

# Rate of Spontaneous Bone Healing after Marsupialization of a Large Radicular Cyst: A Case Report

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## ABSTRACT

Radicular cysts are the most common odontogenic cysts in the tooth bearing area. Marsupialization is the process of making a bone window through which regular irrigation and packing are done, aiming to relieve the pressure inside the cyst and giving a chance for regeneration to take place in hard tissues, resulting in a smaller cystic cavity and thus making it more accessible for final enucleation. This article studies a case of large radicular cyst marsupialized, in which there was a great decrease in size of the bony defect, making marsupialization a better option in larger cysts.

**KEYWORDS:** Bone Healing, Enucleation, Marsupialization, Radicular Cyst

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## Introduction

Radicular cysts, also known as periapical cysts, are the most common odontogenic cysts.<sup>(1)</sup> They originate from proliferation of rests of Malassez epithelium in the teeth bearing area.<sup>(2)</sup>

Inflammation occurs after tooth pulp necrosis or insufficient root canal treatment.<sup>(3)</sup> Histopathologically, a radicular cyst is a fibrous connective tissue capsule lined with epithelium and present a lumen containing liquid and cellular debris.<sup>(4)</sup> It occurs mostly in the second decade of life, with a 6-55% chance of developing from apical periodontitis.<sup>(5)</sup>

Clinically, most radicular cysts are incidental findings during routine radiographic examination, for which they develop slowly, with little to no pain, unless acute inflammatory exacerbation occurs.<sup>(4,5)</sup> The cyst is usually detected by incidental finding during routine radiographic examination. Symptoms like swelling, sensitivity, tooth mobility and displacement are only noticed after the cyst becomes large.<sup>(4,5)</sup>

Radicular cysts are treated surgically by enucleation or marsupialization.<sup>(6)</sup> Enucleation, by definition, is the complete removal of cystic lining with healing by primary closure, while marsupialization is the conversion of a cyst into a pouch so the pressure is relieved, giving a good chance for the bone around the lesion to regenerate, thus decreasing the cyst size.<sup>(2,6,7)</sup>

Enucleation of a large cyst is associated with higher rates of bone fracture and complications related to neighboring vital structures, like blood vessels and nerve bundles, especially in older people.<sup>(8,9)</sup> Whereas marsupialization stimulates bone and soft tissue regeneration,<sup>(1,2,6)</sup> thus decreasing the size of the lesion before the cyst is removed completely.

The aim of this study is to measure the rate of bone healing after marsupialization of a large radicular cyst in the mandible in an old patient for six months.

## Case Report

A 60 year old male patient, previously healthy, presented to maxillofacial surgery clinic on October 25<sup>th</sup>, 2017 to extract his broken teeth. Radiographic examination (fig. 1) revealed a large, well defined, corticated and multilocular radiolucency. Displacement of inferior alveolar canal was noted with no root resorption.

The patient was sent for Computed Tomography (fig. 2). Marsupialization and an incisional biopsy were done under local anesthesia. Histopathologic findings were consistent with radicular cyst. Weekly dressing was done using a pack of iodine and irrigation with normal saline. Panoramic radiography, rather than Computed Tomography, was chosen for serial measurements because of its relatively less radiation dose to the patient.

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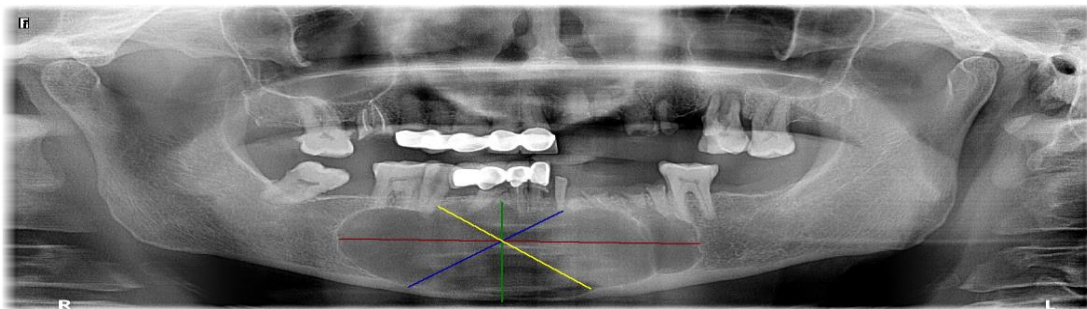
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A panoramic radiograph was taken monthly for six months. Measurements of the bony defect were done through CareStream™ CS 8100, which allows users to measure the length between two points; the same machine was used with the same magnification factor for all measurements. As seen on (Figure 1), four lines were assigned to standardize the serial measurements as follows:

- Line 1: (green) a vertical line that connects the mid-point between the two lower centrals perpendicular to the lower border of the mandible.
- Line 2: (red) A horizontal line of the maximum extension of the bony defect.
- Line 3: (yellow) right diagonal line
- Line 4: (blue) left diagonal line.

(Tables I-V) show progression in treatment measured by the relative change in the aforementioned lines.

After six months of marsupialization the bony defect was greatly decreased and a decision of the complete enucleation of the cyst, along with extraction of the remaining roots, was taken (Fig 5). The patient was operated on May 21<sup>st</sup>, 2018 under general anesthesia to excise the cyst completely and was sent for histopathological examination, to further confirm the diagnosis. There were no complications and the patient was doing well during follow-up visits.



**Fig 1:** Panoramic Radiograph, 25<sup>th</sup> October 2017. Four imaginary lines were assigned to standardize the serial measurements.

Line 1: (green) a vertical line that connects the mid-point between the two lower centrals perpendicular to the lower border of the mandible.

Line 2: (red) A horizontal line of the maximum extension of the bony defect.

