They observed recurrence in two patients, one was recorded in two episodes, also treated by curettage. The authors concluded that surgical treatment by curettage and peripheral ostectomy is a satisfactory method of treatment, with a low recurrence rate. The other 3 patients underwent surgical resection and reconstruction with autogenous iliac crest bone (2) and tibia (1). According Chuong *et al.,* 1986[11], lesions larger than 5 cm, with rapid evolution, more expansion or rupture of corticcal bone resorption associated with dental displacement or deserve a more aggressive approach.

***Figure 1. Preoperative***

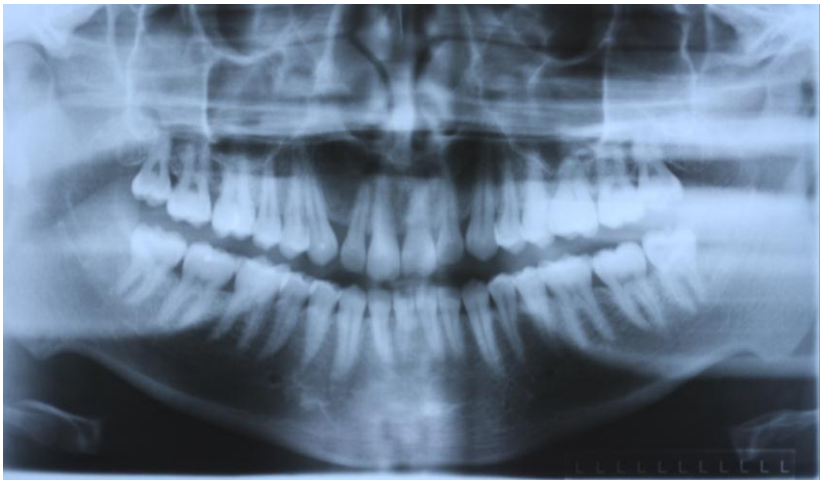


***Figure 2. Postoperative – 5 years leter***

The traditional treatment for CGCL is surgical excision by curettage, and little controversy remains regarding this type of treatment; in some cases, curettage may be supplemented with criotheraphy[26] or periferic ostectomy[3,12], most frequently performed and does not require specific instruments to its realization. The terms usually employed for the surgical treatment is enucleation or CGCL curettage[4, 24]. Although some authors describe the en bloc resection as a treatment modality for aggressive lesions[11, 16], this treatment option does not seem to be ideal. The resulting defect and the consequences of possible recurrences discourage its use. The morbidity and the resulting problems are the most negative factors associated with surgical treatment. Among the possible consequences, tooth loss may be associated with the surgical treatment of large CGCL; in pediatric patients, tooth germs often must be sacrificed, causing deformities of

varying degrees, often difficult to correct. This can be visualized by analyzing the case of two patients treated surgically in our hospital, whose treatment resulted in tooth loss and bone defects that are difficult to correct. In these cases, employed procedures were advanced osteopromotion, such as alveolar distraction osteogenesis, and autogenous bone graft associated with implant-supported rehabilitation for a minimum consequence arising from the treatment administered.

The intralesional administration of corticosteroids is an effective treatment option and recommended by several authors[34-39]. The hypothesis that boosted the use of corticosteroids was the histological similarity of the CGCL with sarcoid, as corticosteroids are effective against these, and the CGCL also respond to this treatment[34]. However, there is a consensus that this similarity is only superficial, as evidenced in a study conducted by imunohistoquimic[47]. However, the giant cell lesions have a fraction of which express receptors for glucocorticoids, the CD-68, and alpha-1-antichymotrypsin, markers for both macrophags[48]. Steroids should act, thus, removing any inflammatory component - reducing the number of monocytes - or the angiogenic lesion[5]. Another possible explanation for the success lies in the possible inhibition of bone resorption and inhibition of proliferation and osteoclasts[49].

Radiotherapy should not be considered as a viable option for the treatment of the jaws of CGCL, which are found more frequently in medical literature. In no case in our sample this method was used to supplement the surgical procedure, or treated with this method. The possibility of non-surgical treatment with other treatments safer and better documented, and the risk of malignant transformation contraindicate its use.

The recurrence rate of CGCL can be as high as 45% or 50%[4], but it is usually deemed to be situated between 0 to 20%, and is not associated with serious consequences as observed in recurrences of more aggressive tumors. In the lesions considered aggressive, a high recurrence rate is reported[11.30]. Greater tendency to relapse is also associated with younger patients[4,15]. These findings suggest that treatment by curettage of aggressive characteristics of injuries in young patients may not represent an appropriate treatment, especially considering

