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Veillonella Spp. Infection As a Rare Cause for Early Multiple Dental Implant Failures: A Case Report

Mustafa TUNALI[1], Cenker Zeki KOYUNCUOGLU[2], Burak SELEK[3], Bayhan BEKTORE[3], Mustafa OZYURT[3], Rana ÇULHAOĞLU[4]

ABSTRACT

Background: Infection, overheating, premature loading and impaired healing are the main factors associated with early failure of dental implants. Multiple implant failures in the same patient, supports the evidence that individual characteristics play an important role in the early failure process. Veillonella spp. are early colonizers of dental biofilms and small, usually non-fermentative, strict anaerobic, nonmotile, nonsporulating, gram-negative cocci that lack capsule.

Objective: The objective of this study was to investigate the possible associated factors and early multiple implant failures in the same patient.

Case Description: A 55-years-old female patient had peri-implant radiolucencies of two adjacent implant sites at the left posterior mandibula 3 months after surgical placement. Aerobic and anaerobic culture techniques were used to study the peri-implant microflora at sites with implant failures. An amoxicillin-resistant Veillonella bacteria was isolated.

Conclusion: The present case shows that amoxicillin-resistant Veillonella associated peri-implantitis can be a risk factor for early implant failures.

Keywords: *Early failure, dental implant, risk factors, Veillonella*

ÖZET

Giriş: Enfeksiyon, aşırı ısınma, erken yükleme ve iyileşmenin bozulması dental implantların erken kayıpları ile ilişkili başlıca faktörlerdir. Aynı hastada birden çok implant kaybı bireysel özelliklerin erken başarısızlık sürecinde önemli bir rol oynadığı yönündeki delilleri kuvvetlendirmektedir. Veillonella dental biyofilmde erken kolonize olan türlerdendir ve küçük, sıklıkla fermentatif olmayan, zorunlu anaerob, hareketsiz, sporsuz, kapsülsüz gram-negatif koklardır.

Amaç: Bu çalışmanın amacı bir hastada meydana gelen çoklu implant kayıpları ile olası faktörler arasındaki ilişkiyi araştırmaktır.

Olgu Sunumu: 55 yaşında bayan hastanın alt çene sol posterior bölgesine yapılan implant operasyonlarından 3 ay sonra birbirine komşu 2 implant bölgesinde periimplant radyolusensi tespit edilmiştir. İmplant kaybı olan bölgelerde peri-implant mikroflora aerobik ve anaerobik kültür teknikleri ile çalışılmıştır. Amoksisiline dirençli Veilonella bakterisi izole edilmiştir.

Sonuç: Bu vaka raporuna göre amoksisiline dirençli Veilonella türlerine bağlı olarak gelişebilen periimplantitisin erken implant kayıpları için bir risk faktörü olabileceği gösterilmiştir.

Anahtar Kelimeler: *Erken kayıp, diş implantı, risk faktörleri, Veillonella*

[1] *Gulhane Military Medical Academy, Haydarpasa Hospital, Periodontology, Istanbul, Turkey.*
[2] *Istanbul Aydin University, Faculty of Dentistry, Department of Periodontology, Istanbul, Turkey.*
[3] *Gulhane Military Medical Academy, Haydarpasa Hospital, Medical Microbiology, Istanbul, Turkey.*
[4] *Gazi University, Faculty of Dentistry, Department of Periodontology, Ankara, Turkey*

