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ALZHEIMER'S DISEASE AND DENTAL IMPLANTS: AN UNEXPECTED CONNECTION

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ABSTRACT

Objective: This case report aims to present a unique scenario of bone resorption around dental implants in a 40-year-old German male 2003with a history of successful multiple dental implant placements. The case highlights the impact of Alzheimer's disease on implant health and emphasizes the need for extra caution in managing periimplantitis in patients with Alzheimer's. **Case Report:** The patient, who had been undergoing regular annual checkups for the past 20 years, developed Alzheimer's disease. Subsequently along with the onset of symptom, within a span of 2 years, bone resorption was observed around his most vulnerable implants, specific to one implant where xenograft was placed 20 years ago leading to the necessary periimplantitis prevalent on that particular implant. The patient's medical records, radiographic images, and treatment history were thoroughly reviewed to understand the progression of bone loss. The patient's dental implants had shown remarkable stability and maintained good oral health during annual maintenance visits from 2001-2021 to the onset of Alzheimer's disease. However, following the diagnosis, significant bone resorption occurred around the implants, leading to complications necessitating repeated procedure for that of one implant. **Discussion:** The influence of Alzheimer's disease on bone resorption around dental implants remains an area of interest and concern. While the exact mechanisms are not fully understood, it is postulated that systemic changes associated with Alzheimer's, such as increased inflammation and compromised immune response, may contribute to periimplantitis development and subsequent bone loss. **Conclusion:** The importance of heightened vigilance when managing periimplantitis in patients with Alzheimer's disease particular attention to preventive measures and early detection of implant-related complications. Further research is warranted to elucidate the intricate relationship between Alzheimer's disease and implantitis.

KEYWORDS: Alzheimer's Disease, dementia, peri implantitis, toothloss, degenerative disease, bone microstructure.

INTRODUCTION

Aging-related diseases are on the rise globally, impacting socioeconomic landscapes due to increased lifespans. Alzheimer's disease (AD), characterized by gradual loss of nervous system functions, prominently features dementia. Enhancing conditions for the elderly to manage neurodegenerative diseases such as AD is crucial.[1]

Implants serve as tooth replacements, addressing tooth loss attributed largely to periodontitis. Periodontitis affects dental support structures, causing tissue destruction and alveolar bone resorption. Smoking, poor oral hygiene, and alcohol consumption elevate periodontitis risk.[4-8]

Tooth loss affects cognitive function, partly due to inflammation induced by periodontitis. Periodontitis-linked inflammation, through cytokines like IL-1, TNF-α, and IL-6, potentially triggers cognitive decline. The inflammation theory also correlates with AD, highlighting its multifaceted origins.[9]

CASE REPORT: MATERIAL AND METHOD

A 40-year-old German male sought dental care in 2001 for missing teeth. A dental implant was placed in area 46. Regular checkups indicated good oral hygiene. In 2020, Alzheimer's disease developed, leading to bone resorption around one implant in 2022. Regular follow-ups in 2023 helped manage periimplantitis.[10]

RESULT AND DISCUSSION

AD's impact on dental implants raises intriguing questions. AD's association with bone loss and osteoporosis implies shared genetic factors.[18] Bone metabolic biomarkers and bone mineral density are

