Annals of Stomatology

BPI

Case Report

HYALURONIC ACID ENRICHED WITH AMINOACID USED TO FILL BONE DEFECT AFTER CYST NASOPALATINE ENUCLEATION: A CASE REPORT

P. Scarano[1], S.R. Tari[1], F. Di Nardo Di Maio[2], M. Di Carmine[1], F.S. Al-Hamed[3] and A. Scarano[1,4*]

[1]Department of Innovative Technologies in Medicine & Dentistry, University of Chieti-Pescara, Italy;
[2]Private practice in Pineto, Italy;
[3]College of Dental Medicine, QU Health, Qatar University, Doha, Qatar;
[4]Department of Oral Implantology, Dental Research Division, College Ingà, UNINGÁ, Cachoeiro de Itapemirim, Espirito Santo, Brazil

**Correspondence to:*
Antonio Scarano, D.D.S., M.D.,
Department of Innovative Technologies in Medicine & Dentistry,
University of Chieti-Pescara,
Via Dei Vestini 31,
66100 Chieti Italy
e-mail. ascarano@unich.it

ABSTRACT

In this study we aim to evaluate the hyaluronic acid enriched with aminoacid used for fill bone defect after cyst enucleation. A 56-year-old man was referred by the dentist to the Department of Oral Surgery, University of Chieti-Pescara, concerning a nasopalatine duct cyst. Hyaluronic acid was placed for better healing. The flap was sutured with interrupted suturing with 3-0. The cist material was sent for histopathological examination. Microscopical examination revealed a cystic cavity covered by pseudostratified epithelium. The clinical, radiologic and histopathological aspect were suggestive of infected nasopalatine duct cyst. No adverse reactions were recorded, and the post-operative course was characterized by the absence of pain. Clinical and radiographic controls were performed at 2 and 4 months by digital dental X-ray after cystic enucleation surgery. The X-ray showed increased bone mineralization. Within the limits of the present investigation, this case report mainly summarized the potential mechanism of HA in promoting bone regeneration and the application prospects of hyaluronic acid-based in bone regeneration.

KEYWORDS: *hyaluronic acid, cyst, nasopalatine duct, bone healing, bone graft, biomaterials*

Received: 23 February 2023
Accepted: 03 April 2023

INTRODUCTION

Cystic lesions are very frequent in the oral and maxillo-facial area (1, 2). Nasopalatine duct cyst (NPDC), also known as incisive canal cysts, is the commonest developmental cysts in the jaws (3). The aetiology is not certain probably mechanical trauma or bacterial infection, and it could stimulate proliferation residual epithelial tissue in the nasopalatine duct. Genetic factors sometimes play a role (4). Secondary cysts are formed by mucus secretion from the retained epithelial cells. Males are affected 18–20 times more often than females. NPDC is suggested when the aspirate is clear and straw coloured (3, 4). The differential diagnosis must be made with lateral radicular cyst and cystic ameloblastoma (5). If the nasopalatine duct appears to be greater than 7 mm in dm, the presence of a cyst should be suspected. Cyst enucleation and local curettage is a general treatment for nasopalatine cysts (6).

Usually, the cysts remain asymptomatic and notable common symptom is a recurrent swelling, in the palatal aspect between the central incisors, at times the cyst may extend labiopalatally and fluctuation will be positive (7). The nasopalatine duct cyst is seen as a well-defined cystic outline, between or above the apices of the maxillary first incisor teeth (8). Kay et al. (1972) reported that any radiograph , which showed radiolucency less than 6 mm wide may be considered within normal limits as an incisive canal fossa in the absence of specific symptoms (9). Histopathology are present the epithelium may be stratified squamous at a lower level, more superiorly it may be pseudostratified columnar, cuboidal as well as ciliated (10). Presence of mucous glands, goblet cells and cilia is highly indicative of their origin within the incisive canal as is the presence of nerves and blood vessels in the fibrous capsule (11).

Cystic contents are an important diagnostic aid to rule out a normal incisive canal fossa radiolucency. The viscous fluid content may be mucoid material or even pus if the cyst has been infected (12). Surgical enucleation is the line of treatment of nasopalatine duct cysts, by raising a palatal flap from canine to canine. In the present case report the residual bone defect after cyst enucleation was filled with hyaluronic acid enriched with amino acid (13).

CASE REPORT

A 56-year-old man was referred by the dentist to the Department of Oral Surgery, University of Chieti-Pescara, concerning a nasopalatine duct cyst. The swelling was initially small which gradually increased in size. No history of trauma was reported by patients. Intraoral examination revealed a pink-colored well-defined swelling located between the roots of central incisors. The panoramic radiograph and cone-beam computed tomography (CBCT) showed a well-defined unilocular radiolucent area beyond the nasal floor. The size evaluated by CBCT approximately was 4x3.5cm (Fig.1).