the possible consequences resulting from this treatment. However, patients with small CGCL might benefit more from surgical treatment, considering the discomfort caused by the duration of treatment and side effects of calcitonin. There is also a higher incidence of recurrence in the maxilla than the mandible, justified by anatomical characteristics between these regions that modify the surgery procedure[33]. In a similar way, the treatment modality employed also appear to influence the healing process, so that surgical treatment in the literature shows a greater tendency to relapse when compared to medical treatment with corticosteroids or calcitonin. This might occur because of the difficulty of complete surgical removal of the lesion, favoring the growth of residual lesions. Other factors not yet known may be related to the relapse of CGCL. Observing cherubism disease in giant cell lesions that occur due to genetic abnormalities, recurrences are not observed after curettage[50]. However, CGCL, relapses may occur frequently. The findings of this study confirm these data. The sample is represented mostly by non-aggressive lesions, with an average size of 3.3 cm in patients with mean age of 18.5 years, and most of them was treated by nonsurgical means. The absence of recurrence was the result of a combination of these factors. Thus a more or less aggressive treatment can be instituted depending on the degree of patient cooperation, the extent and aggressiveness of the lesion and the patient's age.

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**CAPÍTULO 3**

# Retrospective evaluation of the effectiveness of conservative treatment of odontogenic keratocyst by the Piracicaba Dental School between the years 1995 - 2011


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# Retrospective evaluation of the effectiveness of conservative treatment of odontogenic keratocyst by the Piracicaba Dental School between the years 1995 - 2011

**Abstract**

The aim of our study was to retrospectively evaluate all odontogenic keratocysts (OKC) cases treated in the Oral and Maxillofacial Surgery Area at Piracicaba Dental School at University of Campinas in Sao Paulo, Brazil, between 1995 and 2011. This study evaluated characteristics of 53 patients, all diagnosed with OKC by clinical, radiographic and histopathology analysis. The total number of injuries was 59 OKCs. After confirming the lesion, the data were published in the literature. The OKC prevailed in white and young (average age of 30 years) males. Most of the lesions (79%) occurred in posterior mandible. The most common histological pattern of OKC was parakeratinized (82%), and 11 (20%) out of 53 patients presented impacted teeth associated with the lesion. Initial biopsy was performed in all patients, and all cases were treated according to the Department of Oral Diagnosis, Oral and Maxillofacial Surgery Area Protocol, which consists initially of decompression, followed by curettage of the remaining lesion, when necessary. Recurrence occurred in 8 patients (15%), who underwent enucleation and curettage of the remaining bone cavity. All cases are still monitored at least once a year, by panoramic radiographic; and, according to these results, all patients treated with decompression have recurrence rates similar or lower to those reported in the literature. Thus, we believe that conservative treatment, when possible, is effective with low morbidity. However, the strict monitoring is essential, since late manifestations of the lesion can occur.

Key-words: Keratocyst, Decompression, Recurrence, Follow-up.

## Introduction

The odontogenic keratocyst (OKC), or keratocyst odontogenic tumor (KCOT), is a lesion of odontogenic origin, which is classified as a developmental derived from the dental lamina. This lesion was first described in 1956 by Phillipsen[1] and it is well known for its high recurrence rate[2].

It is an aggressive lesion, with greater growth potential than most of the lesions of odontogenic origin, whether cystic or not, and can reach a large size and produce bone destruction. This type of lesion presents a behavior similar to a benign tumor with high recurrence rates, which also differs significantly from other odontogenic lesions[3, 4, 5]. For this and other reasons, extensive research regarding this lesion has been carried out over the last 48 years[6,7,8,9,10,11]. Usually, it is asymptomatic in early stages, being discovered occasionally in radiographics[12] exams. The appearance of signs and symptoms are observed in advanced stages, when they reach larger dimensions, these being mainly the presence of dental malposition, expansion of cortical bone, spontaneous drainage of a yellowish material, pain (especially when infected), trismus and paresthesia[13]. This lesion can be associated, although not in all cases, with an impacted third molar. Radiographically, it appears as a unilocular or multilocular lesion with a scalloped contour. These characteristics are suggestive but not considered an unequivocal proof for the definitive diagnosis of OKC, because other lesions may exhibit similar features[7]. The rates of recurrence vary enormously, from a maximum of 62% to a minimum of 0%[8]. The majority of recurrent cases occur within the first 5 years after treatment[8, 9, 10, 11, 14].

Histologically, epithelial presents two variants: parakeratinized and orthokeratinized. Currently, these variants can be defined by some authors as the kind of nomenclature to be used in the literature. The term odontogenic keratocyst (OKC) is usually related to lesions that have a histological orthokeratinized characteristic type, whereas tumor odontogenic keratocyst (KCOT) is related to lesions with histological parakeratinized characteristic type. These variants can, then, define the treatment to be established, since injuries have orthokeratinized recurrence rate below 5%, and development is less invasive compared with

parakeratinized lesions that may present with a recurrence greater than 50%[15,16,17]. In our paper, more than 80% of lesions were histologic parakeratinized, however, more important than the histological variant, the level of aggressiveness and recurrence detected clinically were the determining factors in defining the kind of nomenclature. In our series, the lesions are often of slow evolution, being minimally invasive and with low rates of recurrence. In this way we describe them as odontogenic keratocysts[18].