INTRODUCTION

Today many conventionally prosthetic treatments have been replaced by implant supported prosthetic supraconstructions. Despite high success rates[1,2] implant fixture failure may occur and is defined as 'the inadequacy of the host tissue to establish or maintain osseointegration. Implant failure timing can be arbitrarily divided into early, when osseointegration fails to occur, and late, when the achieved osseointegration is lost after a period of function. The early failures described as implants removed before prosthetic restoration, while those occurring after prosthetic rehabilitation are classified as late[3]. The implant loss can be attributed to factors such as biological, microbiological, and biomechanical, but the cause and mechanism of the early implant failure are still obscure[4] and the reported early failure rate is from 0.7% to 3.8%.[5] Multiple implant failures in the same patient, supports the evidence that individual characteristics (genetics or microbiological), play a crucial role in the early failure process.[6] Some studies have analyzed the relationship between genetic polymorphisms of the host response and implant failure. Santos et al.[6] stated that the polymorphism in the promoter of the MMP-1 gene could be a risk factor for early implant failure. However, Rogers et al.[7] found no association between the IL-1 composite genotype and failure of dental implants. Also, other studies results indicate that polymorphisms in the IL-2, IL-6 [8] and transforming growth factor-β1[9] genes are not associated with early implant failure.

Infectious origin of early failures can be due to a preoperative contamination, an infected recipient site or a postoperative hematogeneous infection. Possible sources of direct bacterial contamination during implant surgery; the gloves, the surgical instruments, the peri-oral skin and saliva in the oral cavity.[10] Also, implants placed next to asymptomatic, endodontically treated teeth have been reported to be associated with greater failure due to infection.[11] Infection represents one of many factors contributing to the failure of dental implants and no single micro-organism has been closely associated with colonization or infection of any implant system.[12] The aim of this case report is to investigate the possible association between, an amoxicillin-resistant Veillonella spp. and the early multiple implant failures in the same patient.

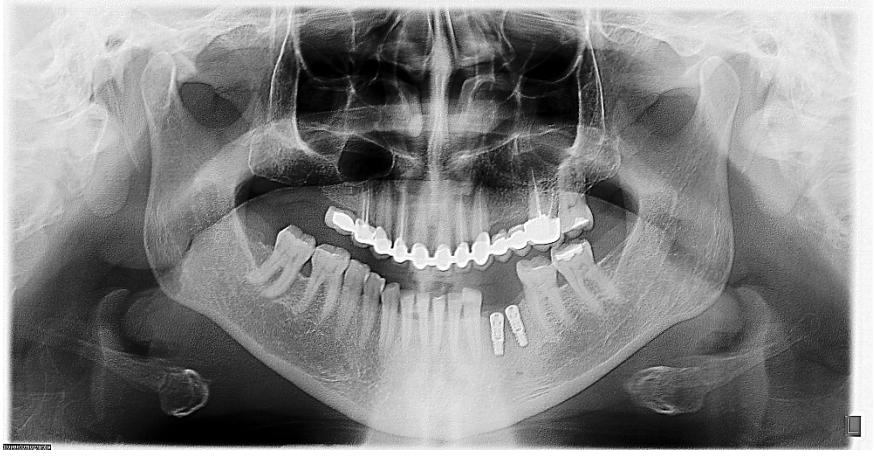

Figure 1. *Peri-implant radiolucencies of two adjacent implants 3 months after surgical placement.*

