

Original Article

Clinical research of jaw marsupialization by applying obturator made by hot pressure casting technique

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Abstract: This study compares the use of iodoform gauze and obturators made by hot pressure casting technique in the opening maintenance after the jaw cyst marsupialization. Forty patients with jaw cyst marsupialization in either retromolar pad or vestibular groove were randomly allocated to either experimental group (hot pressure casting obturator) or control group (iodoform gauze) and monitored for a period of six months. During the period, the data on the patients' facial appearance, comfort, convenience, incidence of inflammation around the opening, and incidence of accidents among the patients were collected. The results demonstrated that the use of hot pressure casting obturators was associated with better clinical outcomes and higher patients' satisfaction rates. We recommend the use of obturators for the treatment of jaw cyst marsupialization in the retromolar pad and vestibular groove.

Keywords: Jaw cyst, marsupialization, hot pressure casting obturator

Introduction

Odontogenic and non-odontogenic cysts commonly occur in the bones of the jaws. Since surgical excision covers a wider area and has serious influence on the appearance and functions of oral and maxillofacial region, marsupialization is often used in the clinical practice [1-6]. During this procedure, the wall of the cystic lesions is opened or removed to the greatest extent during phase I of the surgery. The surgical wound is kept open afterwards for drainage and maintaining the same pressure inside and outside of the cyst. Under the stimulation by normal functional movements, new bones are formed around the cyst and the cystic cavity gradually decreases [7-9]. Odontogenic keratocysts get resolved both clinically and radiographically in a 7-19 months period [10]. After a period of 8-16 months, the decision on the need for the phase II of the surgery is taken based on the progress of recovery. With this approach, the morphology and function of the jaw can be kept to the greatest extent. The patients need an obturator to keep the incision open and avoid other objects entering into the cystic cavity during the maintenance period

after marsupialization. Widely used movable denture-like obturators are fixed through the clasps [11, 12]. Due to limited space at the retromolar pad and vestibular groove, these obturators may seriously affect the appearance and functions of oral and maxillofacial region. As a result, they are commonly substituted by iodoform gauze in the clinical practice [13-15].

Materials and methods

Materials

Dental vacuum hot pressure casting machine and dental hot pressure casting sheets were from ERKODENT, Germany. Silicone impression materials were purchased from DMG, Germany. High-speed and low-speed hand pieces were from NSK, Japan. Polisher was produced locally (China).

Experimental objects

During the period from January 2012 to June 2014, forty patients attending the School of Stomatology Hospital of Jilin University, China were included in the study. The patients were

