ECRONICON OPEN ACCESS

EC DENTAL SCIENCE
Research Article

Clinical Study of Jaw Cyst by Decompression (2)

DU Yue[1], Zhenzhen Li[1], Jie Li[1], Tao Xu[2], Xiaofei Xie[2], Dong Wang[1], Rui Han[3] and Kai Zhang[4]*

[1]*Resident, Departments of Stomatology, The First Affiliated Hospital of Bengbu Medical College, Bengbu, Anhui, China*

[2]*Associate Chief Physician, Departments of Stomatology, The First Affiliated Hospital of Bengbu Medical College, Bengbu, Anhui, China*

[3]*Attending Physician, Departments of Stomatology, The First Affiliated Hospital of Bengbu Medical College, Bengbu, Anhui, China*

[4]*Professor, Department Head, Departments of Stomatology, The First Affiliated Hospital of Bengbu Medical College, Bengbu, Anhui, China*

***Corresponding Author:** Kai Zhang, Professor, Department Head, Departments of Stomatology, The First Affiliated Hospital of Bengbu Medical College, Bengbu, Anhui, China.

Received: July 13, 2021; **Published:** July 24, 2021

Abstract

Jaw cyst is a common benign tumor in the maxillofacial region. It is often not found because of no conscious symptoms. The bulging of the jaw is often obvious when the symptoms appear, and the diameter of the cyst is larger. At present, we mostly use fenestration decompression for jaw cysts larger than 4 mm in diameter, but there are few postoperative research reports. Since the introduction of stomatology in 1998, CBCT and 3D reconstruction have been increasingly used in diagnosis, treatment planning and research. In this study, combined with CBCT and three-dimensional reconstruction, the relationship between the contraction direction and the contraction speed and the initial volume of the cyst cavity after fenestration and decompression was studied.

Keywords: *Jaw Cyst; CBCT; 3D Reconstruction*

Introduction

Odontogenic cysts are unique disorder that affects oral and maxillofacial tissues. They arise as a result of inflammatory or developmental pathogenic causes associated with epithelium of tooth-forming apparatus [1,2]. Traditionally, odontogenic cysts have been treated by enucleation, curettage, and marsupialization [3]. However, this type of large jaw cyst is currently treated with fenestration decompression [1,4]. Since its introduction into dentistry in 1998, Cone Beam Computed Tomography (CBCT) has become increasingly utilized for diagnosis, treatment planning and research. The utilization of CBCT for these purposes has been facilitated by the relative advantages of three-dimensional (3D) over two dimensional radiography [5-7]. And scientific evidence that the utilization of CBCT and three-dimensional reconstruction improve diagnosis and treatment plans or outcomes [8]. This study reconstructed the three-dimensional images of the jaws and teeth of patients at different time points before and after fenestrating decompression, analyzed the cyst contraction of the mandibular odontogenic jaw cyst.

Objectives and Methods

General data

Collected data of 40 patients with mandibular odontogenic jaw cysts diagnosed at the First Affiliated Hospital of Bengbu Medical College from June 2017 to June 2019 and underwent fenestration decompression. Inclusion criteria: (1) Patients undergoing initial surgery. (2) The pathological diagnosis was an odontogenic cyst of the mandible. (3) The diameter of the cyst is greater than 4 cm. Exclusion criteria: (1) The large area of the cyst broke through the cortical bone. (2) Poor compliance, incomplete clinical and follow-up data. 21 males and 19 females among them, 5 to 84 years old, with an average of 32.3 years old. The long axis of the measured cyst (deducting the magnification ratio) was 4.3 - 14.7 cm, with an average of 9.4 cm. Pathological diagnosis: 6 patients with root end cysts, 21 patients with dental cysts, and 13 patients with of keratocysts.