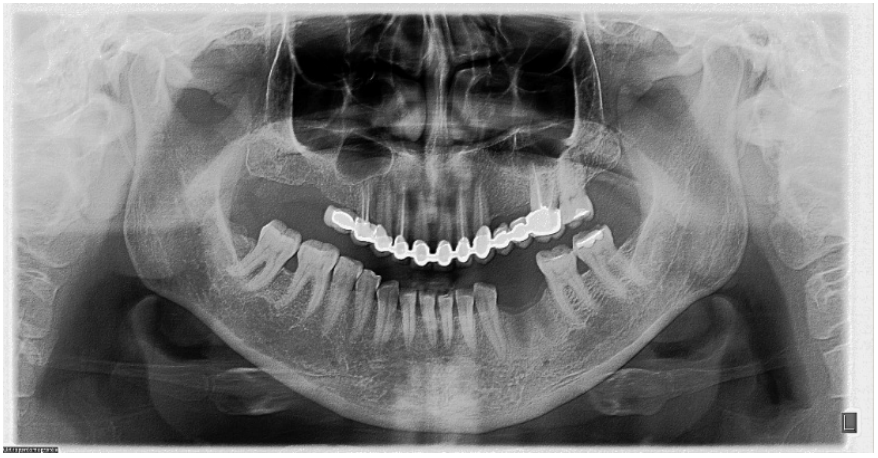

Figure 2. *No augmentation method was performed at the failed implant sites.*

CASE REPORT

A 55-years-old, non-smoking woman was referred for replacement of her missing mandibular left first and second premolars with an implant supported prosthesis. The patient's medical history was insignificant. Intraoral examination revealed localized mild periodontitis and the missing premolars had been lost due to crown fracture caries approximately 10 years ago. Treatment included scaling, root planning and oral hygiene instructions. The clinical signs of periodontitis were markedly improved at re-evaluation appointment. Two 3.75 × 10 mm titanium fixture (Biohorizon; Tapered Internal Implant System, Birmingham, USA) was placed in the edentulous area on the mandibular left side under local anesthesia. The implants replaced with 35 N and primary closure over the cover screw was obtained. Postoperative medication included; amoxicillin 500 mg 3 times daily and 0.12% chlorhexidine rinse 2 times daily, 1 week. The sutures was removed ten days after the surgery and the patient was seen at 3 weeks post-surgery for follow-up. The healing was uneventful at both visits and the cover screws were unexposed.

At 3 months after the implantation; there was no apparent soft tissue inflammation or infection. The patient had experienced no pain, and there were no signs of suppuration, fever, vestibular swelling, or lymphadenopathy. However, radiological examination revealed that patient had peri-implant radiolucencies both of the two implants (Figure 1). Failed osseointegration was seen after the full thickness flap was elevated and implants were surgically removed with tissue pliers. Aerobic and anaerobic culture techniques were used to study the peri-implant microflora at sites with implant failures. No augmentation procedure was utilized or guided bone regeneration was performed at the surgical site (Figure 2). Subsequent medical follow-up was performed to rule out systemic factors to the occurrence, but complete blood count and screening tests proved to be within normal parameters. An amoxicillin-resistant Veillonella bacteria was isolated at sites with early implant failures. Three months after implant failures a second operation was done. Patient who had amoxicillin-resistant Veillonella bacteria was given clindamycin 150 mg every 6 h for 5 days postoperatively. The implants were

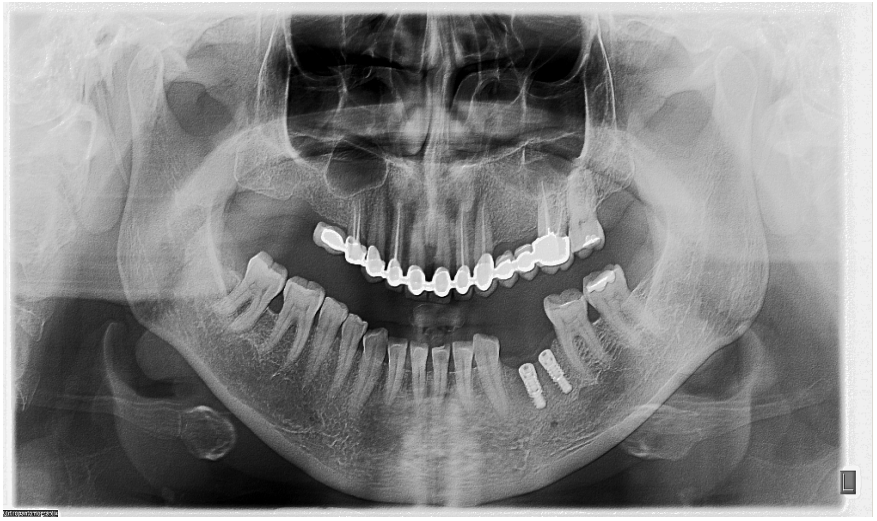

Figure 3. *Radiographic evaluation of two adjacent implants 3 months after second surgical placement.*

evaluated from the time of their placement (Figure 3) until six months after prosthetic treatment (Figure 4).

