PROSTHETIC REHABILITATION USING IMPLANTS AFTER ENucleATION OF AN EXTENSIVE MANDIBULAR MULTILOCULAR DENTIGEROUS CYST: A CASE REPORT

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ABSTRACT

Dentigerous cysts are the most common odontogenic developmental cyst being associated to an impacted tooth. They are usually asymptomatic and are discovered on routine radiographic examinations performed in order to identify the absence of tooth on the arch. The purpose of this case report is to present the spontaneous recovery of a bone defect without the need for bone addition material, as a result of enucleation of large mandibular multilocular dentigerous cyst together with the impacted tooth and the subsequent prosthetic rehabilitation of partial edentulism with dental implants. After 6 months after cystectomy, at the radiographic examination (OPG and CT) was noted the disappearance of almost all of the radiolucency and the formation of a sufficient quantity of bone for the insertion of the implants. They had good primary stability. By loading the implants and the fixed partial denture, functional, physiognomic and psychological needs of the patient have been fulfilled successfully, not being detected the cyst recurrence. Prosthetic rehabilitation with dental implants was the best solution in order to replace the missing teeth in case of an adequate bone regeneration.

Keywords: dentigerous multilocular cyst, mandible, inclusion, enucleation, dental implants

INTRODUCTION

Dentigerous cysts are the most common developmental odontogenic cyst being associated with the crown of an impacted tooth, located in the thickness of the jaws [1].

The exact etiology of the dentigerous cyst is unknown, several theories have been proposed to explain its development. It is stated that dentigerous cyst develops around the crown of an unerupted tooth by accumulation of fluid either between the reduced enamel epithelium and enamel or between the layers of the enamel organ. This accumulation of fluid occurs as a result of the pressure of the erupting tooth on a included follicle which prevents venous flow, and thus induces rapid transudation of serum across the capillary wall [2,3].

Toller [4] stated that at the probable origin of the dentigerous cyst is the proliferative cell destruction of the follicle after impeded eruption. These degradation products have as a result an increased osmotic pressure, and therefore, the formation of cysts.
Another theory suggests that dentigerous cyst may be caused by inflammation of periapical tissue due to infection caused by temporary predecessor tooth that could reach the germ of permanent tooth, thereby generating fluid accumulation [5].

It occurs most frequently in the mandibular angle at the level of the impacted third molars, but can be located also at the level of impacted upper canine, and also in any unerupted tooth (premolar, upper molar, etc.). Often affects children, adolescents, more frequently male, but can occur at any age, the highest incidence being in 2nd and 3rd decade of life.

Dentigerous cysts are usually asymptomatic and are discovered on routine radiographic examinations performed to identify the absence of tooth in the arch. The cyst appears as a radiolucent area usually unilocular with radiopaque borders which surrounds the unerupted tooth, but the large lesions are multiloculated [6].

In evolution, the cyst grows in size and can exceed several centimeters in diameter, and in rare cases may erode the cortical bone.

Dentigerous cysts are not associated with occurrence of nerve disorders, which are caused by malignant disease, direct or indirect damage to neurovascular bundle, other systemic or neurological diseases [7]. Inferior alveolar nerve can sometimes be affected by periapical pathology and the mandibular cysts [8].

Surgical removal is usually recommended because the dentigerous cyst prevents tooth eruption, can increase in size, moves the teeth and causes mobility [9], causes resorption of tooth roots in the neighbourhood, bone deformation, bone damage, affects adjacent vital anatomic structures, may comprise or move the inferior alveolar nerve, causes inferior alveolar nerve paresthesia [10], can lead to pathologic fractures [11,12]. Other complications associated with dentigerous cyst include malignant transformation, the development of squamous cell carcinoma, mucoepidermoid carcinoma, or ameloblastoma [13]. In the case of large cysts, it may be necessary the extraction of multiple teeth, which can have aesthetic, functional and psychological consequences for the patient.

Dentigerous cysts are usually removed through intraoral approach, in order to avoid external scars and damage of the facial nerve branches. In extremely rare cases the extraoral approach is used because has the advantage of a better surgical access. It is used in impacted transmigrant teeth towards the inferior border of mandible, but presents an increased risk of neurological complications, postoperative fractures of the mandible [14].