Application of hot pressure casting obturator

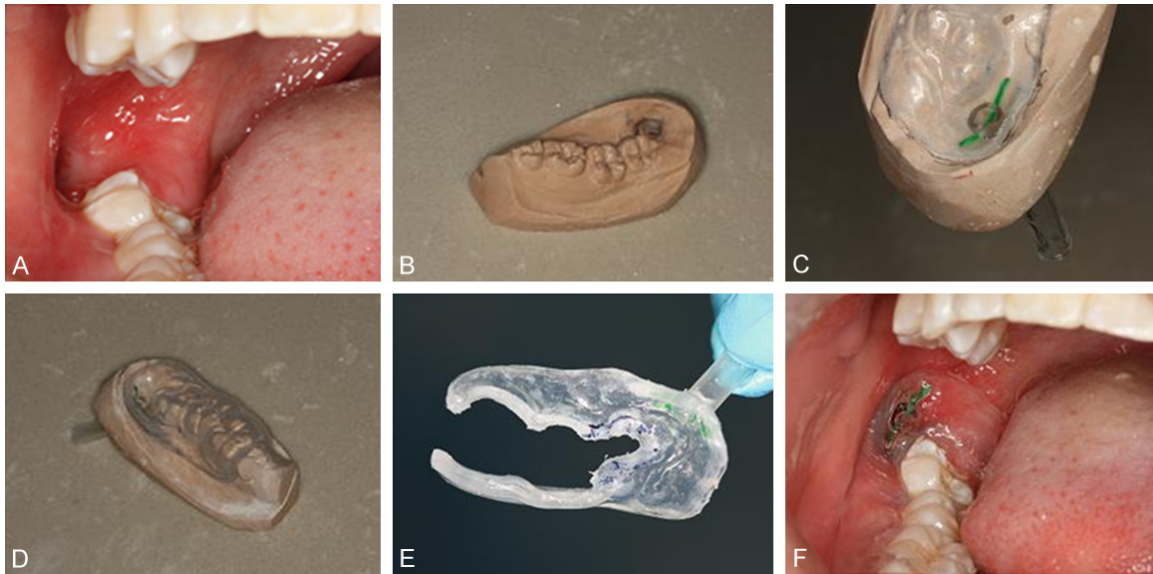


Figure 1. A. Opening of the cyst located under the jaw retromolar pad. B. Making the impression model. C. Pressure casting the internal layer with soft sheet, and placing the internal structure into the cystic cavity in advance. D. Pressure casting the external structure with hard sheet, and forming a complete unit. E. Removing the redundant parts and polishing. F. Placing the obturator into the cystic cavity and fitting into the surrounding soft tissues.

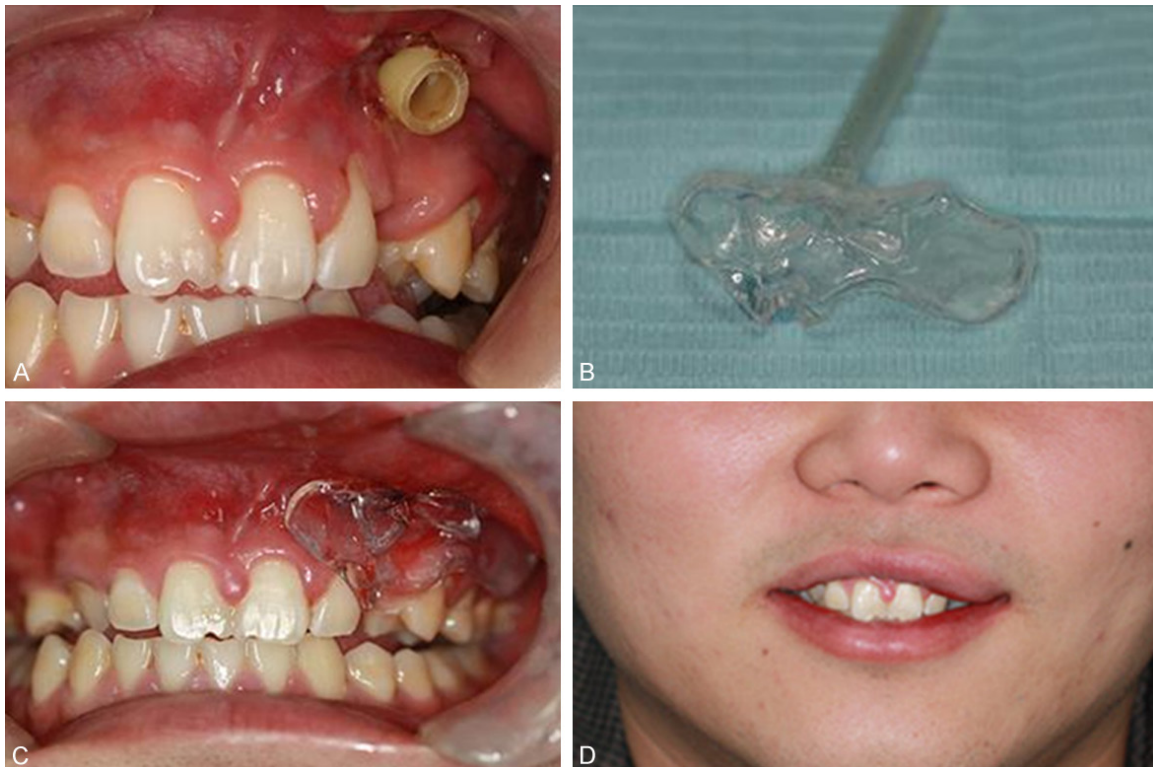


Figure 2. A. The opening located in the vestibular groove. B. The finished hot pressure casting obturator. C. Wearing of the hot pressure casting obturator, with good retention and closure. D. Wearing of the hot pressure casting obturator has no significant influence on the facial morphology and has good appearance.

