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Reconstruction of Pathology Induced Anterior Maxillary Defect: A Case Report

Amina Nouri¹, Jean-Paul Rabbath², Abbasali Khademi³, Amirsalar Khandan³, Pedram Iranmanesh³, Mina D. Fahmy⁴

¹University of Kentucky College of Dentistry, Lexington, KY, USA ²Tilton Family Dental, Tilton, NH, USA ³Department of Endodontics, Dental Research Center, Dental Research Institute, School of Dentistry, Isfahan University of Medical Sciences, Isfahan, Iran ⁴New Hampshire Oral and Maxillofacial Surgery, Pembroke, NH, USA

Corresponding Author: mfahmy@nhoms.com

(Received: 10/06/2024		Revised: 10/07/2024	Accepted: 11/09/2024)
KEYWORDS			
Nasopalatine duct cyst Maxillary defect Reconstruction Nutrition	ABSTRACT A cyst is defined as a pathologic cavity lined by epithelium. Nasopalatine duct cysts (NPDC) of non-odontogenic origin arising from epithelial remnants from two embryonic nasopala ducts. These cysts may form anywhere along the ducts' course, which runs from posterior pa midline to the soft tissue palatine papilla also known as the incisive papilla. NPDC often dev between the 4th and 5th decades of life with men being affected more than women (2:1 ra They are typically asymptomatic but present with palatal swelling in the anterior maxillary reg		elium. Nasopalatine duct cysts (NPDC) are mnants from two embryonic nasopalatine ' course, which runs from posterior palatal s the incisive papilla. NPDC often develop ing affected more than women (2:1 ratio). al swelling in the anterior maxillary region.
	Larger cysts may create a la compressible due to resorpt demarcated round or pear displacement or divergence of in size which differentiates periapical granuloma or ra radiolucency and expansion to enucleation and curettage with	bial expansion in addition tion of bone beneath the re- shaped radiolucency sup of roots may be observed. The it from the incisive can adicular cyst from nonv represents a NPDC until pr th low recurrence rates.	to a midpalate expansion which is usually mucosa. Radiography often shows a well perimposed on the incisive canal, tooth This pathology is usually greater than 6mm al. Differential diagnoses often include a ital central incisors, however a palatal oven otherwise. Typical treatment includes

1. Case Report

A 42-year-old Caucasian male was referred to the oral and maxillofacial surgery clinic in 2023 for chief complaint of partial anterior maxillary edentulism, poor aesthetics and difficulty with mastication. This patient presented with a medical history significant for hypertension, asthma, fibromyalgia and anxiety. Of note, the patient was prescribed marijuana, gabapentin, trazodone, alprazolam and was a current one pack per day cigarette smoker. In 2020, following symptoms of pressure and paraesthesia at the region of his anterior maxilla the patient was seen at an outside hospital facility. Preoperative imaging was

acquired which showed a large radiolucent lesion at the midline anterior maxillary region (Fig 1). Biopsy was recommended and the result was a nasopalatine duct cyst (NPDC). The lesion was removed in its entirety along with teeth #9 and 10 (Fig 2). The remaining defect was large and visually unaesthetic (Fig 3). Clinically, his smile line was relatively low and near the cementoenamel junction. The patient noted that he was declined treatment by a number of providers due to difficulty of the case as well as suspected difficulty in achieving a pleasing postoperative result. The patient's goals included obtaining an aesthetic smile, and restoring function to premorbid state by means of a fixed prosthesis to aid in the ability to masticate and optimize his nutrition. He noted that due to social anxiety and embarrassment of having missing anterior maxillary teeth he did not eat as often as he used to which ultimately affected his nutritional status and he noticed significant weight loss and decreased BMI. The treatment plan included extraction of debilitated teeth #7, 8, 11, 12, 13 followed by immediate implants at sites #7, 8, and 11. Pontics were to be placed at sites #9 and 10 with cantilevers at sites #11 to replace teeth #12 and 13



Fig 1. Preoperative orthopantomogram



Fig 2. Orthopantomogram following lesion and teeth removal



Fig 3A & 3B. Clinical photos following lesion and teeth removal illustrating large anterior maxillary bone defect



Fig 4. CBCT reconstruction of large bony defect following lesion and teeth removal

On the day of surgery, the patient was placed in supine position and draped in sterile fashion. After an appropriate level of sedation was achieved, local anaesthesia was administered intraorally at the appropriate sites. Surgical extraction of teeth #7, 8, 11, 12, 13 was completed and Zimmer/Biomet 3i titanium implants were placed at sites #7, 8, and 11 (Fig 5 A, B & C) followed by closure of the

gingiva with 3-0 chromic gut suture. The patient tolerated the procedure well and was placed on postoperative amoxicillin for 7 days, chlorhexidine mouth rinse for 7 days and pain medication for use as needed to manage discomfort. No intraoperative or postoperative complications were noted and the patient had an uneventful recovery.



Fig. 5 A Post-op surgery placement of Zimmer Implants sites 7, 8 & 11.