Due exactly to structural differences (orthokeratinized and parakeratinized) and clinical behavior (recurrence and degree of aggressiveness), there is a major controversy among surgeons regarding the best treatment for OKC, and about what constitutes a conservative or radical[7,8] treatment The majority considers enucleation, curettage, decompression and marsupialization a conservative treatment, while en block resection, sometimes followed by bone graft, is a radical intervention, and generally applied to applicants OKC. Most surgeons advocate complete removal with extension margins, or meticulous curettement of the surrounding tissues[7]. The enucleation alone is associated with the highest recurrence rates (range, 17% to 56%), usually when the lesion is removed in a fragmented fashion. To decrease the recurrence potential, various adjunctive therapies have been tried, including peripheral ostectomy, or the use of Carnoy's solution, cryotherapy or electrocautery[8-11,14]. Decompression or marsupialization seem to be more conservative options in the treatment of OKC[19,20].

Marsupialization was first described by Partsch in 1882[21,22] for the treatment of cystic lesions. This technique is based on the externalization of the cyst, through the creation of a surgical window in the oral mucosa and in the lesion wall. Their borders are then sutured to create an open cavity that communicates with the oral cavity. This procedure relieves pressure from the cystic fluid, allowing reduction of the cystic space and facilitating bone appositioning to the lesion walls[19-24]. Decompression and marsupialization are very similar techniques. The main difference between them lies in the creation of a surgical window in the oral mucosa and cystic membrane[23], and in using a cylindrical device[20] (like the rubber of a dropper) or a surgical rigid drain to prevent mucosal closure. This one has the

objective of maintaining a continuous communication between the oral cavity and the interior of the lesion. The decompression technique allows the permeability of the cavity because the union of the cyst epithelial wall with the mucous membrane results in the externalization of the lesion. In addition, the intraoral device facilitates the irrigation of the cavity. This helps to avoid food impaction and microorganism accumulation in the area, which could lead to an undesired secondary infection. In addition, after the surgical intervention, the cystic covering tends to become thicker, which facilitates its complete removal in a second surgery. The use of this technique is not new among the possible OKC treatments.

Several reports describe the use of decompression to decrease the size of the cyst, after which it is definitively enucleated[19-25]. The use of these techniques alone are not reported commonly when a complete resolution of the OKC has been achieved[24,25].Regarding the remaining epithelium after decompression of the lesion, August et al[24] reported the differentiation of the OKC epithelium once treatment is carried out. Through histochemical analyses based on Cytokeratin-10 tests, August et al[24] accomplished the pre-operatory identification of the lesion in 14 OKCs. After surgery, the same analysis was carried out again in the cystic epithelium to determine whether the marsupialization/decompression technique resulted in epithelial modulation, which is associated with lower recurrence rates. It was observed that 64% of the patients did not present Cytokeratin-10 in the epithelium analyzed, which shows the differentiation of this tissue, and therefore the lower rates of recurrence. Pogrel and Jordan[26] reported the use of marsupialization as a definitive treatment of OKC. In this study, 10 patients were treated exclusively with marsupialization and decompression, achieving resolution of the lesions with a recurrence rate of 0%.

The purpose of this study was to report our experience with the surgical treatment of 59 OKCs by the use of a defined protocol, based on decompression and posterior enucleation, or curettage if necessary, with reference to the recurrence rate.

**Patients and methods**

Fifty three patients (23 females, 30 males), with a total of 59 OKCs, attended the OMS Department of the Piracicaba Dental School at University of Campinas between 1995 and 2011. In this study, the age range was 13 to 69 years (average of 30 years). All the OKCs were diagnosed by histologic examination by the Department of Oral Pathology. All lesions were discovered by radiographic images and the preoperative diagnoses of OKCs were obtained with biopsied specimens, confirmed postoperatively by histopathologic report. Our treatment protocol for cystic lesions consists of carrying out the initial biopsy and decompression of the lesion on the same day, if possible. Under local anesthesia (2% lidocaine with epinephrine 1:100,000), an aspirative biopsy was made with a 10-ml syringe and #18 needle. A yellow, serous liquid or semi-solid content was obtained, matching the typical description of cystic lesion content. Posteriorly, a nº15 scalpel was used to carry out an elliptical incision in the attached gingival tissue of the alveolar ridge. Fragments of the cystic capsule, mucosa, and bone were taken and introduced into iodoform solution for histologic analyses. A sterile rubber foam dropper was preformed, fitted in the surgical windows, and fixed with non-absorbable suture (nylon 4.0). Rubber cylinders were used to allow permanent communication between the cyst and the oral cavity[20]. The postoperative care included the use of dipyrone via oral for pain control. In addition, daily irrigation of the cavity with saline solution and 0.12% chlorhexidine was carried out to prevent a secondary infection of the cavity. The irrigation procedure was made with a 20-ml syringe with no needle active point to prevent tissue injury. Irrigations were carried out 3 times/day with 60 ml of the irrigation solution. This started the same day of the surgery. Rubber cylinders were removed after 3 weeks and daily irrigation was maintained for another 6 to 9 months. Careful monitoring was based on monthly panoramic radiographies and clinic visits to determine lesion size regression as an effect of decompression and bone formation. If necessary, secondary curettage of the surrounding tissues was carried out after the decompression phase, once radiographic evaluation confirmed a size decrease of the lesion. Under local anesthetic, a horizontal incision was made in the alveolar ridge with a nº15 scalpel.