Microbiology

The implants taken out of the patient were incubated into regenerated tyogluconate medium and %5 sheep blood agar at the bed-side. Additionally and simultaneously, the aerobe cultures were also taken. The mediums were evaluated regarding anaerobe growth after they were incubated inside an anaerobe cabin (Bactron IV anaerobic chamber Sheldon Lab., USA) at 35-37 °C for at least 72 hours. Besides, aerobe growth was also evaluated after 24 hours of aerobe incubation. The identification of these growing species were made according to their gram dye, morphology of the colony, hemolysis characteristics, movement, catalase, indole, esculine, gelatin, urease, and oxidase tests and carbohydrate fermentation characteristics by conventional methods and automatic VITEK2 (bioMerieux, France) system. Penicillin (P), amoxicillin-clavulanate (AMC), meropeneme, clindamicin (DA) sensitivities were evaluated with E-test method.

DISCUSSION

Implant failures can be divided according to chronological criteria in early (primary) failures (failure to establish osseointegration) and late (secondary) failures (failure to maintain the established osseointegration)[3]. Early implant failure usually occurs very rapidly with progressive bone resorption and loss of the implant before loading. If this bone loss is not detected and treated at an early stage, implant failure will result.[13] Early implant failures occur because fibrous scar tissue is formed between the bone and implant surface postoperatively, instead of intimate bone-to-implant contact.[14] This type of failures have two different histopathological features, which may represent different phases of the failure process. In one of them, a dense connective tissue capsule rich in fibroblasts and collagen bundles aligned parallel to the implant surface, together with few inflammatory cells surrounding some of these implants. The other histopathological feature was characterized by a soft tissue capsule heavily infiltrated by a large number of inflammatory cells.[15]

Early failure of dental implants could be attributed to local or systemic factors.[16,17]

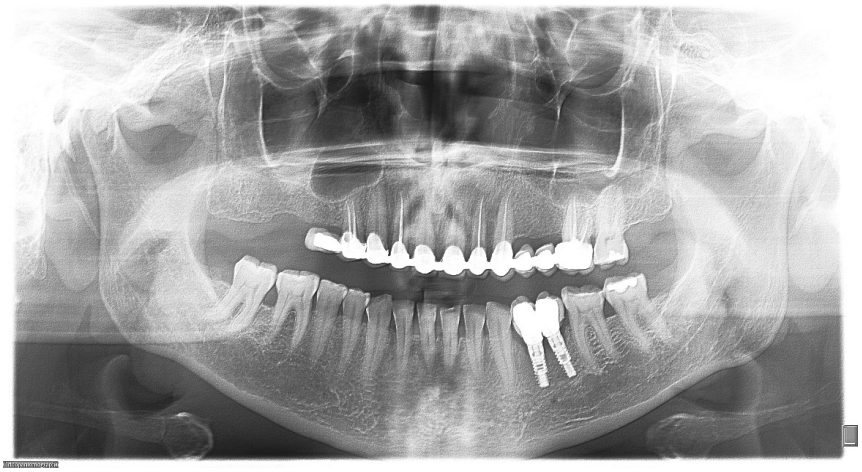

Figure 4. *Radiographic evaluation of two adjacent implants 6 months after prosthetic treatment.*

The influence of systemic conditions in the osseointegration process is poorly documented.[18] Alsaadi et al.[19] noted that Crohn's disease and osteoporosis were associated with increased implant failure; and that gastric and cardiac disease, controlled diabetes type I and II, hypertension, problems with coagulation, hypercholesterolemia, hypo- or hyperthyroidism, claustrophobia and asthma were not related. In osteoporotic patients, with oral bisphosphonates may be a potential risk factor for osteonecrosis of the jaws, rather than osteoporosis as a risk factor for implant success and survival.[16] Also, another study it was suggested, chemotherapy and radiotherapy of oral tissues were significantly related to implant failure.[14] In our case patient was systemically healthy, and follow-up medical evaluations were unable to detect underlying abnormalities.

