Marsupialization of radicular cysts on adolescent patients to reduce treatment morbidity: case report

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Abstract

Objective: There are some things that should be considered in treating growing patient with odontogenic cyst. The marsupialization is considered to have more benefits compared to enucleation for growing patient in order to overcome treatment morbidity such as damage to vital structures, heavy loss of bone, jaw growth disturbances, and pathological fracture. This paper reports the success of two cases of marsupialization of odontogenic cysts in order to reduce the treatment morbidity and to discuss about enucleation for young patient.

Methods: Two female 21 and 22 years old with radicular cysts on tooth 36. Marsupialization was done before completing cyst enucleation.

Results: The shrinkage of the cyst was observed periodically. The position of the wall of the cyst was superficially positioned and the enucleation was done. The treatment result was satisfying with low morbidity.

Conclusion: Marsupialization for odontogenic cyst in growing patient has more advantages than enucleation to reduce treatment morbidity.

Keywords: Radicular cyst, Marsupialization, Enucleation, Morbidity

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Introduction

The odontogenic cysts are common in daily practice. They are generally classified into two types, i.e. developmental cyst and inflammatory cyst. The odontogenic cyst originates from rest of Malassez epithelium, which proliferate to form cyst wall. An odontogenic cyst can enlarge by destroying extracellular matrix with collagenase, bone resorption around the cyst from osteoclast-like cells, or combination of both.¹ Along with the enlargement of the cyst, the intracystic pressure is also increased which helps in its enlargement. Other than mechanical pressure, cytokines such as interleukin-1 α (IL-1 α) and interleukin 6 (IL-6) play important role in the enlargement of the cyst.²

The radicular cyst is the most common inflammatory odontogenic cyst. It is more common in permanent dentition but seldom in deciduous dentition.³ The radicular cyst originates from irritation of periapical tissue due to pulp necrosis from caries or trauma, which could stimulate the proliferation of malassez epithelia. The incidence of radicular cyst is most common in the second decade of life. Permanent teeth have 52–68% incidence and less common on deciduous teeth which account for 0.5–3.3% of all cysts.⁴

There are some techniques to treat odontogenic cyst, i.e. enucleation, marsupialization, or combination of those techniques.¹ An enucleation is a complete removal of cyst wall. The enucleation of small cyst is usually done together with apicoectomy or extraction of the tooth. Amarsupialization

is indicated for large sized mandibular cyst which is located near important structure such as mandibular canal or mental foramen.⁵ So the cystic osmotic pressure would disappear after marsupialization; therefore, the bone around the lesion could regenerate and the size of the cyst is reduced.

Treatment of radicular cyst for growing patient should consider certain things such as permanent teeth buds, patient's cooperation, jaw growth, and healing process. An enucleation for big cyst is considered to have high morbidity and dangerous for important bone structures, blood vessels, and nerve bundles. Small or medium sized radicular cyst of posterior mandible, especially those which are still covered with thick cortical bone, would cause difficulty to reach the cyst without severe bone damage. Access from extraction socket is usually small and it will be hard to make sure that whole cyst has been removed. The marsupialization is considered to be able to stimulate bone and soft tissue regeneration potential, especially for young patients.^{6,7} The reasons mentioned above emphasized that marsupialization is the treatment of choice to avoid bone defect, neurovascular damage, advantageous for young patients, and for middle-sized cyst with thick cortical bone. This paper reports two cases of middle-sized mandibular radicular cyst which have thick cortical bone. A non-radical treatment before enucleation is chosen for both these cases.

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Case Report

First case, twenty-two-year-old female came to Dental Hospital Gadjah Mada University with left mandibular swelling for the last three months. The swelling grew slowly without pain and discharge. We found root remnants on teeth 26, 36 and 46. The radiographic examination showed well-defined radiolucent lesions in region 26, 36 and 46. **Figure 1A** in region 36, the size of the lesion was 17x23 mm. The size of the lesion in region 46 was 14x12 mm and in region 26 was 6x5 mm. Our working diagnosis was multiple radicular cysts 26, 36 and 46.

A

B

C

Figure 1 First patient: A. Initial panoramic radiograph, B. Panoramic radiograph 3.5 months after marsupialization and C. Panoramic radiograph two years after enucleation

The biggest size was found in region 36 with 2 mm distance from inferior mandibular margin. Three and a half months after marsupialization, the size of the cyst in region 36 shrunk to 11x9 mm. **Figure 1B** the distance between the cyst and mandibular margin was considered safe and enucleation was done. Two years after enucleation, the surrounding bone healed normally **figure 1C**.

Second Case, twenty-one-year-old female came to Prof. Soedomo Dental Hospital for a simple tooth extraction. The radiographic examination revealed well-defined radiolucent lesion in region 36. **Figure 2A** the size of the lesion was 13x15 mm. We did aspiration biopsy and the result was odontogenic cyst. A marsupialization was planned because the margin of the cyst was near to mandibular canal. Two months after marsupialization, the size of the cyst shrunk to 9x10 mm. **Figure 2B** it was considered safe to perform enucleation without jeopardizing the neighboring structure. Four months after enucleation, the healing was uneventful **figure 2C**.