Method

(1) Routine oral examination was performed preoperatively, the lesion area was photographed by CBCT, the preoperative volume of the cystic cavity was measured, and the scope of the cystic cavity was determined according to CBCT. (2) General or local anesthesia is performed according to the patient's personal cooperation. According to the imaging data, the near center of the cyst is selected as the opening window, and the mucoperiosteal flap with a diameter of about 2 cm is removed. Part of the cyst is exposed by extracting the bone at the root of the deciduous tooth. The surrounding cyst wall is sent for pathological examination, the cyst fluid is drained, a large amount of physiological saline is flushed, and the iodoform gauze is inserted into the cyst cavity and drawn out from the mouth of the cyst cavity. It is removed at the follow-up visit one week later, and the corresponding cyst plug is made. The patient is asked to do it on his own every day. Flush the cyst cavity, wear a cyst plug on time, keep the drainage port unobstructed, which is conducive to the drainage of cyst fluid. (3) Follow-up every 3 months after operation to observe the changes of the patient's clinical symptoms and perform CBCT every 6 months to compare the changes in the lesion area. (4) Import the original DICOM data into the E3D modeling software, measure the effective tissue threshold interval, extract the effective tissue contour, transform the 3D digital model, complete the three-dimensional reconstruction.

Statistical method

SPSS 21.0 was used for statistical analysis of the data. Pearson correlation analysis was used to analyze the correlation between the indicators. $P < 0.05$. Statistical significance was set at $P < 0.05$.

Result

Changes in the direction of contraction of the mandibular cyst

Among 40 patients, the cyst of 32 cases of mandibular cyst contracted axially along the maximum diameter, and the cyst was irregular elliptical after contraction, as shown in figure 1.

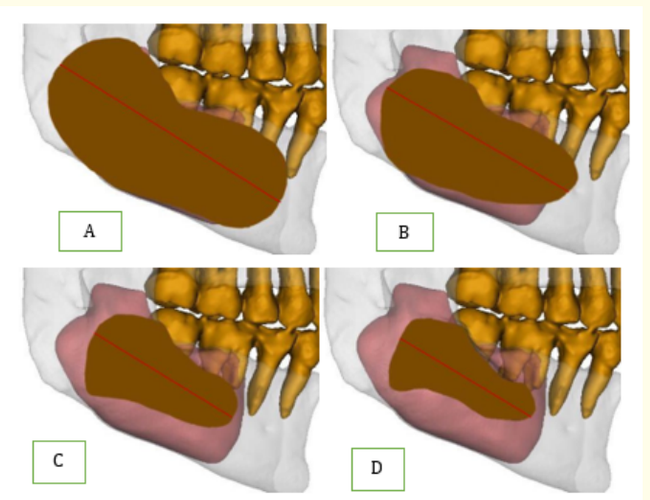

Figure 1: *Changes in the direction of contraction after decompression (A: 1 month postoperatively B: 6 months postoperatively C: 12 months postoperatively D: 18 months postoperatively).*

The relationship between the speed of cyst contraction and the initial volume

The relationship between the contraction speed of the cyst cavity and the initial volume is shown in table 1 and figure 2. The correlation between the initial volume and the lumen contraction rate at each time point was shown by Pearson correlation analysis, there was a positive correlation between the initial volume and the velocities of cystic cavity contraction at each time point ($r > 0$, $P < 0.05$).

Time	Initial volume	
	r	P
1 - 6 months	0.545**	< 0.001
6 - 12 months	0.433**	0.005
12 - 18 months	0.364*	0.021

Table 1: *Correlation analysis of shrinkage rate and initial volume.*
*Notes: *P < 0.05, **P < 0.01.*