Fig. 5 B- Digital scan illustrating removal of teeth and placement of titanium implants



Fig 5 C. Orthopantomogram illustrating removal of teeth and placement of titanium implants

These implants were to remain unloaded for 4 months until osseointegration occurred. At the 4 month postoperative appointment these implants at the abutment level were torque tested at 20Ncm and were stable without any pain, discomfort, purulence or exudate thus indicating osseointegration. The zirconia prosthesis was then delivered (Fig 6).



Fig 6. Clinical photos post-surgery and delivery of final prosthesis

2. Discussion

Nasopalatine duct cysts (NPDCs) are arguably the most common non-odontogenic cysts affecting the maxilla [1]. NPDCs commonly present in patients within the age range of their fourth to sixth decades, exhibiting a predilection towards males [2]. While their clinical manifestations and treatment modalities have been extensively studied, understanding the impact of nasopalatine duct cysts (NPDCs) on patients' self-confidence, nutrition, and quality of life is crucial to providing comprehensive care to affected individuals. This discussion explores the psychological and nutritional consequences of NPDCs. It is imperative to diagnose NPDCs early to avoid further growth of the lesion and the loss of hard and soft tissues of

the associated region. Most **NPDCs** present asymptomatically [3] resulting in a delayed diagnosis. Utilizing appropriate modalities such as histopathology and cone beam computed tomography (CBCT) is helpful in accurately diagnosing NPDCs [4]. The most widely accepted treatment of NPDCs is enucleation [5], in which the cyst must be completely removed to limit recurrence. Frequently, NPDCs are misidentified, resulting in inappropriate interventions including but not limited to endodontic therapy [6], which not only leads to unnecessary interventions for patients but also squanders their time and financial resources. Furthermore, delayed diagnosis and treatment of NPDCs can prolong the psychological burden on affected individuals. Early diagnosis and appropriate treatment can significantly improve patients' quality of life and surgery outcomes.

NPDCs have negative consequences on patients' selfconfidence due to changes in appearance as well as speech disturbances. An individual's smile is recognized as one of the most unique facial attributes noticed by others [7] thus, the anterior positioning of NPDCs amplifies their visibility, drawing more attention to the area. These cystic lesions vary in extent, in some cases, they may cause obvious visual changes that lead to labial or palatal swelling [8]. The destructive nature of NPDCs often lead to loss of alveolar bone and mobility of teeth [9] leading to speech difficulty. Consequences of these alterations cause social isolation and impact interpersonal relationships, can negatively adversely impacting emotional well-being [10]. Individuals with suboptimal oral aesthetics experience diminished selfesteem, as exemplified by the patient in this case report who endured such profound distress that he refrained from smiling altogether. The oral and maxillofacial region is the primary entry point for food ingestion into the body. Conditions affecting this region or necessitating surgical intervention within can lead to compromised food intake. The extent and duration of this impairment are contingent upon the nature of the underlying pathology [11]. NPDCs have the potential to impede individuals' nutritional intake both pre- and post-operatively and lead to a decline in their structures involved in mastication, leading to suboptimal healing. Wound healing requires additional energy expenditure, therefore adequate nutrition is necessary for wound healing post-operatively [12]. Consequences of dietary restrictions and inadequate nutrient intake can possibly hinder patients' wound healing ability and overall well-being [13]. Suboptimal nutritional status significantly contributes to the onset of postoperative complications and has the potential to elevate patient morbidity rates [14]. These complications must be taken into consideration while managing patients with defects of the oral and maxillofacial region. NPDC excision defects can compromise patients' ability to maintain a balanced diet and adequate calorie intake, consequently, leading to nutritional deficiencies and weight loss. In this case study, the NPDC led to significant loss of hard and soft tissues post-operatively, causing a large maxillary defect. The loss of teeth correlates with diminished dietary quality and a decreased intake of various essential nutrients [15]. In this case, extraction of multiple teeth resulted in diminished food consumption and subsequent weight loss, a predictable outcome given the circumstances. Cases of partial edentulism can range from simple to complex. Many clinical scenarios are suitably treated with cantilevered implant-supported cemented fixed restorations [16]. In this particular case, poor quality bone due to the presence of NPDC and aesthetic considerations dictated implant placement as described in the case study. Therefore, prosthetic design with a cantilever fixed partial denture can fulfill the treatment objectives while minimizing alignment challenges. Due to the importance of minimizing functional loading on the distal of the cantilevered pontic [17], an occlusal rest and a wrap around on the buccal and lingual surfaces were configured on tooth #14.

overall health by compromising the normal anatomical

3. Conclusions

Defects caused by NPDCs can adversely impact patients' self-esteem, nutrition, and quality of life. Early detection, proper management, and consideration of psychological and nutritional needs is crucial when managing patients

with NPDCs. Post-operative follow-up is necessary to ensure appropriate healing, and evaluation of the patient. Literature has been unclear about long-term success when cantilever prostheses have been supported by dental implants. However, the use of implants to support cantilevered fixed partial dentures has been successful in selected clinical situations.

Availability of data and materials

The datasets supporting the conclusions of this study are included within the article.

Competing Interests Statement

The authors have declared that no competing interests exist.