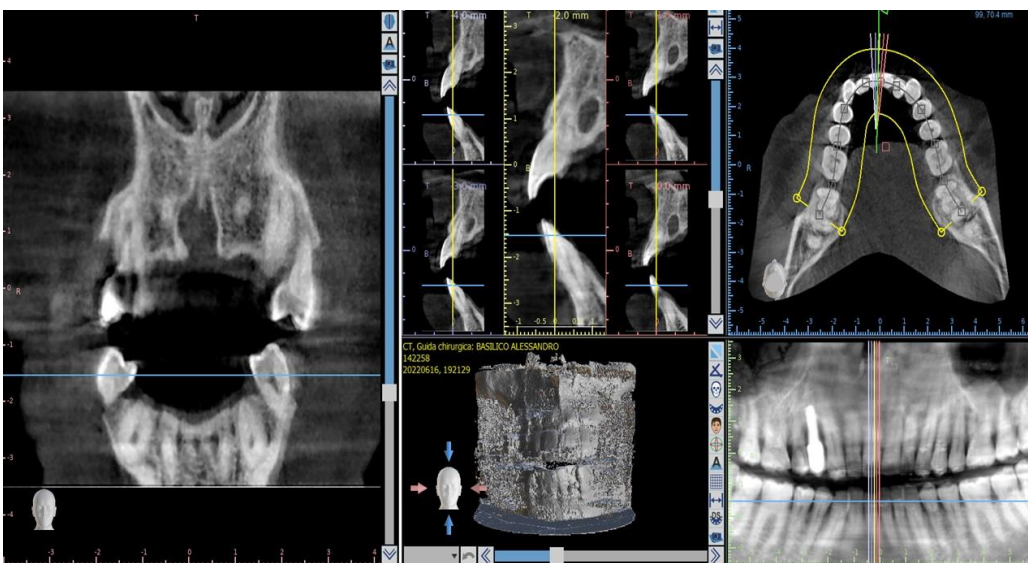

Fig. 1. *A well-defined, unilocular radiolucent lesion in the maxillary anterior region on the CBCT was detected.*

The patient was subjected to antibiotic treatment with Amoxicillin + Clavulanic acid (GlaxoSmithKline, UK) 2 gr/day for six days from the one prior to surgery. Disinfection of the oral cavity was achieved by rinsing with Chloroxidine digluconate at 0.2%. Conscious sedation was achieved by intravenous administration of benzodiazepines. After loco-regional infiltration anesthesia with Articain + Adrenaline 1/100.000 (Septodont, France), and full-thickness of the palatal mucosa is engraved (Fig. 2).

Fig. 2. *Intraoperative image showing the size of the cyst with. B- Residual bone defect after cyst enucleation.*

A palatal mucoperiosteal flap was reflected by a periosteal elevator to expose the cyst. The neurovascular bundle is salvaged and the cyst is carefully dissected free, from its bony bed. The inner lining of the cyst was scraped off and sent for microscopic evaluation. Hyaluronic acid (Italfarmacia, Rome, Italy) was placed to improve the healing response (14). The flap was sutured with interrupted suturing with 3-0 polyamide (Assumid, Assut, Europe, Magliano dei Marsi, AQ Italy). The cist material was sent for histopathological examination. Microscopical examination revealed a cystic cavity covered by pseudostratified epithelium. There is a fibrous connective tissue wall with inflammatory of lymphocytes and plasma cells. The clinical, radiologic and histopathological aspect were suggestive of infected nasopalatine duct cyst. No adverse reactions were recorded, the post-operative course was characterized by the absence of pain. Clinical and radiographic controls were performed at 2 and 4 months by digital dental X-ray after cystic enucleation surgery. The X-ray showed increased bone mineralization (Fig. 3).