The purpose of this case report is to present the spontaneous recovery of a bone defect without the need for bone addition material, due to enucleation of a huge multilocular dentigerous cyst that circumferentially surrounds the mandibular left permanent canine and subsequent prosthetic rehabilitation of edentation by using dental implants. Original features of this case are the great extension of the lesion, the obtaining of a sufficient spontaneous bone regeneration without the use of bone graft material, the absence of nerve damage following surgery for complete removal of the cyst.

CASE REPORT

The male patient aged 53 years, came to Private Dental Office „Dr. Anca Rusu” Bucharest accusing neuromuscular, masticatory, phonation disorders, changes in position of the mandible, vertical dimension and profile as a result of lateral maxillary and mandibular edentations.

The patient did not present dental or craniofacial abnormalities, skin or skeletal
Dysmorphology. At intraoral clinical examination it has been observed the absence of the left mandibular canine in the respective arcade and the space was closed by the migration of neighbouring teeth (fig.1). Surrounding mucosa was intact and normal in color. Extraoral examination did not reveal the presence of an evident facial asymmetry, a swelling or a sensitivity related to the absence of canine, lymph nodes were not palpable.

An orthopantomography was performed to detect the absence of the canine in the hemiarch and the possibility of being impacted. On the orthopantomography has been observed the impacted mandibular canine and a large well-defined area of radiolucency with radiopaque contour that surrounds circumferentially the impacted tooth. Multilocular appearance was due to remaining bone trabeculae superimposed on radiolucency of cyst (fig. 2). It was observed a thinning of the mandibular basal cortex and the roots of the involved teeth were not resorbed.

As the lesion was large, it was necessary a CT examination in order to assess bucco-lingual extension, buccal and lingual bone integrity, to highlight relations with neighboring anatomical structures (mental nerve and mandibular canal) (fig.3,4,5).

**Figure 1. Initial clinical appearance of the patient**

**Figure 2. Preoperative orthopantomography which presents an extensive mandibular dentigerous cyst, multilocular in appearance associated to an impacted canine**

**Figures 3, 4. CT images that show a radiolucent lesion surrounding the impacted mandibular canine**
Large cysts can affect nearby nerves (inferior alveolar and mental nerves) causing paresthesia of the lower lip. Nerve function was assessed using a cotton thread to determine the sensitivity of the lip and a 27-gauge needle to test the perceived pain. No alteration of sensitivity was observed at this level.

Clinical and radiological diagnosis was unilateral multilocular dentigerous cyst.

For a more accurate diagnosis a biopsy was performed under local anaesthesia using a 18-gauge needle and an amount of colored fluid was aspirated from the lesion, which suggested that the lesion is cystic. Biopsy was useful for the diagnosis in order to distinguishing neoplastic from non neoplastic lesions, having a low risk of complications.

It was decided entirely enucleation of the cyst with intraoral approach and extraction of impacted tooth, because there was no eruption possibility of impacted tooth due to its position and the patient's age. Patient received detailed explanations of surgical procedures that will be performed, possible complications and informed consent was obtained from him.

Systemic antibiotic prophylaxis was performed before the beginning of the procedure. The surgical intervention began and was performed under local anaesthesia in Spix's spine and mental nerve. The irrecoverable premolars (34 and 35) that presented periodontal lesions and vertical bone lysis, the first premolar also having a horizontal root fracture were extracted due to the proximity to the cyst (fig. 6).

After extraction the initial horizontal incision was made (fig. 7). It was then performed the envelope flap and its detachment to create access to the lesion and for partial exposure of the impacted tooth crown (fig. 8).

It was decided the extraction of canine through fragmentation technique for reduction of postoperative neuro-sensory deficit and other complications (fig. 9).
The canine was cut with a bur mounted in the turbine and decoronation was performed, and then the two fragments were extracted separately. The luxation was made with an elevator first of coronal, then of the radicular fragment (fig.10, 11).

The cyst was enucleated totally and a fragment was sent to histopathological examination for definitive diagnosis confirmation of dentigerous cyst.

The bone defect (fig. 12) was covered with a bioresorbable collagen membrane Bio-Gide.
It was then reapplied to the bone bed the envelope mucoperiosteal flap and the suture was performed with resorbable threads (fig. 13). Healing went without special events. Despite the large size of dentigerous multilocular cyst there were no complications such as pathologic fractures and permanent bone defects.

At 6 months after cystectomy, on radiographic exam (OPG and CT) was observed the disappearance almost completely of radiolucency and the formation of sufficient bone to allow the insertion of implants for the prosthetic rehabilitation.