aged between 31 and 65 years, with a mean age of 55 years, and included 13 women and

27 men. In these patients, 20 procedures of jaw cyst marsupialization at retromolar pad and

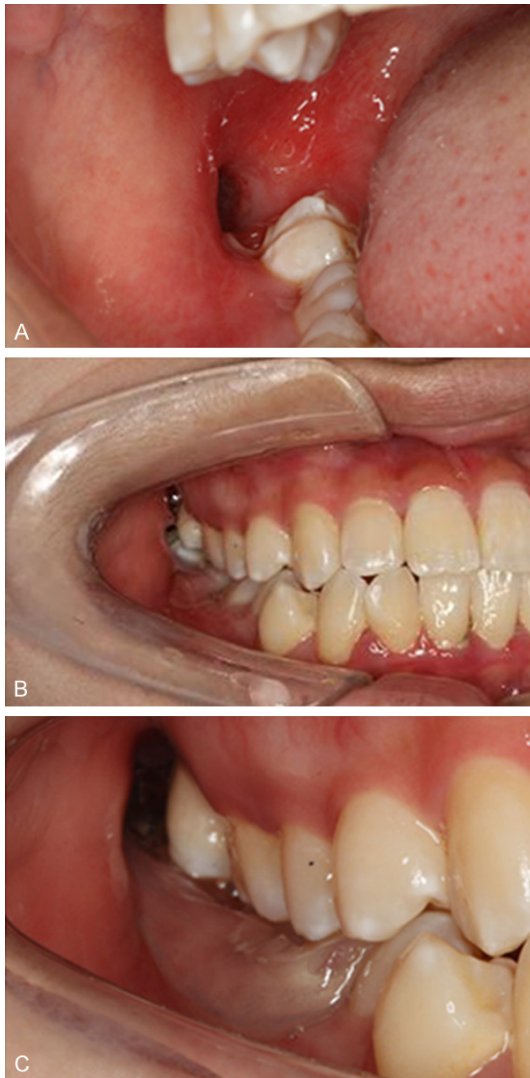


Figure 3. A. The opening located in the retromolar pad. B. Due to limited space for marsupialization at the status of occlusion, a moveable denture-like obturator cannot be used. C. Wearing of the hot pressure casting obturator has no influence on the normal occlusion and other functional movements and feels comfortable for patients.

20 procedures at vestibular groove were performed. The patients were randomly allocated into the experimental group and the control observation group. All patients had no other oral and maxillofacial diseases (such as Sjogren's syndrome), dentures or serious systematic conditions. Informed consent was obtained from all patients included in the study.

Manufacturing of hot pressure casting obturator

The impressions were made using silicone. The impression needed to reflect the soft tissues

around the opening of the cystic cavity, surrounding dentition and mucosal morphology completely and accurately. The impression materials were pressed into the cystic cavity to a certain depth. Areas in plaster model around the opening were buffered with wax. Hot pressure casting on the model with 2 mm soft sheet was done and revised to the suitable size. Then, based on the size of the cystic cavity opening and the depth of the cavity, a drainage tube with appropriate diameter and length was inserted into the cystic cavity on the plaster model and fixed together with the soft sheet. After this, the second hot pressure casting was done by using the 2 mm hard sheet. A double-layer obturator was formed and then revised and polished. The internal soft sheet can reduce the tenderness and offers a comfortable feeling. The external hard sheet serves to maintain the form and strength of the obturator (**Figure 1**).