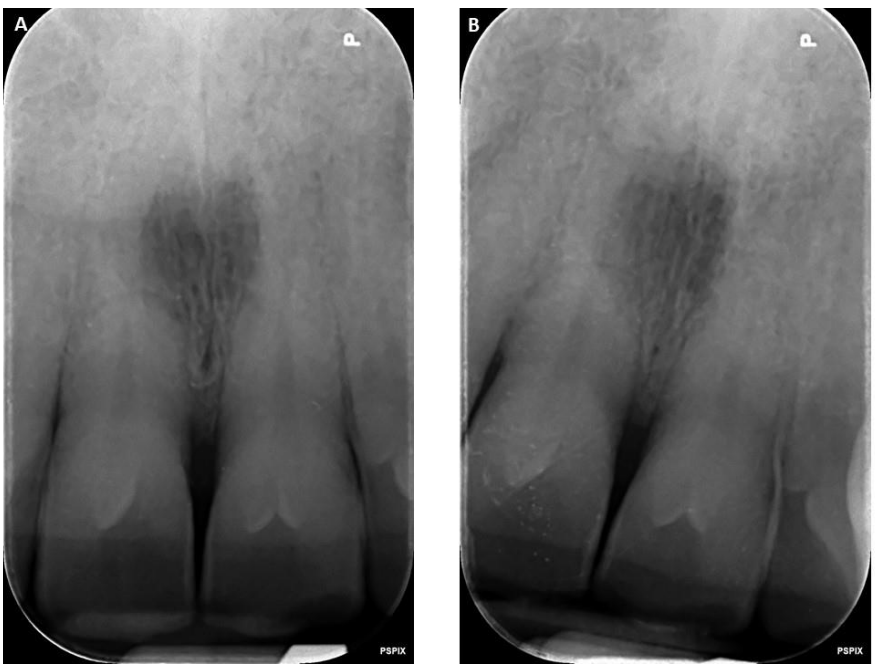

Fig. 3. *A- Digital x-Ray after 2 months. B- Digital x-ray after 4 months shows a bone defect reduction and an increase of mineralization.*

DISCUSSION

The clinical results of this case repot show absence of pain and a good soft tissue healing. Progressive healing has been recorded and minor post-operative symptoms occurred such as swelling, very low pain, absence of sensitive alterations and no haemorrhagic complications.

Bone healing involving a variety of cells, growth factors, cytokines, chemokines, and intracellular and extracellular signaling pathways and have a limited ability to self-heal after injury. When the length of the bone defect exceeds 2 to 2.5 times the diameter of the damaged bone, the self-healing ability of bone tissue alone is not enough (15, 16). For this reason, many biomaterials have been prosed such as, autologous bone, hydroxyapatite, porcine bone, bovine bone etc. In recent years, hyaluronic acid-based hydrogels have received extensive attention in soft tissue augmentation regeneration and in bone regeneration (17). It is generally present in mammalian tissues and plays a critical role in cell differentiation, migration, proliferation, inflammation, angiogenesis, wound healing (18, 19).

In this case report, we described the use the HA for fill the cyst cavity, through clinical evaluation and reported a good healing without clinical sign. Also, the x-ray shows the radiopacity the bone defect residual after cisty and residual cavity volume reduction was recorded.

The clinical use of biomaterial with or without barrier membranes in bone defects resulting from cystic lesions is not completely clarified (20-25). Cystic cavities have been shown to heal well without the use of biomaterials, which could behave like foreign bodies. In this study, we used cross-linked high molecular weight hyaluronic acid (HA) enriched with amino acid.

The hyaluronic acid has been used in oral surgery for treated with success the periodontal defect (26). In conclusion this case report mainly summarized the potential mechanism of HA in promoting bone regeneration and the application prospects of hyaluronic acid-based in bone regeneration.

REFERENCES

1. Ettl T, Gosau M, Sader R, Reichert TE. Jaw cysts - filling or no filling after enucleation? A review. *J Craniomaxillofac Surg.* 2012;40(6):485-493. doi:https://doi.org/10.1016/j.jcms.2011.07.023
2. Robertson H, Palacios E. Nasopalatine duct cyst. *Ear Nose Throat J.* 2004;83(5):313.
3. Escoda Francoli J, Almendros Marques N, Berini Aytes L, Gay Escoda C. Nasopalatine duct cyst: report of 22 cases and review of the literature. *Med Oral Patol Oral Cir Bucal.* 2008;13(7):E438-443.
4. Shear M, Speight P. *Cysts of the Oral and Maxillofacial Regions*: Wiley; 2007.
5. Gnanasekhar JD, Walvekar SV, al-Kandari AM, al-Duwairi Y. Misdiagnosis and mismanagement of a nasopalatine duct cyst and its corrective therapy. A case report. *Oral Surg Oral Med Oral Pathol Oral Radiol Endod.* 1995;80(4):465-470. doi:https://doi.org/10.1016/s1079-2104(05)80372-5
6. Nortjé CJ, Farman AG. Nasopalatine duct cyst. *International Journal of Oral Surgery.* 1978;7(2):65-72.
7. Swanson KS, Kaugars GE, Gunsolley JC. Nasopalatine duct cyst: an analysis of 334 cases. *J Oral Maxillofac Surg.* 1991;49(3):268-271. doi:https://doi.org/10.1016/0278-2391(91)90217-a
8. Allard RH, van der Kwast WA, van der Waal I. Mucosal antral cysts. Review of the literature and report of a radiographic survey. *Oral Surg Oral Med Oral Pathol.* 1981;51(1):2-9. doi:https://doi.org/10.1016/0030-4220(81)90118-3
9. Killey HC, Kay LW. *Benign Cystic Lesion of the Jaws, their Diagnosis and Treatment.* Livingstone, Ltd, Edinburgh& London.: E& S.
10. Killey HC, Kay LW. Observations based on the surgical closure of 362 oro-antral fistulas. *Int Surg.* 1972;57(7):545-549.
11. De Cuyper K, Vanhoenacker FM, Hintjens J, Verstraete KL, Parizel PM. Nasopalatine duct cyst. *JBR-BTR.* 2008;91(4):179.
12. Vasconcelos R, de Aguiar MF, Castro W, de Araujo VC, Mesquita R. Retrospective analysis of 31 cases of nasopalatine duct cyst. *Oral Dis.* 1999;5(4):325-328. doi:https://doi.org/10.1111/j.1601-0825.1999.tb00098.x
13. Moss HD, Hellstein JW, Johnson JD. Endodontic considerations of the nasopalatine duct region. *J Endod.* 2000;26(2):107-110. doi:https://doi.org/10.1097/00004770-200002000-00012