A mucoperiosteal flap was obtained with exposure of the lesion cavity. The secondary curettage of the cavity was carried out with a Lucas' bone curette and the cavity was irrigated with saline solution. Finally, the flap was closed with 4.0 silk suture (Johnson & Johnson, Ethicon, Brazil). The use of topical 0.12% chlorhexidine solution twice a day was indicated for 2 weeks. In those cases, where treatment of the lesion consisted of enucleation only, a procedure similar to the one described above was used. Patients receive follow-up with clinical and serial panoramic radiographs at 7, 15, and 30 days. Ninety days after the procedure is done, patients are monitored periodically every 6 months. From the second year on, the patient is monitored once a year (annex 7).

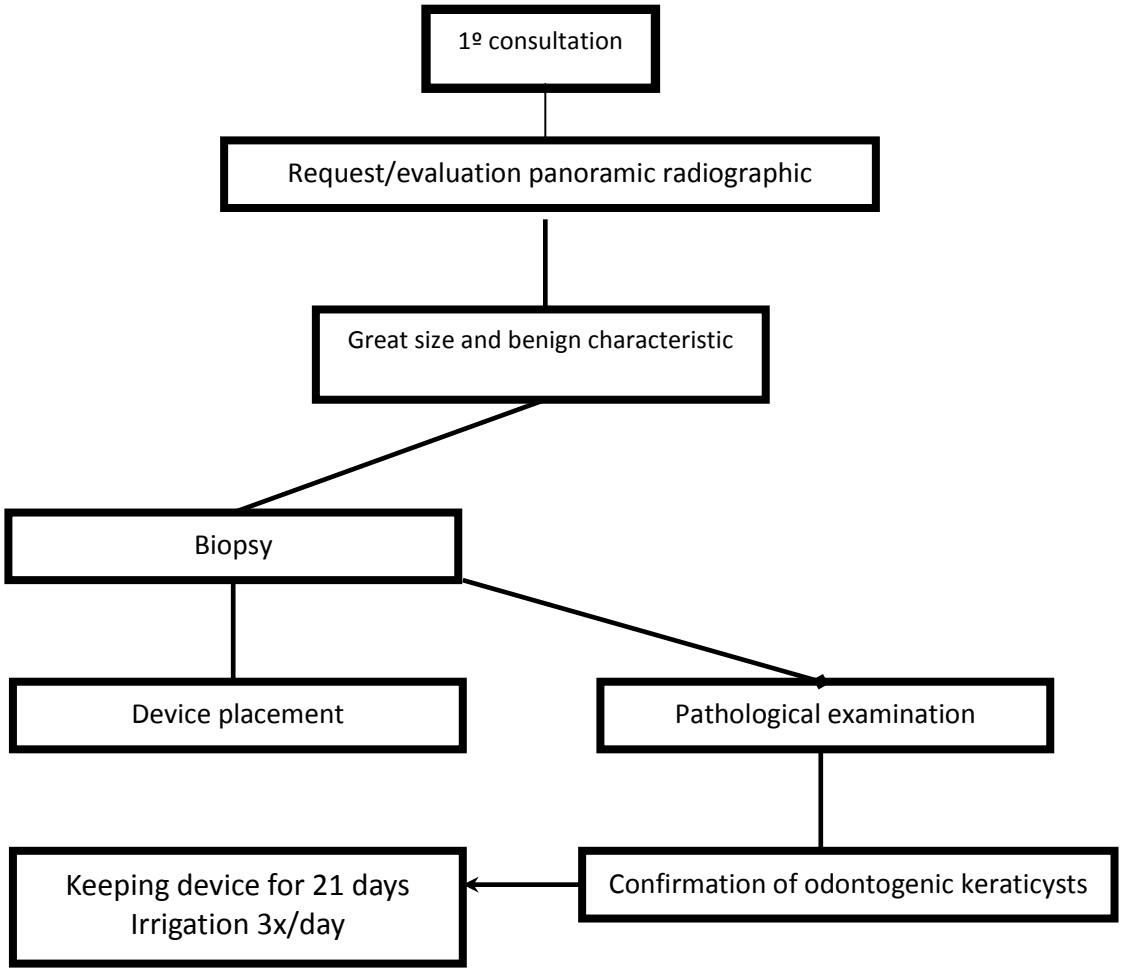


*Chart 1*

## Results

Among these 53 patients diagnose with OKC, young and males prevailed, as shown in the table below. Most of the lesions (34 lesions, 57%) occurred in the angle of the mandible and mandibular ramus associated, or not, with other sizes. The most common histologic pattern of OKC was parakeratinized (82%), and 29 out of 53 patients presented impacted teeth associated with the lesion. Forty seven OKCs (81%) were treated by only decompression or associated with curettage of the remaining lesion. Twelve OKCs (19%) were treated by enucleation and curettage only. Recurrence occurred in 8 of 53 patients (15%) with 11 OKCs out of 59 lesions. These patients were treated initially with decompression (6 cases), or with enucleation and periferic ostectomy (2 cases). All recurrence cases were submitted to enucleation/curettage and peripheral osteotomies of the remaining bone cavity. All cases are still monitored at least once a year, by means of panoramic radiographics (figure 1 and 2).

**Table 1.** General characterisctcs

| case | Radiographic aspect | Tooth envolved | side | location (nº) | Initial treatment | recurrence | Recurrence treatment |
|---|---|---|---|---|---|---|---|
| 1 | unilocular | yes | right | ramus mand.(1) | Enucleation + curettage | yes | enuc. + curet. + P.O |
| 2 | unilocular | yes | right | ramus mand.(1) | descompression | no | -- |
| 3 | multilocular | yes | right | ramus mand.(1) | descompression | no | -- |
| 4 | multilocular | no | right | ramus mand.(1) | descompression | no | -- |
| 5 | unilocular | yes | right | body mand.(1) | descompression | no | -- |
| 6 | unilocular | yes | right | maxilla(1) | Enucleation + curettage | no | -- |
| 7 | unilocular | no | -- | symphysis(1) | descompression | no | -- |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| 8 | multilocular | yes | widespread | jaw(3) | descompression | yes | enuc. + curet. + P.O |
| 9 | unilocular | yes | right | ramus mand.(1) | descompression | yes | enuc. + curet. + P.O |
| 10 | unilocular | no | left | angle man.(1) | descompression | no | -- |
| 11 | unilocular | no | left | ramus mand.(1) | descompression | yes | enuc. + curet. + P.O |
| 12 | unilocular | no | right | body mand.(1) | descompression | no | -- |
| 13 | unilocular | yes | right | ramus mand.(1) | descompression | no | -- |
| 14 | unilocular | yes | left | body mand.(1) | descompression | no | -- |