It was considered safe to perform enucleation without jeopardizing the neighboring structure. **figure 3** a definitive diagnosis is defined through histopathologic examination. Histopathologic examination of the first patient showed granulation tissue with squamous epithelia, leucocytes, and lymphocytes infiltrate. **Figure 4A** while, histological examination of the second case showed the lesion consists epithelia with lymphocytes, plasma cells and PMNs infiltrates. **Figure 4B** we considered to do aspiration biopsy for second patient because the patient had no swelling.

Discussion

The radicular cyst is diagnosed through clinical and radiographic examination, periapical or panoramic radiograph. A panoramic radiograph is the standard examination to detect mandibular bone lesions, including radicular cyst.⁷ Clinical findings which could support radicular cyst are non-vital teeth, buccal cortex expansion of the lesion, and absence of pain. A definitive diagnosis is defined through histopathologic examination. We considered to do aspiration biopsy for second patient because the patient had no swelling.

The indications of marsupialization are large-sized cyst, to reduce morbidity such as damage of important structures, to avoid major bone loss, to prevent mandibular growth disturbances, and to avoid pathologic fracture. Marsupialization is the preferred treatment for large-sized mandibular cyst, especially those which is located near to mandibular canal, antrum and permanent teeth buds.⁸

Figure 2 Second patient: A. Initial panoramic radiograph, B. Panoramic radiograph two months after marsupialization and C. Panoramic radiograph four months after enucleation

Figure 3 Removal of cyst's wall, minimal damage to cortical bone of mandible

Figure 4 A. Histopathologic examination of the first patient. Granulation tissue with squamous epithelia, leucocytes and lymphocytes infiltrate and B. Histological examination of the second case. The lesion consists epithelium with lymphocytes, plasma cells and PMNs infiltrates

It is considered as conservative and less invasive treatment for young patients.³ A medium-sized mandibular cyst with thick cortical bone needs major bone removal for complete enucleation. This is one of the reason of our preference to do marsupialization in the cases presented. We observed several disadvantages of marsupialization. It creates space in superior wall of the cyst and must be preserved for 2–3 months to allow bone regeneration. It is very important to prevent closure of the superior wall of the cyst in order to prevent the formation of residual cyst.⁹ The space should be cleaned regularly to prevent infection while waiting for bone regeneration. The two cases showed that the opening of the cyst gradually reduced and caused access difficulties and reducing clean ability.

The mechanism of the reduction in the size of cysts by marsupialization is well known. An intra-cystic pressure stimulates the release of epithelial inflammatory cytokines such as IL-1 α and could initiate bone resorption by stimulating and activating osteoclasts. The marsupialization inhibits the epithelial IL-1 α expression and reduces bone resorption and decreases the size of the cyst.¹⁰ Mean reduction time for radicular cyst's size to reduce to its half was six months (± 2 months).¹ It is true for the first patient who had 23 mm cyst. Three months after marsupialization, the diameter of the cyst was reduced to 11 mm. The rate of the reduction is also affected by the initial size of the cyst, in which bigger lesion tends to reduce rapidly.¹¹

Treatment plan of pediatric cystic lesion to be considered are some factors such as anatomical location of the lesion in growing facial skeleton, permanent teeth buds, prompt bone regeneration, and child's cooperation.¹² A mandibular asymmetry may happen in growth period, during the end or after growth period. Several things could cause mandibular asymmetry during growth period such as trauma, arthritis, osteo-myelitis, ankylosis, tumor and bone lesion.¹³ A post-natal mandibular growth disturbance causes growth misregulation with unknown mechanism. An early growth period (postnatal until deciduous teeth period) is marked by bone deposition in the posterior border of mandibular ramus with bone resorption simultaneously occurring in anterior border to maintain ramus proportion. An alveolar bone will fail to form if there are no teeth and resorb when the teeth are extracted. Surgical treatment such as cyst enucleation could interfere with mandibular growth.

The main consideration of marsupialization for these cases is to avoid major bone removal. The mandibular cortical bone of the two patients was considered as thick. A major bone removal was needed to gain direct access to the cyst. Access from extraction socket is not sufficient to ensure complete cyst removal without damage of neighboring important structures. The marsupialization can prevent mandibular contour changes because it stimulates bone growth from inside of the lesion.^{6,10} The cases presented showed no mandibular contour changes. The morbidities are considered low and no complications occurred.

Conclusion

Two cases reported indicate the possibility of complete healing for radicular cyst with marsupialization prior to complete enucleation. This method is effective and recommended to treat patients with odontogenic cyst especially in young adults.

Conflict of Interest

The authors report no conflict of interest.

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