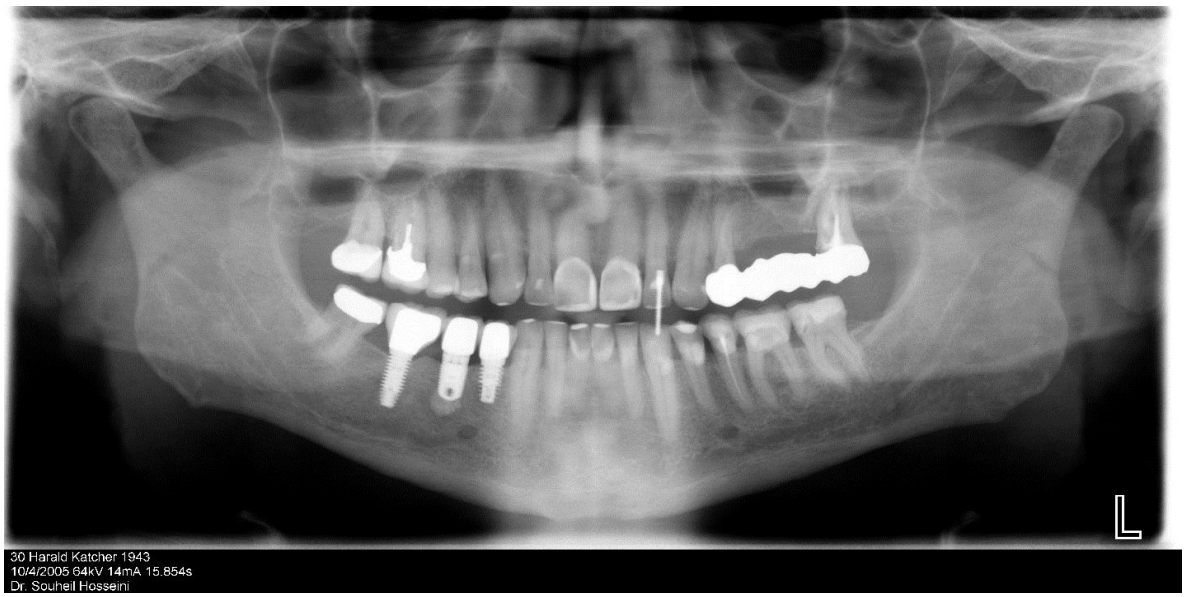
linked to AD patients.[19] Comorbidities and shared pathophysiology indicate possible common mechanisms.[20]

An inflammatory process, initiated by dysbiotic biofilm, drives periodontitis, possibly influencing AD.[21] The link between AD and bone quality, governed by osteoclastogenesis and osteogenesis, is uncertain. Evidence suggests treating one condition might benefit the other.[22,23] Hormone replacement therapy and acetylcholinesterase inhibitors have shown potential.[24, 25]

Macrophages' role in periimplantitis and AD intertwines. M1 macrophages initiate inflammation, while M2 promote healing. Successful osseointegration transitions from M1 to M2.[26, 27]

Laser therapy's minimally invasive potential in periodontal therapy and periimplantitis treatment is promising.[28]

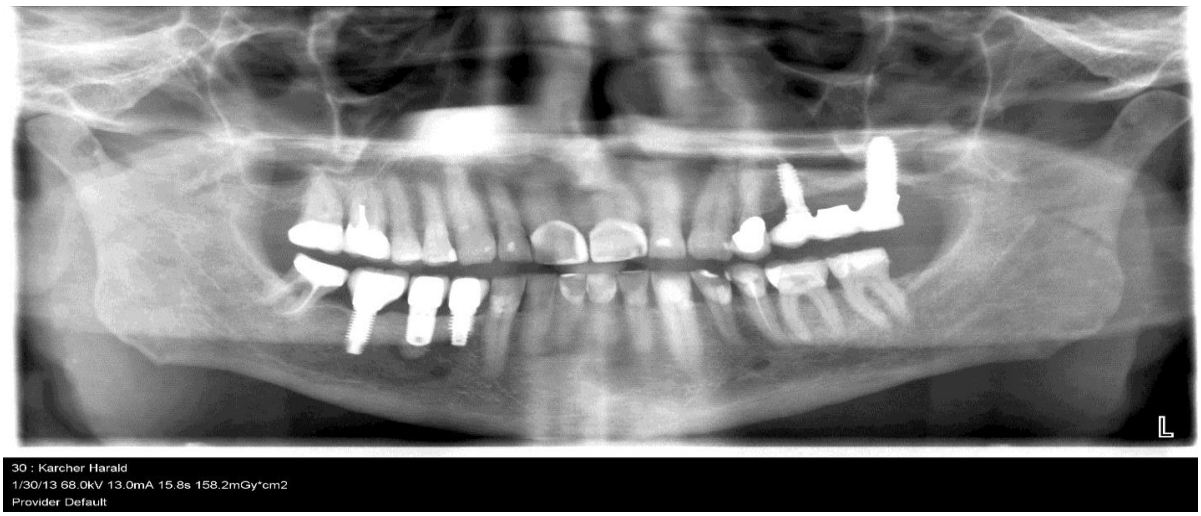
Figure 1 Incision given, flap reflected, osteotomy done.
Figure 2 Implants and bone graft placed.
Figure 3 membrane placed.
Figure 4 Impression taken.
Figure 5 occlusal clearance checked.
Figure 6 final prosthesis placed.