| 15 | unilocular | yes | left | body mand.(1) | Enucleation + curettage | no | -- |
| 16 | unilocular | no | right | angle mand.(1) | Enucleation + curettage | no | -- |
| 17 | unilocular | no | -- | symphysis(1) | descompression | no | -- |
| 18 | unilocular | no | right | angle mand.(1) | Enucleation + curettage | no | -- |
| 19 | unilocular | no | left | angle mand.(1) | Enucleation + curettage | no | -- |
| 20 | unilocular | no | left | body mand.(1) | descompression | no | -- |
| 21 | multilocular | yes | left | ramus mand.(1) | descompression | no | -- |
| 22 | multilocular | yes | widespread | jaw(3) | descompression | no | -- |
| 23 | unilocular | yes | left | Body/symph(1) | descompression | no | -- |
| 24 | multilocular | yes | right | ramus/ang/ body (1) | descompression | no | -- |
| 25 | unilocular | yes | right | body mand.(1) | descompression | no | -- |
| 26 | unilocular | no | right | body mand.(1) | descompression | no | -- |
| 27 | unilocular | no | left | ramus mand.(1) | descompression | no | -- |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| 28 | unilocular | yes | left | ramus/ang.(1) | Enucleation + curettage | no | -- |
| 29 | unilocular | no | right | ramus mand.(1) | descompression | no | -- |
| 30 | multilocular | yes | left | ramus/ang/ body (1) | descompression | no | -- |
| 31 | unilocular | yes | left | angle/ body (1) | descompression | no | -- |
| 32 | unilocular | no | left | ramus mand.(1) | descompression | yes | enuc. + curet. + P.O |
| 33 | unilocular | no | left | ramus mand.(1) | descompression | no | -- |
| 34 | unilocular | yes | left | ramus/body(2) | descompression | no | -- |
| 35 | unilocular | yes | right | ramus mand.(1) | descompression | no | -- |
| 36 | unilocular | no | left | angle mand.(1) | Enucleation + curettage | no | -- |
| 37 | unilocular | yes | left | ramus mand.(1) | descompression | no | -- |
| 38 | unilocular | no | left | maxilla(1) | Enucleation + curettage | no | -- |
| 39 | unilocular | yes | right | ramus/ang.(1) | descompression | no | -- |
| 40 | unilocular | yes | left | ramus/ang.(1) | descompression | no | -- |
| 41 | unilocular | no | left | body mand.(1) | descompression | no | -- |
| 42 | multilocular | yes | right | ramus/ang/ body (1) | descompression | no | -- |
| 43 | unilocular | yes | right | angle mand.(1) | Enucleation + curettage | yes | enuc. + curet. + P.O |
| 44 | unilocular | yes | right | ramus mand.(1) | Enucleation + curettage | no | -- |
| 45 | unilocular | no | right | body mand.(1) | Enucleation + curettage | no | -- |
| 46 | unilocular | no | right | ramus mand.(1) | descompression | no | -- |
| 47 | unilocular | no | right | ramus mand.(1) | descompression | no | -- |
| 48 | unilocular | no | -- | symphisis(1) | descompression | no | -- |
| 49 | unilocular | no | -- | symphisis(1) | descompression | no | -- |
| 50 | unilocular | no | right | body mand.(1) | descompression | yes | enuc. + curet. + P.O |
| 51 | unilocular | yes | right | ramus/body(2) | descompression | yes | enuc. + curet. + |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| | | | | | | | P.O |
| 52 | unilocular | yes | left | body mand.(1) | descompression | no | -- |
| 53 | unilocular | no | right | body mand.(1) | descompression | no | -- |