Several studies reported on the negative effect of smoking on osseointegration.[20,21] The vasoconstrictive action of nicotine; excess levels of carboxyhemoglobin in the blood and impaired polymorphonuclear neutrophil leukocyte function are possible mechanisms leading to impaired wound healing.[14] However, results from the present studies[22-,24] failed to demonstrate significant differences between smokers and non-smokers and tobacco use alone cannot be considered as a risk factor for early implant failures. The impact of smoking may be more important to long-term implant failures than to early implant failures.[22- 24]

A local risk factor is any situation that could pose a risk to successful osseointegration and restoration of a dental implant at the level of the implant site and surrounding teeth.[17] Surgical trauma (overheating) together with inadequate bone volume and quality are generally believed to be the most important local etiological factors for early implant failures.[3] It has been suggested that type 4 and 1 bone types have slightly higher failure rates[5,19] and lack of primary stability or micro motion produced after implant placement preventing osseointegration process.[25] Bone quality in the implant sites in our case was deemed adequate, and good primary stabilization of implants was observed. Regions were prepared with copious irrigation and light drilling pressures along with bone tapping where indicated. Implants were also tightened to place without excessive pressures, which can also lead to

bone loss caused by necrosis of bone cells. Implants which are simultaneously placed with bone graft materials and/or guided tissue regeneration have postsurgical foreign body reaction. This may be the explanation of higher percentage of implants with early progressive bone loss in cases where bone graft and/or membrane are used at the time of implant placement.[13] But in our case no augmentation procedure was utilized.

In implant surgery; the periodontal and endodontic state of neighboring teeth must be taken into consideration. Higher failure rates were reported when implants were inserted next to neighboring teeth than implants in an edentulous ridge.[19] In addition, implants placed next to asymptomatic, endodontically treated teeth[11] or implants inserted next to endodontically treated teeth with periapical lesions have been reported to be associated with greater failure. In our case, teeth adjacent to implants were free from either periapical endodontic lesions, prior endodontic therapy, pulpal symptoms or caries.

Nelson et al.[26] was hypothesized that extra radicular bacteria may persist in apparently healed alveolar bone from previously infected sites, and that these microorganisms may proliferate to trigger early implant failure where bone quality, quantity, and primary stability are optimal. Therefore they conducted a study; 77 microbiological samples were taken from 16 pre-implant extraction sockets, 56 healed post-extraction osteotomies at fixture placement, and five failed fixtures. Tissue fluids and bone samples were analyzed by either anaerobic/aerobic culturing or DNA molecular techniques. They have presented evidence that bone from previously infected and apparently healed sterile sites may harbor bacteria (including Veillonella atypica, Veillonella parvula) as a contamination, which may be reactivated to an infection during clinical implant therapy. However, the teeth were extracted 10 years ago in the present case. During peri-implant biofilm formation the microbial composition alterated from a predominately gram-positive non-motile, aerobic and facultative anaerobic composition towards a flora with a greater proportion of gram-negative, motile, anaerobic bacteria.[27] A metabolic interaction with Veillonella species, which coaggregate with Streptococci.[28] Veillonella species are small, usually non-fermentative, strict anaerobic, gram-negative cocci which are routinely isolated from the oral cavity, the upper respiratory tract, small intestines and vagina.[29] In addition, in this report periodonto-pathogenic bacterial sources of contamination were likely minimal as periodontal health existed at the time of implant placements, although no follow-on bacterial sampling.

CONCLUSION

It can be speculated that some other undiscovered causes such as an unascertained bone pathology or contamination of surgery sites before implant placement may lead early implant failing cases. Bone debridement appears to decrease the number of persistent bacteria in the site of the formerly infected periapical region and the presence of microorganisms resistant to antibiotics (especially penicillin) should not be forgotten. In addition, immediate diagnosis and therapy of early progressive bone loss around dental implants are the key factors to save early failures. Re-evaluation visits (2-4 weeks) after implant placement to detect any signs of early failure and immediate therapies can be achieved if needed.

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