Line 3: (yellow) right diagonal line.

Line 4: (blue) left diagonal line.



**Fig 2:** Computed Tomography, 25<sup>th</sup> October 2017, shows extension of the bony defect before treatment.

**Table I:** Serial measurements of lines 1-4: Four imaginary lines assigned to standardize the serial measurements. Diagnosis and marsupialization were done on October 25, and monthly radiographs were taken afterwards.

Date	Line 1 (mm)	Line 2 (mm)	Line 3 (mm)	Line 4 (mm)
October 25, 2017	32.2	75.2	45.0	39.4
November 29, 2017	31.4	74.5	41.8	39.1
December 27, 2017	17.3	52.9	26.6	27.2
February 10, 2018	14.9	50.0	23.0	14.0
March 8, 2018	12.5	49.0	22.3	13.3
April 4, 2018	7.5	41.9	18.1	11.2

**Table II:** Serial measurements of line 1: A vertical line that connects the mid-point between the two lower centrals perpendicular to the lower border of the mandible, shown in green in figure 1.

Date	Length (mm)	% Decreased
October 25, 2017	32.2	-
November 29, 2017	31.4	2.5
December 27, 2017	17.3	46.3
February 10, 2018	14.4	53.8
March 8, 2018	12.5	61.2
April 4, 2018	7.5	76.8

**Table III:** Serial measurements of line 2: A horizontal line of maximum extension of the bony defect, shown in red in Figure 1.

Date	Length (mm)	% Decreased
October 25, 2017	75.2	-
November 29, 2017	74.5	1
December 27, 2017	52.9	29.7
February 10, 2018	50.0	33.5
March 8, 2018	49.0	34.8
April 4, 2018	41.9	44.3

**Table IV:** Serial Measurements of line 3: A right diagonal line shown in yellow in Figure 1.

Date	Length (mm)	% Decreased
October 25, 2017	45.0	-
November 29, 2017	41.8	7.1
December 27, 2017	26.6	40.9
February 10, 2018	23.0	48.9
March 8, 2018	22.3	50.5
April 4, 2018	18.1	59.8

**Table V:** Serial Measurements of line 4: A left diagonal line shown in blue in Figure 1.

Date	Length (mm)	% Decreased
October 25, 2017	39.4	-
November 29, 2017	39.1	0.8
December 27, 2017	27.2	31.0
February 10, 2018	14.0	64.7
March 8, 2018	13.3	66.3
April 4, 2018	11.2	71.6

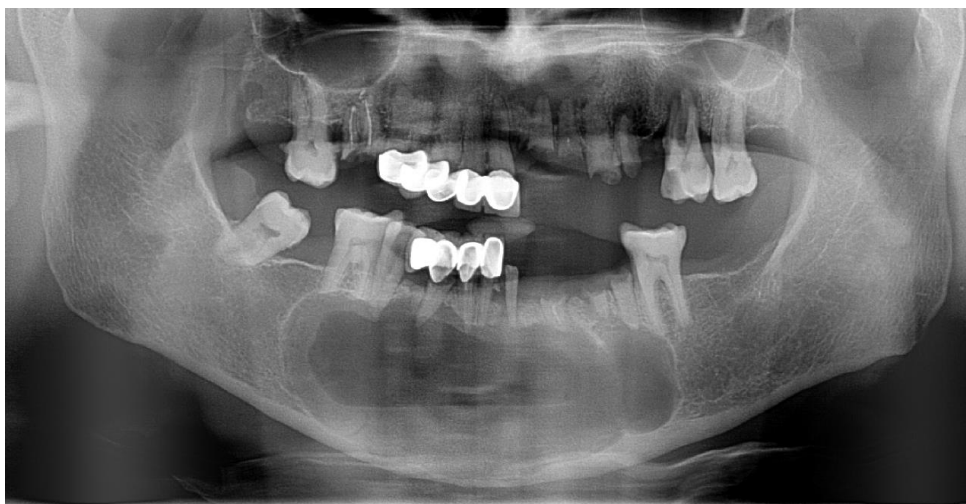
## Discussion

The study of bone healing after marsupialization of a radicular cyst showed gradual decrease in the size of the bony lesion. The vertical aspect of the cystic cavity exhibited a 76.8% decrease over six months. Whereas the horizontal direction only decreased 44.3% of the original size. The decrease was 59.8% in the right diagonal direction, and 71.6% in the left diagonal direction. There was a dramatic decrease in the bony defect by the second month of marsupialization in all directions. So it can be concluded that at least two months after marsupialization would be appropriate for the final enucleation of the cyst. In this case six months was the time given for marsupialization, which further increased the healing of the bony defect.

Pathological fracture is a common complication of complete excision of a large cyst in the mandible,<sup>(4)</sup> but marsupialization of such a cyst followed by excision greatly decreases chances of fracture.<sup>(10)</sup> Marsupialization was a better option, for which it protects the inferior alveolar nerve.<sup>(1,2,6,8)</sup>

This can be explained by the great decrease of bony lesion on its vertical axis, and increased bone healing around vital structures (Fig 4, Table II). In this case the inferior alveolar canal in the mandible or the maxillary sinus when radicular cysts are in the maxilla.

In marsupialization, patient cooperation and operator skill are needed in keeping the cystic cavity clean to prevent infection and enhance bone healing making it smaller and more accessible for enucleation.



**Fig 3:** Panoramic Radiograph, 10<sup>th</sup> February, 2018. Four months after marsupialization.



**Fig4:** Panoramic Radiograph, 4<sup>th</sup> April, 2018. Six months after marsupialization.

## Conclusion

Successful Marsupialization of Radicular Cyst greatly decreases the bony defect making the final enucleation more accessible with less complication.

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