*** P.O = peripheral ostectomy / ENUC. = enucleation /CURET. = curettage**

## Discussion

The treatment of OKC is still controversial, and this is due to their aggressive behavior and ability to recurrence as well as the lack of definition on what constitutes a conservative or radical[14] treatment.

On one side are those who advocate a treatment based on enucleation, curettage, decompression and marsupialization, regarded as conservative treatments. Many authors have shown the successful treatment of large OKCs using the technique of decompression and irrigation[19,20,24,25]. This treatment does require a cooperative patient who will irrigate the cyst on a regular basis and will follow up regularly. For this reason, only a select group of patients may be suitable for this treatment. The benefit of this treatment over more conventional approaches (enucleation, en bloc resection) lies in the minimal surgical morbidity. In addition, associated structures such as the inferior alveolar nerve and developing teeth are less vulnerable to damage[19,21,26]. Second, the argument of those who advocate a radical approach is the possibility of recurrence[8], however, according to the findings of our study, the OKCs applicants are histologically similar to the original injury and they also can apply, again, conservative treatments. Thus, the majority of our patients (80%) were treated by decompression, avoiding the surgical access in areas of the lesion that contained teeth, important anatomical structures such as the inferior alveolar nerve, and also preventing the weakening of the mandibular bone structure, which could lead to fractures in the trans-or post-operative.

The decompression and marsupialization techniques were based in the exteriorization of the cystic cavity and resulted in communication with the oral cavity[20,23]. These procedures relieve pressure of the cystic fluid, allowing shrinkage of the cystic space and the appositioning of bone to the cystic walls. Several reports describe the use of the decompression technique to decrease the size of

the cyst, after which it was definitively enucleated. The use of marsupialization for the treatment of cystic lesions is not new and was originally described by Partsch in the late 1800s[21,22]. However, it is not common and there is relatively little in the literature on the use of this technique alone for carrying out the complete resolution of OKC [20,24,26]. In our sample, recurring lesions were small in dimension. The secondary treatment, based in curettage associated to the peripheral ostectomy, has been accomplished in all of the cases, reducing the chance of new recurrences. The main advantage of the conservative treatment is the preservation of bone structure, soft tissue and teeth associated to OKC, fact that is of great importance if we consider that most of the patients are young. These procedures are less traumatic for the patient, eliminating medication and hospitalization expenses, and in most cases, avoid the need to accomplish reconstruction through grafts or extensive reconstructions. In most of the cases in which the recession is the elected treatment, the need of accomplishing the reconstruction of the jaw through grafts of autogenous bone is imperative. Usually these reconstructions are accomplished in a second surgery, which translates into larger discomfort for the patient, and increase of the morbidity, increments in the costs of the treatment and time of recovery, among others. Additionally, in these cases, there may be a need to put on some type of reconstruction plate. This adds possible complications with the use of rigid fixation material such as the exhibition of the plate, dehiscence and infection, among other complications.

**Figure 1**. ***Preoperative***

***Figure 2. postoperative – 1 year leter***

Time of duration of the decompression treatment (1 to 14 months) is one of the disadvantages of this technique. In fact, this is one of the main causes of abandonment of the treatment by the patient because of loss of interest in proper irrigation treatment and attendance of periodic controls. In spite of being a technique that requires prolonged postoperative treatment and special considerations (like the ones mentioned above), and even a second surgical procedure in order to curette the remaining cystic cavity, it is a technique that allows the professional to offer the correct treatment and save hospital expenses that would increase with other complicated procedures that require general anesthesia and hospitalization. The technique is then an ideal alternative procedure for the treatment of odontogenic keratocysts that, in addition to being conservative (if compared with the enucleation technique), is well-adapted to the latin american reality, making the “cost-benefit” of the technique one of its more important advantages.

