

Development of Nasopalatine Duct Cyst in Relation to Dental Implant Placement

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Abstract

Background: Dental implantation is considered as one of the most widely employed procedures in dental practice. Nasopalatine duct cyst (NPDC) is one of the most common developmental cysts in the oral cavity that develops from the proliferation of embryological epithelial remnants of nasopalatine duct. **Aim:** The aim of this study was to highlight the development of NPDC after the placement of dental implants. **Materials and Methods:** A literature search was carried out in March 2015 using PubMed, EMBASE, and Cochrane library databases, searching for articles relating the development of NPDC after placement of dental implants. **Results:** Our search identified only four case reports of NPDC related to dental implants as reported in the literature published in English. **Conclusion:** Placement of dental implants can induce development of NPDCs, indicating that placement of dental implants requires well-trained specialists with perfect skills in dental implantology. Additionally, critical selection of appropriate cases is of great importance in order to avoid the development of such complications.

Keywords: Dental implant, nasopalatine duct cyst (NPDC), nonodontogenic cyst

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Introduction

Dental implantation is considered as one of the most widely employed procedures in dental practice. Even though biocompatible osseointegrated dental materials are used for fabrication of dental implant, some complications correlated with dental implants may occur.^[1] Moreover, placement of dental implants in the maxilla may be complicated by certain anatomical landmarks such as the nasopalatine duct, maxillary sinus, and nasal cavity.^[2] This may jeopardize the surgical osteotomy preparation.^[3,4]

Nasopalatine duct cyst (NPDC) is an intraosseous developmental nonodontogenic cyst in the midline

of the anterior palate. It is one of the most common developmental cysts in the oral cavity.^[5] It develops from the proliferation of embryological epithelial remnants of nasopalatine duct.^[6] It represents about 1% of the maxillary cysts.^[5,7] The etiology of NPDC is unknown, but the possible causes may include local trauma, infection, and spontaneous proliferation.^[8] The cone beam computerized tomography (CBCT) with its potential for 3D CT-based surgical planning and measurement helps in the evaluation of the nasopalatine canal dimensions before any surgical procedures in this region.^[9] It has been reported that CBCT is superior to the conventional CT in that it reduces the size of the

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irradiated area of the patient and it has higher image accuracy.^[10]

The aim of this study was to highlight the development of NPDC after the placement of dental implants.

Materials and Methods

A literature search was carried out in March 2015 using MEDLINE, accessed via the National Library of Medicine PubMed Interface, EMBASE, and Cochrane library databases, searching for articles, published in English, relating the development of NPDC after the placement of dental implants. We used a combination of the following keywords: Nasopalatine duct cyst, nonodontogenic cyst, developmental cyst, and dental implants. The search was limited to articles published during the past 20 years. We also used the “related article feature” of PubMed to identify further references of interest within the primary search. These references were obtained, and their bibliographies and pertinent secondary references were also identified and acquired. This process was repeated until no further new articles could be identified. The abstracted literature was reviewed.

Inclusion criteria

All evaluated studies should involve the occurrence of NPDC in relation to the dental implant placement.

Exclusion criteria

All studies that do not support the occurrence of NPDC after the placement of dental implants should be excluded.

Results

Only four articles were identified related to the occurrence of NPDC after the placement of dental implants in the literature published in English. All of these articles were case reports [Table 1]. Table 1 demonstrates some details about each case that included preoperative radiographs, preoperative condition of the site of implant placement, type of the implant used (either immediate or delayed), the period from placement of implant till discovery of the lesion, cyst treatment, and the postoperative clinical outcomes.