October 2005 follow up opg

October 2010

October 2012



January 2013

January 2014

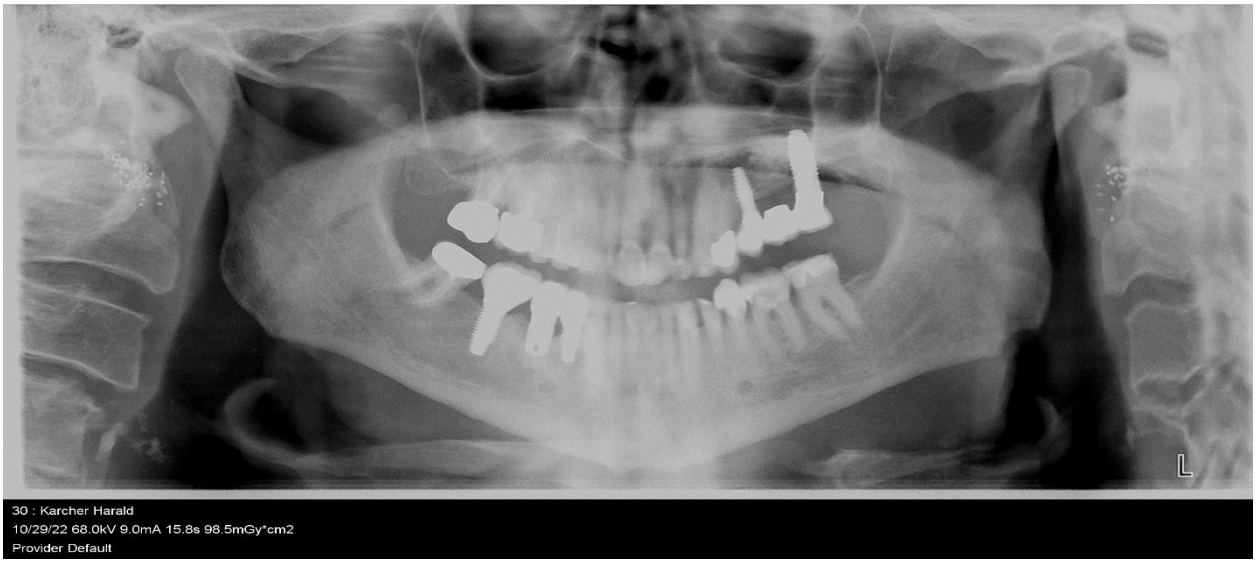
January 2015 follow up

Febrary 2016 follow up

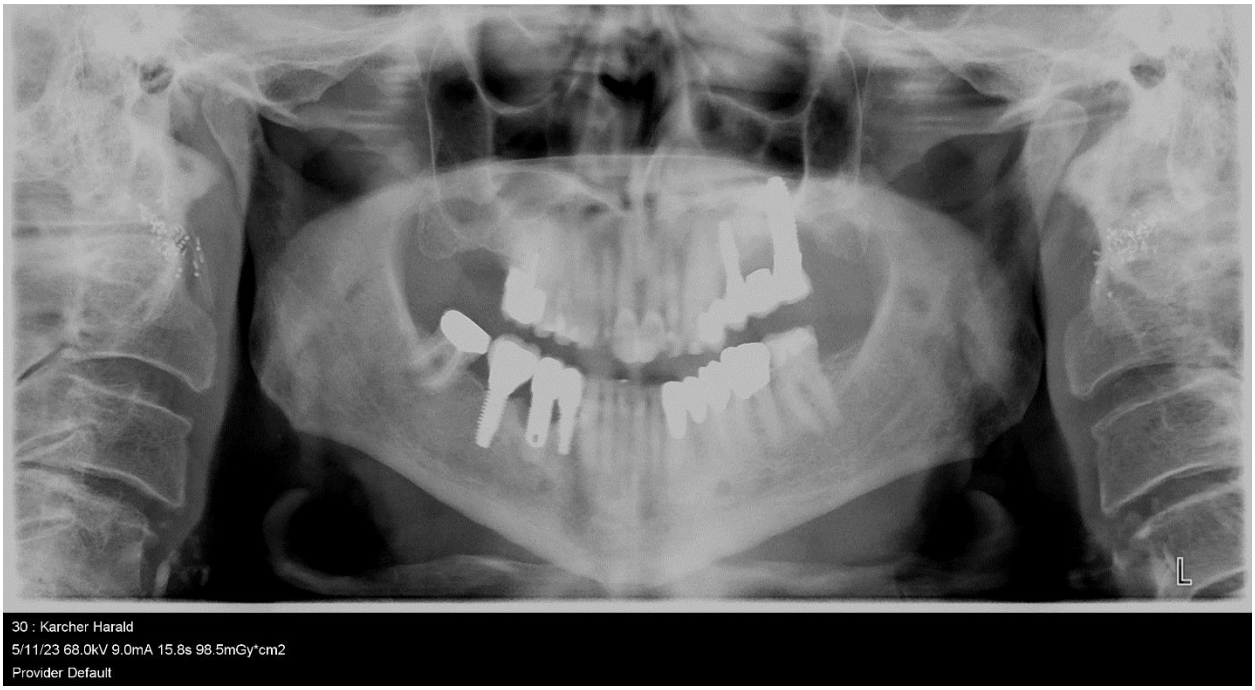
October 2017 follow up.

December 2020 follow up

In 2020 when the patient came for follow up we found radiopaque gold particles in his ear, when inquired the wife said this is the treatment of alzihmers and we started noticing bone loss on implant 45 and Periimplantitis maintainance started.



October 2022 follow up



May 2023 follow up

After Periimplantitis maintainance

CONCLUSION

The relationship between AD and dental implant-related bone resorption demands vigilant periimplantitis management in Alzheimer's patients. Further research is imperative to decipher this intricate connection, refining treatment strategies for better outcomes.

REFERENCES