14. Scarano A, Rapone B, Amuso D, Inchingolo F, Lorusso F. Hyaluronic Acid Fillers Enriched with Glycine and Proline in Eyebrow Augmentation Procedure. *Aesthetic Plast Surg.* 2022;46(1):419-428.
15. Wiese A, Pape HC. Bone defects caused by high-energy injuries, bone loss, infected nonunions, and nonunions. *Orthop Clin North Am.* 2010;41(1):1-4, table of contents. doi:https://doi.org/10.1016/j.ocl.2009.07.003
16. Scarano A, Degidi M, Perrotti V, Degidi D, Piattelli A, Iezzi G. Experimental evaluation in rabbits of the effects of thread concavities in bone formation with different titanium implant surfaces. *Clin Implant Dent Relat Res.* 2014;16(4):572-581. doi:https://doi.org/10.1111/cid.12033
17. Xin L, Wei C, Tong X, et al. In situ delivery of apoptotic bodies derived from mesenchymal stem cells via a hyaluronic acid hydrogel: A therapy for intrauterine adhesions. *Bioact Mater.* 2022;12(107-119. doi:https://doi.org/10.1016/j.bioactmat.2021.10.025
18. Passi A, Vigetti D. Hyaluronan as tunable drug delivery system. *Adv Drug Deliv Rev.* 2019;146(83-96. doi:https://doi.org/10.1016/j.addr.2019.08.006
19. Scarano A, Bugea C, Leo L, Santos de Oliveira P, Lorusso F. Autologous Platelet Gel (APG): A Preliminary Evaluation of the Mechanical Properties after Activation with Autologous Thrombin and Calcium Chloride. *Materials (Basel).* 2021;14(14):doi:https://doi.org/10.3390/ma14143941
20. Di Dio M, Scarapecchia D, Porcelli D, Arcuri C. Spontaneous bone regeneration after removal of cysts: one-year follow-up of 336 consecutive cases. *JOURNAL OF ORAL SCIENCE & REHABILITATION.* 2016;2(2):50-56.
21. Wachtel H, Fickl S, Hinze M, Bolz W, Thalmair T. The bone lamina technique: a novel approach for lateral ridge augmentation--a case series. *Int J Periodontics Restorative Dent.* 2013;33(4):491-497. doi:https://doi.org/10.11607/prd.1248
22. Chiapasco M, Rossi A, Motta JJ, Crescentini M. Spontaneous bone regeneration after enucleation of large mandibular cysts: a radiographic computed analysis of 27 consecutive cases. *J Oral Maxillofac Surg.* 2000;58(9):942-948; discussion 949. doi:https://doi.org/10.1053/joms.2000.8732
23. Santamaria J, Garcia AM, de Vicente JC, Landa S, Lopez-Arranz JS. Bone regeneration after radicular cyst removal with and without guided bone regeneration. *Int J Oral Maxillofac Surg.* 1998;27(2):118-120. doi:https://doi.org/10.1016/s0901-5027(98)80308-1
24. Chacko R, Kumar S, Paul A, Arvind. Spontaneous Bone Regeneration After Enucleation of Large Jaw Cysts: A Digital Radiographic Analysis of 44 Consecutive Cases. *J Clin Diagn Res.* 2015;9(9):ZC84-89. doi:https://doi.org/10.7860/JCDR/2015/13394.6524
25. Scarano A, Ciccarese S, Amuso D, Mortellaro C, Lorusso F. Cortical bone lamina approach for mandibular large cystic defect: a case report. *J Biol Regul Homeost Agents.* 2019;33(6 Suppl. 2):85-91 DENTAL SUPPLEMENT.
26. Pilloni A, Marini L, Gagliano N, et al. Clinical, histological, immunohistochemical, and biomolecular analysis of hyaluronic acid in early wound healing of human gingival tissues: A randomized, split-mouth trial. *J Periodontol.* 2023;94(7):868-881. doi:https://doi.org/10.1002/JPER.22-0338