6. References

[1] Cecchetti, F., Ottria, L., Bartuli, F., Bramanti, N. E., & Arcuri, C. (2012). Prevalence, distribution, and differential diagnosis of nasopalatine duct cysts. *ORAL & implantology*, 5(2-3), 47–53. <u>https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3505099/</u>

[2] Swanson, K. S., Kaugars, G. E., & Gunsolley, J. C. (1991). Nasopalatine duct cyst: an analysis of 334 cases. *Journal of oral and maxillofacial surgery : official journal of the American Association of Oral and Maxillofacial Surgeons*, 49(3), 268–271. https://doi.org/10.1016/0278-2391(91)90217-a

[3] Elliott, K. A., Franzese, C. B., & Pitman, K. T. (2004). Diagnosis and surgical management of nasopalatine duct cysts. *The Laryngoscope*, *114*(8), 1336–1340. https://doi.org/10.1097/00005537-200408000-00004

[4] Sane, V. D., Gadre, K. S., Halli, R., Singh, V., Doshi, P., Saddiwal, R., & Thopte, S. (2014). Role of cone-beam computed tomography in diagnosis and management of nasopalatine duct cyst. *The Journal of craniofacial surgery*, 25(1), e92–e94. https://doi.org/10.1097/SCS.000000000000427

[5] Fujioka-Kobayashi, M., Miyasaka, N., Miyasaka, A., Koyanagi, M., Inada, R., Miyasaka, T., & Satomi, T. (2023). A Custom-Made Surgical Guide for Accurate Enucleation of Nasopalatine Duct Cysts: A Technical Note and Case Report. *Case reports in dentistry*, 2023, 9246701. https://doi.org/10.1155/2023/9246701

[6] Dedhia, P., Dedhia, S., Dhokar, A., & Desai, A. (2013). Nasopalatine duct cyst. *Case reports in dentistry*, 2013, 869516. https://doi.org/10.1155/2013/869516

[7] Stojilković, M., Gušić, I., Berić, J., Prodanović, D., Pecikozić, N., Veljović, T., Mirnić, J., & Đurić, M. (2024). Evaluating the influence of dental aesthetics on psychosocial well-being and self-esteem among students of the University of Novi Sad, Serbia: a cross-sectional study. *BMC oral health*, 24(1), 277. https://doi.org/10.1186/s12903-024-04002-5

[8] Tanaka, S., Iida, S., Murakami, S., Kishino, M., Yamada, C., & Okura, M. (2008). Extensive nasopalatine duct cyst causing nasolabial protrusion. *Oral surgery, oral medicine, oral pathology, oral radiology, and endodontics, 106*(4), e46–e50. https://doi.org/10.1016/j.tripleo.2008.05.046

[9] Perumal C. J. (2013). An unusually large destructive nasopalatine duct cyst: a case report. *Journal of maxillofacial and oral surgery*, *12*(1), 100–104. https://doi.org/10.1007/s12663-011-0201-5

[10] Kaur, P., Singh, S., Mathur, A., Makkar, D. K., Aggarwal, V. P., Batra, M., Sharma, A., & Goyal, N. (2017). Impact of Dental Disorders and its Influence on Self Esteem Levels among Adolescents. *Journal of clinical and diagnostic research : JCDR*, *11*(4), ZC05–ZC08. https://doi.org/10.7860/JCDR/2017/23362.9515

[11] Badwal, R. S., & Bennett, J. (2003). Nutritional considerations in the surgical patient. *Dental clinics of North America*, 47(2), 373–393. <u>https://doi.org/10.1016/s0011-8532(02)00110-6</u>

[12] Falender, L. G., Leban, S. G., & Williams, F. A. (1987). Postoperative nutritional support in oral and maxillofacial surgery. *Journal of oral and maxillofacial surgery : official journal of the American Association of Oral and Maxillofacial Surgeons*, 45(4), 324–330. https://doi.org/10.1016/0278-2391(87)90353-3

[13] Giridhar VU. Role of nutrition in oral and maxillofacial surgery patients. Natl J Maxillofac Surg. 2016 Jan-Jun;7(1):3-9. doi: 10.4103/0975-5950.196146.

[14] Jain, S., Jain, A., Palekar, U., Shigli, K., Pillai, A., & Pathak, A. D. (2014). Nutritional considerations for patients undergoing maxillofacial surgery – A literature review. *Indian Journal of Dentistry*, *5*, 52–55. <u>https://doi.org/10.1016/j.ijd.2013.07.014</u>

[15] Zhu, Y., & Hollis, J. H. (2014). Tooth loss and its association with dietary intake and diet quality in American adults. *Journal of dentistry*, 42(11), 1428–1435. https://doi.org/10.1016/j.jdent.2014.08.012

[16] Brar, A., Mattoo, K., Jain, P. (2014). Designing Cantilever Prosthesis: A Case Study. *Research & Reviews: A Journal of Dentistry*, (5) 3, 2230-8008.

[17] Himmel, R., Pilo R., Assif, D., Aviv, I. (1992). The cantilever fixed partial denture-a literature review. *J Prosthet Dent*. 67(4):484-487. https://doi.org/10.1016/0022-3913(92)90077-N

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