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A Custom-Made Obturator for The Decompression of Odontogenic Cysts. An Orthodontist's Role in Effective Non-Surgical Treatments for Large Cystic Lesions

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Abstract

Odontogenic cysts present management challenges, especially in large lesions. Decompression is a preferred conservative method, and custom obturators have proven effective in maintaining drainage and promoting hygiene. A case study of a 38-year-old male with large mandibular Odontogenic keratocysts (OKCs) demonstrated the success of a custom obturator made from self-curing acrylic, featuring Adams clasps, a labial bow, and a decompression tube for stability. One month postoperatively, there was significant cyst size reduction and bone regeneration, confirming the appliance's efficacy. While custom obturators are versatile across patient demographics, fabrication challenges do exist.

Emerging 3D printing technologies show promise for improving efficiency and accessibility, highlighting the advancement of minimally invasive OKC management with favourable outcomes. This article reviews and discusses the advantages of using an obturator in a case study for decompression of an OKC following marsupialization.

Keywords: Dental Lamina, Decompression, Odontogenic Keratocyst, Root Resorption

Introduction

Cystic lesions are the most common of the intraosseous jaw diseases, typically presenting as painless swellings. They may affect vital structures like the maxillary sinuses and inferior alveolar nerve, leading to dental displacement and root resorption. Various cystic lesions such as odontogenic keratocysts, dentigerous cysts, radicular cysts, and unicystic ameloblastomas can grow large, posing challenges for conservative treatment.[1]

The odontogenic keratocyst (OKC) is a developmental cyst from the dental lamina, most commonly appearing in individuals during their second and third decades of life. It frequently occurs in the mandibular third molar and ascending ramus area but can be found in any dentate region of the maxilla and mandible. On radiographs, OKCs appear as unilocular or multilocular lesions with scalloped borders. Due to their similar features to other odontogenic cysts, imaging alone isn't enough for a definitive diagnosis. OKCs are locally aggressive, capable of penetrating cortical bone, displacing the inferior alveolar nerve, and extending to the base of the skull.[2] Treatments include decompression, marsupialization, enucleation, and bone resection, often in combination. There's no consensus on the best approach, but it's crucial to avoid complications, especially with large cysts.

Decompression is a common conservative method that aims to reduce intracystic pressure through constant drainage, promoting bone growth from the cyst walls. The cyst opening can be maintained using iodoform gauze packing, custom obturators, or drainage systems.[3] The literature delineates a diverse array of decompression devices, with a central component being the drainage tube. This tube facilitates the evacuation of fluid secreted by the cyst lining and secures adjacent anatomical structures, including bone, teeth, or soft tissues. Marker et al.[4] introduced an appliance crafted from polyethylene tubing, which is thermally manipulated and flattened on a glass plate to enhance its retention within soft tissues. Similarly, Swantek et al.[5] designed a device anchored directly to the bone via fixation screws, while alternative approaches incorporate suturing techniques to affix drainage tubes to surrounding soft tissues. Kolokythas et al.[6] proposed an elegant method utilizing a wire ligature to stabilize the drainage tube to neighbouring teeth. In a novel advancement, Castro-Núñez et al.[7] applied negative pressure as a strategic adjunct in the decompression of odontogenic cysts.

Ingenious modifications of common medical devices, such as urethral catheters, intravenous administration sets, nasogastric tubes, Luer syringes, dual nasal trumpet stents, and saline cuffs, have been adapted for use in decompression therapy.[8] Orthodontic brackets also serve as viable anchorage points for securing drainage tubes.[9] Removable appliances, while offering practical advantages—including enhanced hygiene, cystic cavity irrigation, and temporary tooth replacement—present inherent challenges. Their fabrication demands multiple clinical sessions, and conventional workflows necessitate precise impressions of the residual dentition and adjacent soft tissues for laboratory processing.

Interim measures, such as surgical packing to maintain wound patency, can induce significant patient discomfort, particularly during removal, often necessitating local anaesthetic intervention.[10,11] These limitations underscore the imperative for continued innovation in appliance design and fabrication techniques to enhance both patient comfort and therapeutic efficacy.

In light of this background, we conducted a case study within our department utilizing the obturator technique for the management of odontogenic keratocyst (OKC). A 38-year-old male patient presented with a two-week history of localized pain in the lower left quadrant of the mandible (Fig 1). The patient's medical and dental history was otherwise unremarkable. Clinical evaluation revealed normal extraoral and intraoral findings, although localized tenderness was noted upon palpation in the affected region. Preoperative panoramic radiography (orthopantomogram, OPG) showed a large unilocular odontogenic keratocyst (OKC) in the lower left mandible, associated with impacted teeth 43 and 33, as shown in Fig 2. Subsequent Cone Beam Computed Tomography (CBCT) provided further characterization, demonstrating a unilocular, expansile lesion with well-defined corticated borders and scalloping around the roots of teeth 42 and 44, in addition to the impacted teeth. (Fig 3)

Figure1: Intraoral picture

Figure 2: Orthopantomography - large unilocular odontogenic keratocyst (OKC) in the lower left mandible, associated with the impacted teeth 43 and 33

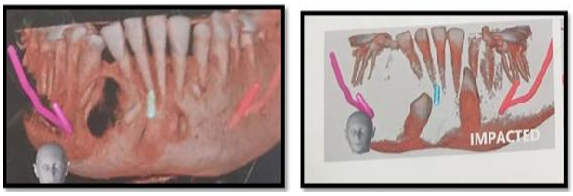

Figure 3: CBCT imaging shows a unilocular, expansile lesion with clear borders. The lesion scallops around the roots of teeth 42 and 44 and is associated with impacted teeth.