After local anaesthesia and antibiotic prophilaxis, the surgical intervention began by exposing the crestal bone where the implants will be inserted through incisions from the level of canine to second molar with the detachment of mucoperiosteal flap for viewing of interventional field. Three Sky Fast classic cylindro-conical titanium implants from Bredent were inserted to replace the mandibular canine, first premolar and second molar. There was no need for bone augmentation, as it was formed a sufficient amount of new bone. The superstructure has been mounted on the implant by screwing. It was then reapplied to the bone bed the mucoperiosteal flap and the suture was performed with resorbable threads. Immediate after the surgery panoramic radiographs of control were made. All three titanium implants were placed so that the newly formed bone to develop around them and stabilize them.

After a healing period of 6 months, the osseointegration of implants was assessed by radiographic examination, also was evaluated the presence of signs of infection or pathological processes around them for the application of definitive prosthetic bridge. Peri-implant tissues were favorable, both clinically and radiographically, bone regeneration at lingual and buccal level has been satisfactory, ensuring stability of implants (fig.14).
The implants were further used as a basis for fixed partial denture made from zirconia. By uploading of implants and fixed partial denture, functional, physiognomic and psychological requirements of the patient have been fulfilled successfully (fig.15).

Patient prognosis was excellent as the osseointegration of implants was successful and dentigerous cyst recurrence was not detected on control panoramic radiographs (fig.16).

**DISCUSSION**

Dentigerous cyst is the most common type of developmental non-inflammatory odontogenic cyst and the most common cause of occurrence of an area of radiolucency associated with an impacted tooth [15,16].

They are usually derived from the epithelial remnants of the formation organs of the tooth. Dentigerous cysts are defined as cystic lesions which are caused by separation of the follicles around the crown of an impacted tooth. They are caused by accumulation of fluid between the reduced enamel epithelium and the crown surface of impacted tooth.

Most cysts dentigerous are solitary and unilateral. Bilateral and multiple cysts are discovered, usually in association with cleidocranial dysplasia or Maroteaux-Lamy syndrome [17]. The majority of case reports of dentigerous cysts which are found in the surgical specialized literature are located in the mandible and only a few cases in maxilla.

Dentigerous asymptomatic cyst may reach very large sizes without involving, usually, the mandibular canal, later it can be easily separated from the surrounding tissues and removed [18].

From the radiological point of view there are several types of cyst: central, the radiolucency surrounds the crown of the impacted tooth, lateral, the cyst develops along the root of the tooth and surrounds in part the crown of impacted tooth, circumferential, when the cyst completely surrounds the unerupted tooth which can be seen within the cyst cavity [19].

Histological examination of the cyst lining...
is essential to differentiate this relatively benign lesion from a more aggressive lesion, such as an ameloblastoma or odontogenic keratocth, central mucoepidermoid carcinoma that require an aggressive resection to prevent relapses [20].

Dentigerous cysts should be surgically removed because of the potential sequelae. Cyst removal surgical treatment includes: decompression, marsupialization or enucleation by intraoral or extraoral approach. The advantage of enucleation of the dentigerous cyst is an operation in one step, which has a lower recurrence rate and short cure time, with or without bone grafting techniques [21].

Several studies from the literature have reported bone healing after enucleation and simple closure of the cyst without the use of bone grafts, even in cases of very large lesions [22,23].

Studies conducted by Chiapasco et al. [24] demonstrated the spontaneous healing of bone with the filling of the residual cavity after enucleation of large mandibular cysts. They concluded that spontaneous bone regeneration occurs in case of large mandibular cysts without the use of bone addition material, thus the surgical procedure being simplified.

Cakarer et al. [25] reported that regeneration of large bone defect caused by a dentigerous cyst before implant placement is achieved without resorting to bone grafting procedures.

The case presented in this article is in accordance with similar cases from specialized literature and presents the spontaneous bone regeneration of a large multilocular dentigerous cyst after total enucleation, without additional autogenous or alloplastic bone graft material, followed by prosthetic rehabilitation of partial edentulism with prosthetic physognomic zirconium bridge attached to the implants. Although there are developing new techniques and materials of bone regeneration, in the case of large dentigerous cysts, conventional surgery with intraoral approach still remains valid and effective.

CONCLUSIONS

Prosthetic rehabilitation with dental implants was the best solution to replace missing teeth in the case of proper bone regeneration. In the case presented in this article, the prosthetic denture fixed on implants functions without problems for almost 1 year without clinical or radiological signs.

REFERENCES