Experimental grouping

Twenty patients undergoing vestibular groove marsupialization were randomly allocated into either the vestibular groove experimental group ($n = 10$) or the vestibular groove control group ($n = 10$). Similarly, the twenty patients undergoing retromolar pad marsupialization were placed into either the retromolar pad experimental group or the retromolar pad control group ($n = 10$ in each group). The patients in the experimental groups were wearing hot pressure casting obturator for 24 hours a day, and flush the obturator and the cystic cavity after each meal with normal saline every day. If the obturator did not fit the opening after two to three months due to the changes in the morphology of surrounding tissues, new obturator was made and the observation continued. The control group used iodoform gauze 24 hours a day with two thirds of the gauze immersed into the cystic cavity and one third left outside. Normal saline was used to flush the cystic cavity every day and rinse the iodoform gauze, which was changed regularly.

Comparison of the appearance, comfort and convenience for the patients

During the first week after marsupialization, the patients used obturators or iodoform gauzes under the close supervision and instructions of treating doctor. After three months, the patients

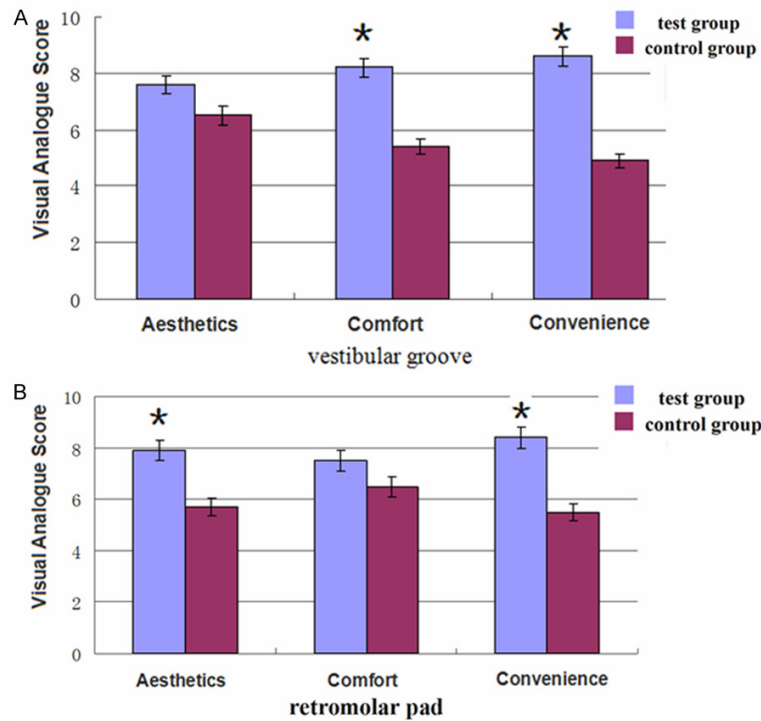


Figure 4. Comparison of the appearance, comfort and convenience for the patients, as measured by VAS scale, in vestibular groove group (A) and retromolar pad group (B).

were asked to fill the VSA quantitative rating scale to evaluate the appearance, comfort and convenience of using the obturators or iodoform gauzes. The visual analog scale (VAS) is a psychometric response scale which can be used in questionnaires. It is a measurement instrument for subjective characteristics or attitudes that cannot be directly measured. When responding to a VAS item, respondents specify their level of agreement to a statement by indicating a position along a continuous line between two end-points. In this test, we identified the scale from “no distress” (0 points) to “agonizing” (10 points).

Comparison of incidence of inflammation around the opening

The opening was checked for inflammation after wearing the hot pressure casting obturator or iodoform gauze for one month, three months and six months. The occurrence of inflammation was judged by is the presence and extent of hyperemia and edema in the soft tissue around the opening.

Comparison of complication incidence

Complication here refers to the situation that happened during the maintenance period after cyst marsupialization, had influences on the disease prognosis and could not be treated by the patients themselves. The complications included secondary infection of the cystic cavity, removing of the wadding fallen into the cystic cavity, and secondary marsupialization due to healing of the soft tissue around the opening. We monitored and compared the incidence of complications during six months in both experimental and control groups that were wearing hot pressure casting obturator or iodoform gauze.