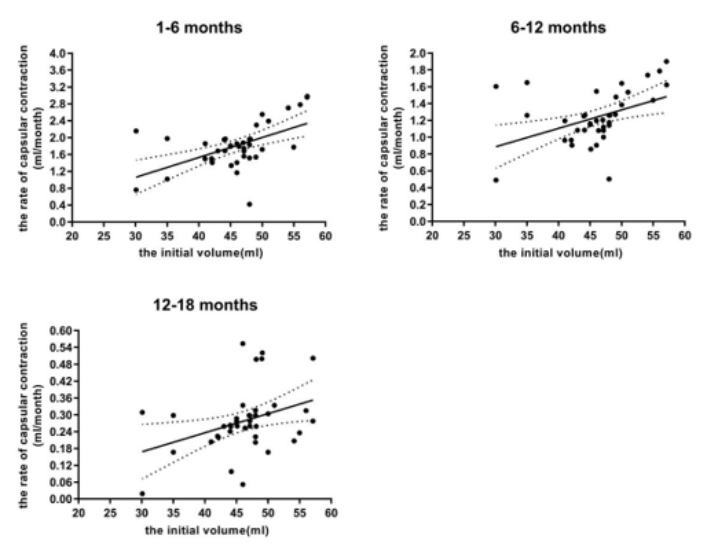

Figure 2: *Correlation between initial volume and the rate of capsular contraction.*

Discussion

The most widely used and widely demonstrated treatment for the removal of small-sized odontogenic cysts of the jaw is the enucleation [9]. The treatment of large odontogenic cyst is still controversial. Unfortunately, the complete removal may be difficult and followed by several complications especially when the cyst is proximal to vital structures such as the inferior alveolar neurovascular bundle, or inferior border of the mandible [1,10,11]. In these cases, the decompression for jaws cystic lesion seems to be an effective alternative treatment [12]. The marsupialization approach, described by Partsch in 1892, is a technique involving the creation of a large window of the cyst wall, converting the cyst into a pouch so the cyst is decompressed, exposing the cyst lining to the oral environment. This com-

munication between the oral cavity and the cyst wall reduces the internal pressure of the lesion and promote the generation of new bone tissue. When using X-ray curved tomography and apical radiographs to observe the extent of cystic lesions, it can only reflect the extent of jaw cysts in two dimensions, and the bone destruction in the lip-buccal direction cannot be displayed. CBCT can accurately calculate the volume of jaw cysts and can observe the jaw cysts in three dimensions [13-16].

This study found that the lumen of the mandibular cyst contracted axially along the maximum diameter, and the residual cyst was elliptical after fenestration. It may be related to the following factors [7,12-14,17]: 1. The role of stress: the healing method of the cyst cavity after fenestration is to first form new bone in the inner side of the cortical bone, and then the woven bone continues to form and thicken, and the trabecular bone in the woven bone is continuously calcified and thickened, and constantly rebuilt under the action of stress. Due to the different stresses in different positions of the cyst cavity, the osteogenesis rate is also different. 2. The position and number of opening windows: Scholars pointed out that the position and number of opening windows are the factors that influence the healing of cystic cavity. The opening window of the mandibular body in the center of the cyst may be one of the reasons why the cyst is symmetrical and shrinks with the diameter as the axis. 3. The influence of bone resistance: the expansion and contraction of the cyst cavity may be affected by the bone resistance around the jaw.

The results of this study show that the contraction speed of the cyst wall is negatively correlated with the initial volume. Taking into account the differences in age, initial volume of the cyst, pathological type, and patient compliance, it is recommended to routinely observe closely for 12 months after opening the window. When the contraction of the cyst is found to slow down significantly, curettage can be performed according to the patient's wishes. There is no need to wear a cyst plug and flush the cyst cavity, which shortens the treatment cycle and reduces the treatment burden on patients. Because the average thickness of the cyst wall increases after the fenestration, and the imaging shows that the bone is repaired like a needle or ground glass [17,18], the cyst wall is in close contact with the new bone, and the residual cyst is fusiform in the center of the jaw. There are also some difficulties in stage □ curettage. Methods to improve the quality of the second-stage operation and ensure complete removal of the cyst wall, such as expanding the window, observing the cyst wall with an endoscope, and using an osteotomy and aspirator to remove the cyst wall, are worthy of further discussion.