1. Du, X.; Wang, X.; Geng, M. Alzheimer's disease hypothesis and related therapies. *Transl. Neurodegener,* 2018; *7:* 2.
2. Marchini, L.; Ettinger, R.; Caprio, T.; Jucan, A. Oral health care for patients with Alzheimer's disease:An update. *Spec. Care Dent,* 2019.
3. Delwel, S.; Binnekade, T.T.; Perez, R.S.; Hertogh, C.M.; Scherder, E.J.; Lobbezoo, F. Oral health and orofacial pain in older people with dementia: A systematic review with focus on dental hard tissues. *Clin. Oral Investig,* 2017; *21:* 17–32.
4. Natto, Z.S.; Abu Ahmad, R.H.; Alsharif, L.T.; Alrowithi, H.F.; Alsini, D.A.; Salih, H.A.; Bissada, N.F. Chronic Periodontitis Case Definitions and Confounders in Periodontal Research: A Systematic Assessment. *Biomed. Res. Int,* 2018; *2018*: 4578782.
5. Eke, P.I.; Dye, B.A.; Wei, L.; Slade, G.D.; Thornton-Evans, G.O.; Borgnakke, W.S.; Taylor, G.W.; Page, R.C.;Beck, J.D.; Genco, R.J. Update on Prevalence of Periodontitis in Adults in the United