Results

Perception of appearance, comfort and convenience

Wearing hot pressure casting obturator has no significant influences on the appearance of patients who underwent the marsupialization at vestibular groove (**Figure 2**). The dentition of the patients who underwent marsupialization at the retromolar pad can have normal occlusion when wearing hot pressure casting obturator, and there was no influence on oral function (**Figure 3**). After three months, the experimental groups of both vestibular groove and retromolar pad had better satisfaction compared to the control groups (**Figure 4**).

Inflammation at the opening of the marsupialization

After observing patients wearing the hot pressure casting obturator or iodoform gauze for one, three and six months, we found that in the experimental group, the patients could easily wear, remove, and clean the obturator by themselves, and there was no obvious inflammation at the site of opening. In the control group, how-

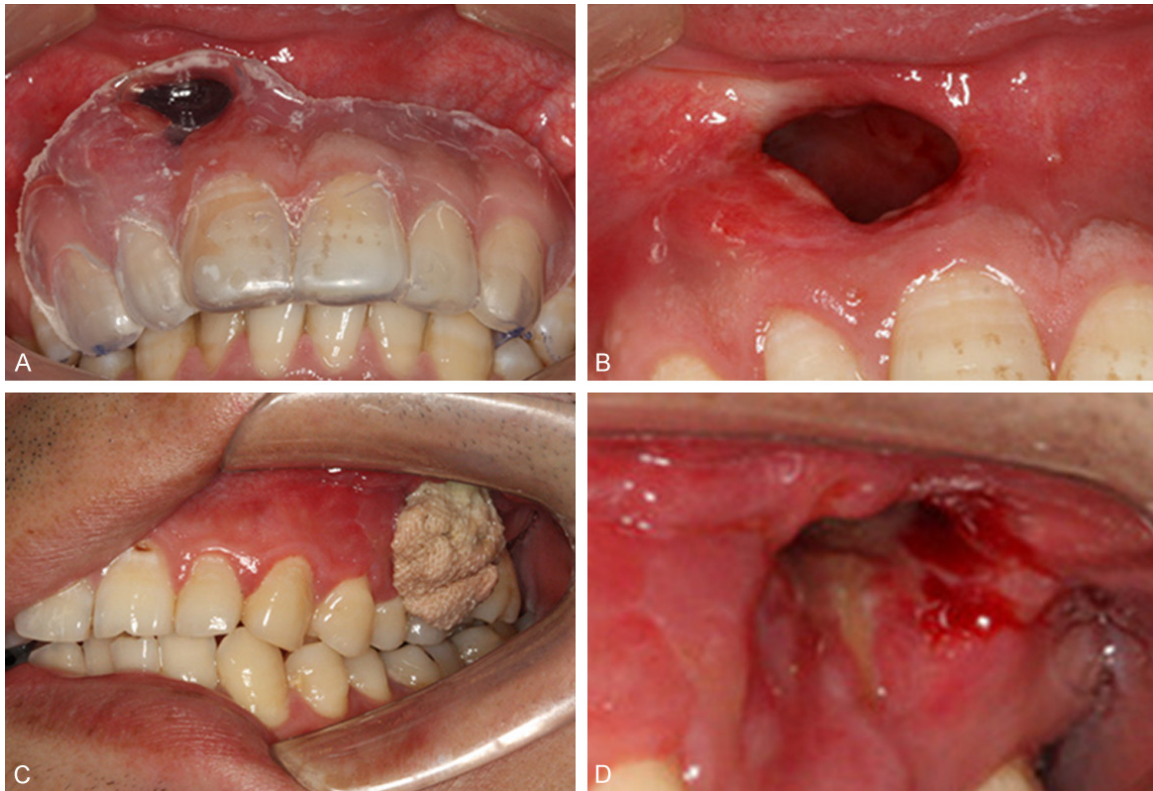


Figure 5. Comparison of inflammation at the opening of marsupialization. A. Wearing of the hot pressure casting obturator after the marsupialization at the vestibular groove. B. Hot pressure casting obturator is easy to wear, remove and clean. There is no obvious inflammation of the soft tissue around the opening. C. At the vestibular groove, iodoform gauze was used after the marsupialization. D. Since iodoform gauze is not convenient for self-cleaning and the cleaning is incomplete, inflammation can easily develop at the site of opening.

ever, iodoform gauze is inconvenient for the patients to wear and remove. The iodoform gauze is difficult to clean and, when not changed in time, causes inflammation at the opening of the marsupialization (**Figure 5**).