Discussion

NPDC is more common in males than in females (3:1).^[11-13] Although the etiology of NPDC is not clear as per yet, it may result from spontaneous proliferation of embryonic tissues remnants. Also, it has been attributed

Table 1: Characteristics of the included studies

Article authors	Type of perioperative radiograph	Preoperative condition	Type of placed implant	Time elapsed between implant placement and cyst discovery	Management procedure	Clinical outcomes
McCrea, S.J. (2014)	Not mentioned	Not mentioned	Not mentioned	3 years	Cyst enucleation followed by symphyseal graft and bone xenograft, covered with membrane. With preservation of the implant	After 6, 12, and 24 months there was satisfactory healing and stability of the implant and adjacent tooth
Takeshita, <i>et al.</i> (2013)	Panoramic view	Limited inflammation to gingival tissue, with no involvement of periapical region	Immediate implant	2.5 years	Cyst enucleation with resection of the apical part of the implant involved in it	After 28 months, no peri-implantitis, no mobility, with increased radio-opacity in original cyst area
Casado, <i>et al.</i> (2008)	Panoramic view	Root resorption of maxillary central incisor with periapical lesion	Immediate implant	3 years	Cyst enucleation with preservation of the implant, the defect was covered with organic bovine matrix graft	Not mentioned
Sivolella, <i>et al.</i> (2013)	Panoramic view	No sign of inflammation with absence of any radiographic changes. The teeth in this area were extracted 4 years before implant placement for periodontal problem	The implants were placed 4 years after the teeth extraction (delayed implant)	5 years	Cyst enucleation with preservation of the implant, the defect was covered with bone substitute and collagen membrane	One month later, bone dehiscence and loss of one of two implants occurred. The other implant was stable with good condition and stability. No signs of recurrence 2 years later

to some factors including local trauma, poorly fitting dentures, and local infection.^[12,14] NPDC is usually asymptomatic and it appears radiographically as a heart-shaped radiolucency due to the superimposition of the nasal spine and the resistance of the adjacent roots.

As a treatment protocol, marsupialization alone may be sufficient in small lesions, but in case of large lesions marsupialization should be followed by cystectomy and autogenous bone grafting.^[12]

To our knowledge, this is the first review reporting NPDC cases after the placement of dental implants. McCrea^[15] reported a case of NPDC in a close proximity to a dental implant. No any pathological conditions were detected in the medical history of the patient. The author clarified that the implant presented a formally successful osseointegration. The bone on the implant surface was not lost due to infection, but as a by-product of the expansive nature of the NPDC in that area. The author proposed that with the removal of this expansive force induced by the NPDC, the bone-implant contact could be restored, though he did not explain clearly the possible relation between the formation of NPDC in reference to the placement of dental implant.

Takeshita *et al.*^[2] reported a case of a 45-year-old male patient, who received an implant in the maxillary left central incisor due to root fracture. Unfortunately, an asymptomatic oval-shaped radiolucency surrounding the apical area of the implant was revealed, even though there was no special finding in the physical condition of the patient. This radiolucency was diagnosed later as the NPDC. The authors suggested that the nasopalatine duct was traumatized or at least part of the canal was anteriorly positioned during the osteotomy procedures for dental implant. They postulated that the previously mentioned trauma stimulated the development of the NPDC as indicated by Brode and Araiche.^[16]

Casado *et al.*^[17] reported a case of NPDC formation following the placement of an immediate dental implant. The immediate implant was placed after extraction of a tooth in an alveolus contaminated by prior endodontic infection, following careful curettage and debridement. They suggested that the placement of dental implant in the area with a preexisting infection could have facilitated the secondary bone infection.

Sivolella *et al.*^[18] reported a case of NPDC that occurred following the placement of two dental implants positioned 4 years after the teeth extraction without any previous local endodontic pathology or radiolucency. They concluded that the occurrence of NPDC maybe correlated with implant surgery, because surgery is considered a possible irritant cause.

Conclusion

From the literature, the development of NPDC following the placement of dental implant maybe related to some factors, such as local trauma during surgical procedures, which may traumatize the nasopalatine duct and the presence of infection at the time of implantation.

Therefore, critical selection of appropriate cases as well as the use of CBCT views to visualize the exact position of the nasopalatine duct is of great importance in order to avoid the development of such complications. Furthermore, the use of tapered implants in this region may be beneficial.^[19]

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Conflicts of interest

The authors declare that there is no conflict of interests regarding the publication of this paper.

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