States: NHANES 2009 to 2012. *J. Periodontol*, 2015; *86*: 611–622.
6. Lertpimonchai, A.; Rattanasiri, S.; Arj-Ong Vallibhakara, S.; Attia, J.; Thakkinstian, A. The association between oral hygiene and periodontitis: A systematic review and meta-analysis. *Int. Dent. J*, 2017; *67*: 332–343.
7. Bergstrom, J. Tobacco smoking and chronic destructive periodontal disease. *Odontology*, 2004; *92:* 1–8.
8. Wang, J.; Lv, J.; Wang, W.; Jiang, X. Alcohol consumption and risk of periodontitis: A meta-analysis. *J. Clin.Periodontol*, 2016; *43:* 572–583.
9. Rogers, J. The inflammatory response in Alzheimer's disease. *J. Periodontol*, 2008; *79:* 1535–1543.
10. Li, Q.X.; Fuller, S.J.; Beyreuther, K.; Masters, C.L. The amyloid precursor protein of Alzheimer disease in human brain and blood. *J. Leukoc. Biol*, 1999; *66:* 567–574.
11. Troiano, G.; Laino, L.; Dioguardi, M.; Giannatempo, G.; Lo Muzio, L.; Lo Russo, L. Mandibular Class II Furcation Defect Treatment: Effects of the Addition of Platelet Concentrates to Open Flap: A Systematic Review and Meta-Analysis of Randomized Clinical Trials. *J. Periodontol*, 2016; *87:* 1030–1038.
12. Leira, Y.; Dominguez, C.; Seoane, J.; Seoane-Romero, J.; Pias-Peleteiro, J.M.; Takkouche, B.; Blanco, J.; Aldrey, J.M. Is Periodontal Disease Associated with Alzheimer's Disease? A Systematic Review with Meta-Analysis. *Neuroepidemiology*, 2017; *48:* 21–31.
13. Yoshida, T.; Blair, A.; D'Alessandro, A.; Nemkov, T.; Dioguardi, M.; Silliman, C.C.; Dunham, A. Enhancing uniformity and overall quality of red cell concentrate with anaerobic storage. *Blood Transfus*, 2017; *15:* 172–181.
14. Lo Muzio, L.; Pannone, G.; Santarelli, A.; Bambini, F.; Mascitti, M.; Rubini, C.; Testa, N.F.; Dioguardi, M.; Leuci, S.; Bascones, A.; et al. Is expression of p120ctn in oral squamous cell carcinomas a prognostic factor? *Oral Surg. Oral Med. Oral Pathol. Oral Radiol.* 2013; *115:* 789–798.
15. Dioguardi, M.; Troiano, G.; Laino, L.; Lo Russo, L.; Giannatempo, G.; Lauritano, F.; Cicciu, M.; Lo Muzio, L. ProTaper and WaveOne systems three-dimensional comparison of device parameters after the shaping technique. A micro-CT study on simulated root canals. *Int. J. Clin. Exp. Med*, 2015; *8:* 17830–17834.
16. Li, J.; Xu, H.; Pan, W.; Wu, B. Association between tooth loss and cognitive decline: A 13-year longitudinal study of Chinese older adults. *PLoS ONE*, 2017; *12:* e0171404.
17. Makiura, T.; Ikeda, Y.; Hirai, T.; Terasawa, H.; Hamaue, N.; Minami, M. Influence of diet and occlusal support on learning memory in rats behavioral and biochemical studies. *Res. Commun. Mol. Pathol. Pharmacol*, 2000; *107:* 269–277.
18. Faggion, C.M., Jr. Critical appraisal of evidence supporting the placement of dental implants in patients with neurodegenerative diseases. *Gerodontology*, 2016; *33:* 2–10.
19. Wu, Z.; Nakanishi, H. Connection between periodontitis and Alzheimer's disease: Possible roles of microglia and leptomeningeal cells. *J. Pharmacol. Sci*, 2014; *126:* 8–13.