Conclusion

Collectively, fenestration decompression has certain curative effects on odontogenic jaw cyst. This study found that after fenestration and decompression, the law of the contraction direction of the cyst cavity and the correlation between the contraction speed and the initial volume, which provide a certain direction for follow-up treatment.

Bibliography

1. Bilodeau EA and Collins BM. "Odontogenic Cysts and Neoplasms". *Surgical Pathology Clinics* 10.1 (2017): 177-222.

2. Deboni MC., *et al*. "Surgical management of dentigerous cyst and keratocystic odontogenic tumor in children: A conservative approach and 7-year follow-up". *Journal of Applied Oral Science* 20 (2012): 282-285.

3. Koca H., *et al*. "Outcome of dentigerous cysts treated with marsupialization". *The Journal of Clinical Pediatric Dentistry* 34 (2009): 165-168.

4. Pogrel MA. "The keratocystic odontogenic tumor (KCOT)-An odyssey". *International Journal of Oral and Maxillofacial Surgery* 44 (2015): 1565-1568.

5. Kapila SD and Nervina JM. "CBCT in orthodontics: assessment of treatment outcomes and indications for its use". *Dentomaxillofacial Radiology* 44.1 (2015): 20140282.

6. Mozzo P., *et al*. "A new volumetric CT machine for dental imaging based on the cone beam technique: preliminary results". *European Radiology* 8 (1998): 1558-1564.

7. Hatcher DC. "Operational principles for cone-beam computed tomography". *Journal of the American Dental Association* 141.3 (2010): 3S-6S.

8. Kapila S and Farman AG. "Craniofacial imaging in the 21st century. Proceedings of the 2002 COAST Conference, Asilomar Conference Center, Pacific Grove, California". *Orthodontics and Craniofacial Research* 6 (2003): 7-8.

9. Pogrel MA. "The keratocystic odontogenic tumor". *Oral and Maxillofacial Surgery Clinics of North America* 25 (2013): 21-30.

10. Uchoa-Vasconcelos AC., *et al*. "Demographic profile of oral non odontogenic cysts in a Brazilianpopulation". *Medicina Oral, Patologia Oral, Cirugia Bucal* 19 (2014): e308-e312.

11. Hu YH., *et al*. "Conservative treatment of dentigerous cyst associated with primary teeth". *Oral Surgery, Oral Medicine, Oral Pathology, Oral Radiology, and Endodontology* 112 (2011): 5-7.

12. Freitas DQ., *et al*. "Bilateral dentigerous cysts: review of the literature and report of an unusual case". *Dentomaxillofacial Radiology* 35 (2006): 464-468.

13. Su YK., *et al*. *Zhonghua Kou Qiang Yi Xue Za Zhi* 54.8 (2019): 546-552.

14. Borghesi A., *et al*. "Odontogenic keratocyst: imaging features of a benign lesion with an aggressive behaviour". *Insights Into Imaging* 9.5 (2018): 883-897.

15. August M., *et al*. "Dedifferentiation of odontogenic keratocyst epithelium after cyst decompression". *Journal of Oral and Maxillofacial Surgery: Official Journal of the American Association of Oral and Maxillofacial Surgeons* 61.6 (2003): 678-683.

16. Giuliani M., *et al*. "Conservative management of a large odontogenic keratocyst: Report of a case and review of the literature". *Journal of Oral and Maxillofacial Surgery* 64 (2006): 308.

17. Pogrel MA. "Treatment of keratocysts: The case for decompression and marsupialization". *Journal of Oral and Maxillofacial Surgery* 63 (2005): 1667.

18. Gao L., *et al*. "Decompression as a treatment for odontogenic cystic lesions of the jaw". *Journal of Oral and Maxillofacial Surgery* 72 (2014): 327.

Volume 20 Issue 8 August 2021