The recurrence rate observed among our sample was 14.3%. In comparison with other important published studies[7,14,20,25,27-42], we obtained results within the

average with a more conservative approach.

| **Autor ( es )** | **year** | **Nº cases** | **Recurrence %** |
|---|---|---|---|
| PINDBORG ; HANSEN | 1963 | 16 | 62 |
| TOLLER | 1967 | 55 | 51 |
| RUD ; PINDBORG | 1969 | 21 | 33 |
| PANDERS ; HADDERS | 1969 | 22 | 14 |
| BROWNE | 1970 | 85 | 25 |
| McIVOR | 1972 | 43 | 05 |
| PAYNE | 1972 | 20 | 45 |
| RITTERSMA ; VAN GOOL | 1972 | 48 | 32 |
| DONOFF et al.. | 1972 | 13 | 15 |
| FORSSELL et al | 1974 | 38 | 29 |
| EVERSOLE et al.. | 1975 | 35 | 20 |
| BRANNON | 1976 | 283 | 12 |
| HODGKINSON et al.. | 1978 | 74 | 39 |
| VEDTOFTE ; PRAETORIUS | 1979 | 57 | 51 |
| FORSSELL | 1980 | 121 | 40 |
| VOORSMITH et al., | 1981 | 52 | 13 |
| AHLFORS et al.. | 1984 | 255 | 27 |
| ZACHARIADES et al.. | 1985 | 16 | 25 |
| PARTRIDGE ; TOWERS | 1987 | 45 | 27 |
| FORSSELL et al.. | 1988 | 75 | 43 |
| BRONDUM ; JENSEN | 1991 | 44 | 18 |
| MARKER et al.. | 1996 | 23 | 8,7 |
| DAMMER et al.. | 1997 | 52 | 06 |
| BATAINEH ; Al QUDAH | 1998 | 31 | 00 |
| STOELINGA P | 2001 | 82 | 11 |
| SCHMIDT e POGREL | 2001 | 26 | 11.5 |
| AUGUST et al.. | 2003 | 11 | 18 |
| POGREL & JORDAN | 2004 | 10 | 00 |
| MORGAN et al | 2005 | 40 | 22.5 |
| CHIRAPATHOMSAKUL et al | 2006 | 51 | 22.6 |
| MAURETTE et al | 2006 | 30 | 14.3 |
| KOLOKYTHAS | 2007 | 22 | 9 |
| ARNNOP et al | 2009 | 120 | 26 |
| BOFFANO et al | 2010 | 261 | 11.9 |
| ZECHA | 2010 | 137 | 23.5 |
| **MARANO; MORAES** | **2011** | **59** | **15** |

***Chart 2***

If we sum up the advantages of a conservative approach, like the one we suggest, versus a more radical treatment, the decompression treatment protocol

stands up as an equally effective, cheaper, and simpler procedure for the treatment of OKC if the patient can be closely monitored and periodically evaluated (clinically and radiographically). All cases are still monitored at least once a year, by means of panoramic radiographics, differently described by Stoelinga[17] and August[24]. These authors explain the necessity to observe a long follow-up to consider a complete resolution of the OKC. In 2003, August *et al.*[24], examined the nature of the cyst lining before and after decompression with cytokeratin stains and reported positive cytokeratin-10 staining in the predecompression biopsy, and negative cytokeratin-10 stains in the post decompression specimen. In 3, 6, 9, and 12-month samples, a return to more normal oral epithelium within 9 months of decompression treatment was indicated. Several studies suggest that the largest number of recurrences of OKC occur during the first 5 years after the initial treatment period (about 70%)[20-22]. For this reason the annual radiographic control of these patients is recommended for an undetermined time[8,43,44]. According to the results, we can conclude that OKC treated with decompression presents similar recurrence rates to those reported in the literature. This demonstrates that this method of treatment for OKC offers a conservative and effective option with low morbidity and similar recurrence rates to those reported in the literature. However, the closes follow up and frequent control is of addition importance to the treatment success.

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# CONCLUSÃO

Os tratamentos adotados pela área de CTBMF da FOP-Unicamp para as lesões: cisto ósseo traumático, Granuloma central de células gigantes e Queratocisto odontogênico se mostraram efetivos e com resultados semelhantes aos de outros trabalhos na literatura, sendo que a escolha do tratamento a ser realizado deve levar sempre em consideração o tipo e tamanho da lesão, bem como as condições clínicas e radiográficas da lesão, assim como a colaboração do paciente.