Comparison of complications occurrence

Among the 20 patients who use iodoform gauze, there were four cases of wadding fallen into the cystic cavity and removed through clinical treatment and one case of healing of soft tissue at the opening and undergoing a secondary marsupialization. But among the 20 patients who used the hot pressure casting obturators, there was only one case of uncomfortable wearing due to longer rim of the obturator and it was solved after the appropriate adjustment and grinding.

Discussion

It is important for the maintenance of the incision after jaw marsupialization. Firstly, the heal-

ing of soft tissues should be prevented to avoid closure of the cystic cavity and cyst relapse. Secondly, the cystic cavity should be flushed regularly, and the secretion drained out in time. Thirdly, the exogenous infections must be avoided while keeping the cystic cavity open. To help in achieving these objectives, the patients undergoing maxillofacial cyst marsupialization usually wear obturators [16-19].

The opening of jaw cyst marsupialization is usually located in the mouth. The mouth cavity is the main functional region for speaking and feeding in the daily life, so it is very difficult to maintain the cystic opening without affecting the patient's daily life to a certain degree [20-22]. Movable denture-like obturator can be used if the cystic opening locates in the dentition area. However, these obturators cannot be used when the cystic opening is located in the area of upper and lower vestibular groove and retromolar pad [23, 24]. In these situations, iodoform gauze is often used to maintain the

cystic opening. A number of problems are associated with this approach, however. The patients need to remove and put back the iodoform gauze after flushing the cystic cavity every day. This is rather complex process associated with patients inconvenience and suffering. An incompletely cleaned iodoform gauze can trigger infection in cystic cavity. Iodine is a slight irritant to the tissue, and its prolonged use may promote formation of granulation tissue [25]. The wadding often falls into the cystic cavity and cannot be removed when the cavity is bigger. Finally, the wadding cannot prevent the soft tissue of the incision from healing, often resulting in the need for secondary marsupialization when the healing of the soft tissue around the opening occurs [18, 19, 26, 27].

Making of obturator by hot pressure casting technique does not involve additional special equipment, since the vacuum hot pressure casting machine and plastic sheets are all common dental clinical equipment and materials. Tooth preparation is not needed in the making of hot pressure casting obturator, and the procedure can be finished in one clinical visit. The structure of the obturator is simple and the patients can remove and clean it by themselves. It provides a comfortable wearing experience and has no influences on the daily life activities such as talking and feeding. Depending on the particular position of the cyst marsupialization, different approaches to the design of hot pressure casting obturator can be chosen, especially in the positions where the movable denture-like obturators cannot be used, such as vestibular groove and retromolar pad. Finally, since the part of obturator that is placed inside the cystic cavity is made of soft structure, the patients can adjust its length and shape by themselves as the new bone is gradually formed and the cystic cavity diminishes in size. To do so, the clinical adjustment and grinding is not needed, and thus the number of clinics visits can be reduced. Growing number of publications highlight the advantages of using obturators in the treatment of large jaw cysts [28-30].

Although the sample size in our study was relatively small, the data obtained clearly indicate that the use of obturators allows significantly improved aesthetics, comfort and convenience for the patients. The use of obturators also

reduces the incidence of inflammation at the opening of marsupialization. On the basis of our findings we would recommend the practitioners to consider the use of hot pressure casting obturators instead of iodoform gauze whenever possible, especially when marsupialization is located in the vestibular groove and retromolar pad.

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Disclosure of conflict of interest

None.

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