20. Teixeira, F.B.; Saito, M.T.; Matheus, F.C.; Prediger, R.D.; Yamada, E.S.; Maia, C.S.F.; Lima, R.R. Periodontitis and Alzheimer's Disease: A Possible Comorbidity between Oral Chronic Inflammatory Condition and Neuroinflammation. *Front. Aging Neurosci*, 2017; *9:* 327.
21. Perrone, D.; Ardito, F.; Giannatempo, G.; Dioguardi, M.; Troiano, G.; Lo Russo, L.; DE Lillo, A.; Laino, L.; Lo Muzio, L. Biological and therapeutic activities, and anticancer properties of curcumin. *Exp. Ther. Med*, 2015; *10:* 1615–1623.
22. Gayathri, R.; Saadi, A.V.; Bhat, K.M.; Bhat, S.G.; Satyamoorthy, K. Allele, genotype, and composite genotype effects of IL-1A +4845 and IL-1B +3954 polymorphisms for chronic periodontitis in an Indian population. *Indian J. Dent. Res*, 2011; *22:* 612.
23. Oue, H.; Miyamoto, Y.; Koretake, K.; Okada, S.; Doi, K.; Jung, C.G.; Michikawa, M.; Akagawa, Y. Tooth loss might not alter molecular pathogenesis in an aged transgenic Alzheimer's disease model mouse. *Gerodontology*, 2016; *33:* 308–314.
24. Carroll B, Korolchuk VI. Nutrient sensing, growth and senescence, *FEBS J*., 2018; 285: 1948-1958.
25. Hernandez-Segura A, Nehme J, Demaria M. Hallmarks of cellular senescence. *Trends Cell Biol*, 2018; 28: 436-453.
26. Lopes-Paciencia S, Saint-Germain E, Rowell MC, Ruiz AF, Kalegari P, Ferbeyre G. The senescence-associated secretory phenotype and its regulation. *Cytokine*, 2019; 117: 15-22.
27. Guerrero A, De Strooper B, Arancibia-Carcamo IL. Cellular senes- cence at the crossroads of inflammation and Alzheimer's disease. *Trends Neurosci*, 2021; 44: 714-727.
28. Puzianowska-Kuźnicka M, Owczarz M, Wieczorowska-Tobis K, et al. Interleukin-6 and C-reactive protein, successful aging, and mortality: the PolSenior study. *Immun Ageing*, 2016; 13: 21.
29. Sabbatinelli J, Prattichizzo F, Olivieri F, Procopio AD, Rippo MR, Giuliani A. Where metabolism meets senescence: focus on endo- thelial cells. *Front Physiol*, 2019; 10: 1523.
30. Wiley CD, Campisi J. From ancient pathways to aging cells- connecting metabolism and cellular senescence. *Cell Metab*, 2016; 23: 1013-1021.
31. Hajishengallis G. The inflammophilic character of the periodontitis- associated microbiota. *Mol Oral Microbiol*, 2014; 29: 248-257.
32. Slade GD, Ghezzi EM, Heiss G, Beck JD, Riche E, Offenbacher S. Relationship between periodontal disease and C-reactive protein among adults in the Atherosclerosis Risk in Communities study. *Arch Intern Med*, 2003; 163: 1172-1179.

33. Choi S, Kim K, Chang J, et al. Association of chronic periodonti- tis on Alzheimer's disease or vascular dementia. *J Am Geriatr Soc*, 2019; 67: 1234-1239.
34. Chen CK, Wu YT, Chang YC. Association between chronic peri- odontitis and the risk of Alzheimer's disease: a retrospective, population-based, matched-cohort study. *Alzheimers Res Ther*, 2017; 9: 56.