The cyst was then surgically excised and allowed to drain with the edges sutured. A conservative therapeutic approach was implemented, involving decompression of the cyst followed by primary closure through suturing (Fig 4). To maintain the patency of the decompression site, a custom-fabricated obturator was designed to facilitate continuous drainage and promote bone regeneration. This obturator, constructed from self-curing acrylic, incorporated retentive elements such as Adams clasps, a labial bow, and a decompression tube to enhance functionality and stability. The appliance was inserted into the patient's oral cavity and positioned appropriately.(Fig 5)

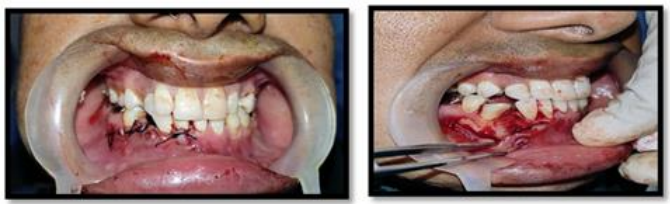

Figure 4: The cyst was surgically removed, decompressed, and the edges were sutured for primary closure.

Figure 5: A custom-made obturator was designed from self-curing acrylic to keep the decompression site open. It included a decompression tube, Adams clasps, and a labial bow for stability and functionality. The appliance was placed in the patient's oral cavity.

One month postoperatively, follow-up evaluation demonstrated significant clinical and radiographic improvement. Radiographic assessments revealed a marked reduction in the size of the cystic lesion and substantial evidence of bone density restoration, indicating effective decompression and progressive resolution of the pathology. (Fig 6) The favourable outcome from this procedure highlights the efficacy of conservative management combined with a well-designed obturator in treating large odontogenic keratocysts. The prognosis remains positive with ongoing follow-up and adherence to postoperative care protocols.

Figure 6: Orthopantomogram One-month post-surgery, follow-up showed significant improvement with a reduced cyst size and increased bone density on radiographs, indicating successful decompression and healing.

The implementation of custom obturators is crucial in the conservative management of odontogenic cysts, especially within the framework of decompression therapy. These devices facilitate continuous drainage, thereby decreasing intracystic pressure and promoting natural bone regeneration. The incorporation of retentive features, such as Adams clasps and labial bows, enhances the stability and functionality of obturators while also enabling effective hygiene maintenance through cavity irrigation. In comparison to traditional methods such as surgical packing, obturators offer improved patient comfort and reduce the frequency of required clinical interventions. Additionally, their customizable nature allows for adaptation to the specific anatomical and clinical requirements of each patient.

Discussion

The management of odontogenic keratocysts (OKCs) continues to advance, emphasizing minimally invasive techniques that preserve vital anatomical structures while promoting natural bone regeneration. Among these approaches, decompression has gained widespread acceptance for its ability to reduce intracystic pressure, facilitate progressive bone healing, and minimize the risks associated with aggressive surgical treatments such as enucleation or resection.[12]

The literature highlights a diverse array of decompression techniques and devices, showcasing the ingenuity in addressing the challenges posed by large OKCs. Custom obturators, as demonstrated in our case, exemplify the efficacy of tailored solutions in achieving therapeutic goals. By integrating retentive features such as Adams clasps, labial bows, and decompression tubes, these devices ensure stability, promote effective cavity drainage, and support hygiene maintenance. The substantial reduction in cyst size and bone density

restoration observed within one month underscores the effectiveness of this approach.

The adaptability of decompression methods is further emphasized in studies such as those by Sevekar et al., [13] which illustrate the application of modified appliances in pediatric patients. Devices like a Hawley's appliance combined with a nasotracheal tube not only facilitate cyst management but also preserve erupting teeth, reduce clinical visits, and enhance patient comfort. These innovations are particularly advantageous for younger patients, where minimizing disruption to dental development is crucial.

For adult populations with extensive lesions, secure and hygienic decompression devices have proven essential. Custom drainage solutions, including fixation-based designs described in elderly patients, mitigate risks of device displacement and enable continuous drainage with regular irrigation. These advancements significantly improve therapeutic outcomes and patient compliance, highlighting the broad applicability of personalized decompression strategies.[2]

Despite these advancements, challenges persist. The fabrication of removable appliances often requires multiple clinical appointments and precise laboratory processes, which can limit accessibility in certain settings. Interim measures, such as surgical packing, may cause discomfort and necessitate additional interventions, emphasizing the need for streamlined, patient-friendly solutions.[14-16]

Future directions in decompression therapy should focus on enhancing patient comfort, reducing fabrication complexity, and ensuring long-term stability. Emerging technologies, such as 3D printing and CAD/CAM workflows, offer promising opportunities for creating precise, custom appliances with fewer clinical visits and improved efficiency.[17] Additionally, standardized protocols and further longitudinal research are necessary to establish the comparative efficacy of various decompression methods across diverse patient demographics.

Conclusion

Conservative management of OKCs through decompression, combined with innovative appliance design, remains a cornerstone of effective treatment. Tailored solutions, such as custom obturators, demonstrate significant clinical and radiographic improvements while ensuring patient comfort and compliance. The integration of advanced technologies and continued research will further refine these approaches, enhancing therapeutic outcomes and optimizing patient care in managing challenging cystic lesions.

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