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## ANEXO 1

**COMITÊ DE ÉTICA EM PESQUISA**
**FACULDADE DE ODONTOLOGIA DE PIRACICABA**
**UNIVERSIDADE ESTADUAL DE CAMPINAS**

# CERTIFICADO

O Comitê de Ética em Pesquisa da FOP-UNICAMP certifica que o projeto de pesquisa "**Avaliação retrospectiva dos casos de cisto ósseo traumático atendidos pela Área de Cirurgia Buco-Maxilo-Facial da Faculdade de Odontologia de Piracicaba entre 1999 a 2006**", protocolo nº **174/2006**, dos pesquisadores **BENTO STANG e MARCIO DE MORAES**, satisfaz as exigências do Conselho Nacional de Saúde – Ministério da Saúde para as pesquisas em seres humanos e foi aprovado por este comitê em 13/12/2006.

The Ethics Committee in Research of the School of Dentistry of Piracicaba - State University of Campinas, certify that the project "**Retrospective evaluation of the cases traumatic bone cyst at Piracicaba Dental School between 1999 - 2006**", register number **174/2006**, of **BENTO STANG and MARCIO DE MORAES**, comply with the recommendations of the National Health Council – Ministry of Health of Brazil for research in human subjects and therefore was approved by this committee at 13/12/2006.

**Profa. Cecília Gatti Guirado**
Secretária
CEP/FOP/UNICAMP

**Prof. Jacks Jorge Júnior**
Coordenador
CEP/FOP/UNICAMP

Nota: O título de protocolo aparece como fornecido pelos pesquisadores, sem qualquer edição
Notice: The title of the project appears as provided by the authors, without editing

## ANEXO 2

**COMITÊ DE ÉTICA EM PESQUISA**
**FACULDADE DE ODONTOLOGIA DE PIRACICABA**
**UNIVERSIDADE ESTADUAL DE CAMPINAS**

# CERTIFICADO

O Comitê de Ética em Pesquisa da FOP-UNICAMP certifica que o projeto de pesquisa "**Avaliação retrospectiva do tratamento do granuloma de células gigantes atendidos pela área de Cirurgia Buco-Maxilo-Facial da Faculdade de Odontologia de Piracicaba entre 1995 e 2005: Análise clínica e histológica**", protocolo nº **071/2006**, dos pesquisadores **ANIBAL HENRIQUE BARBOSA LUNA e JOSE RICARDO DE ALBERGARIA BARBOSA**, satisfaz as exigências do Conselho Nacional de Saúde – Ministério da Saúde para as pesquisas em seres humanos e foi aprovado por este comitê em 05/07/2006.

The Research Ethics Committee of the School of Dentistry of Piracicaba - State University of Campinas, certify that project "**Retrospective evaluation of the treatment efficacy of giant cell granulomas in Piracicaba Dental School between 1995 - 2005: Clinical and histologic analysis**", register number **071/2006**, of **ANIBAL HENRIQUE BARBOSA LUNA and JOSE RICARDO DE ALBERGARIA BARBOSA**, comply with the recommendations of the National Health Council – Ministry of Health of Brazil for researching in human subjects and was approved by this committee at 05/07/2006.

**Profa. Cecília Gath Guirado**
Secretária
CEP/FOP/UNICAMP

**Prof. Jacks Jorge Júnior**
Coordenador
CEP/FOP/UNICAMP

Nota: O título do protocolo aparece como fornecido pelos pesquisadores, sem qualquer edição.
Notice: The title of the project appears as provided by the authors, without editing.

## ANEXO 3

UNICAMP

# COMITÊ DE ÉTICA EM PESQUISA

**UNIVERSIDADE ESTADUAL DE CAMPINAS**

FACULDADE DE ODONTOLOGIA DE PIRACICABA

## CERTIFICADO

Certificamos que o Projeto de pesquisa "Protocolo de Atendimento de Queratocisto Odontogênico pela Área de Cirugia Buco-Maxilo-Facial da Faculdade de Odontologia de Piracicaba entre os anos de 1995 a 2003", protocolo CEP nº **057/2004**, dos Pesquisadores ***Paul Maurette O'Brien*** e ***Márcio de Moraes***, está de acordo com a Resolução 196/96 do Conselho Nacional de Saúde - MS e foi aprovado pelo Comitê de Ética em Pesquisa da Faculdade de Odontologia - UNICAMP.

We certify that the research project "Treatment Protocol of Odontogenic Keratocyst by the Oral and Maxillofacial Area of the Piracicaba Dental School in the years of 1995 to 2003", register number **057/2004**, of ***Paul Maurette O'Brien*** and ***Márcio de Moraes***, is in agreement with the recommendations of 196/96 Resolution of the National Health Committee - Brazilian Health Department and was approved by the Research Ethics Committee of the School of Dentistry of Piracicaba - State University of Campinas - UNICAMP.

Piracicaba - SP, Brasil, May 05 2004

*Profa. Dra. Cinthia Pereira Machado Tabchoury*
Secretaria
CEP/FOP/UNICAMP

*Prof. Dr. Jacks Jorge Júnior*
Coordenador
CEP/FOP/UNICAMP