

Long-term Implant Maintenance in a Patient with Sjögren's Syndrome

Long term follow up of dental implant in patient affected with Sjögren's Syndrome.

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Introduction:

Dental implant is coming popular treatment for the patients with missing teeth or edentulous arrears. The implant treatment is a highly reliable and well established for a fixed or removable prostheses with 5-year success rates ranging of 90 to 100% (ref). Although, several references described that implant was contraindication for patients with systemic disease. These patient's patho-phgiology conditions or receiving medication in their treatment may interfere the healing process of following implant treatments. Thus, the patient with systemic disease is increasing a risk of early and late failures of implants.

The benefit of treatment with dental implant in such patients is superiority beyond the risk. Of course, it is necessary to fully evaluate the application to such patients.

The English literature survey performed on the dental implant therapy and systemic diseases using MEDLINE, EMBASE electronic database, such as a diabetes mellitus, AIDS/HIV, rheumatoid arthritis, osteoplosis, Crohn's disease, cardiovascular disease, scleroderma, Sjogren syndrome, lichen planus, ectodermal dysplasia, and post-transplantation status. The review of dental implant and general disease by Zygimantas et al. revealed that systemic disease conditions did not show significant effect to the dental implantation, except for the only weak relation ship with bone density in osteoporosis and implant failure. (Zygimantas). However, reviewing the paper has some limitation according to most papers described limited information in each report, and a relatively short period follow-up.

Sjögren syndrome (SS) is a systemic autoimmune diseases, affects the exocrine glands particularly salivary glands and lacrimal glands. The lesion characterized histopathologically by the infiltrating lymphocytes to the gland and impaired secretions, was generated dry eye and dry mouth. SS reveled more prevalent in female than in male, and usually affected fourth and fifth decade. Oral manifestation of SS shows hyposalivation, xerostomia, burning mouse, rampant caries, sclerosis and swelling of parotid gland.

The SS classified into two clinical forms as primary and secondary sjogren's, with ocular symptom, oral symptom, ocular signs, histopathology, oral signs and autoantibodyies. The secondary sjogrens has implications with other connective tissue disease such as rheumatoid arthritis and lupus erythematosus.

Due to hyposalivation and dry mouth, SS patient complain burning of oral mucosa, discomfort and pain, where wearing conventional removal prothesis. Other manifestation of erythematos candidasis, angular

cheilitis, rampant caries, difficulty of swallowing are often present with SS patient. Several treatment performed to these oral manifestations likes increased fluid intake, salivary stimulation, lubricants and artificial saliva. However, there is no essential treatment for the SS.

Dental implant related prosthesis may great help to release these discomfort in the patient with SS. On the literature, several reviews and case report of dental implant and SS presented, and most of these reports did not showed significant effect on implantation success despite of some limitation of survey. However, some cases existed implant remove

It is certainly too early to give recommendations for the dental implantation in patient with SS.

In this study, a case affected by SS during a term of implants maintenance will be presented and the relationship between long-term implant maintenance and SS will be discussed.

Case:

A 45-year-old female, 156cm in height and 57kg in weight, had a partially edentulous maxilla and mandible with chief complaint of dissatisfaction wearing an upper denture at August 1, 1983. ~~underwent treatment to restore the occlusion on August 1, 1983.~~ She was a non-smoker and her physique was within normal limits. At this initial visit the patient lost 12 teeth in the maxillae and 8 in the mandible, totaling 20 lost teeth (Fig. 1). **The chief complaint was dissatisfaction wearing an upper denture; therefore dental implant treatment was performed and completed.**

最初に何本のインプラントを植えたのですか。それをここで記載、はじめに咬合を回復させる必要があった。この時点で次に抜歯する歯の状態はすでに保存不可能なカリエスがあったのではないですか。単に抜歯でなく保存不可能であることを記述する必要がある。

Thereafter, the remaining natural teeth had to **be extracted gradually** due to severe dental caries, and as a result seven additional implant surgeries were performed after a loss of a natural tooth, during which fixed crown bridge-type prostheses were temporarily placed to restore function to the area of tooth loss.

In total, 22 implants were placed over a span of 25 years from February 1984 to April 2009 (Fig. 2a-c). Two sapphire aluminous implants at No. 44 and 46 in the **first** operation, six rough surface titanium implants at No. 11, 13, 14, 16, 17, and 21 in the **second**, four rough surface titanium implants at No. 23, 24, 26, and 27 in the **third**, two rough surface titanium implants at No. 44 and 46 in the **forth**, two rough surface titanium implants at No. 36 and 37 in the **fifth**, three rough surface titanium implants at No. 33, 43, and 41 in the **sixth**, three rough surface titanium implants at No. 34, 45, and 47 in the **seventh** were placed.

Two sapphire aluminous implants at No. 44 and 46 were removed because of severe resorption of alveolar bone. このインプラント撤去は？ なぜ骨吸収が起きたのか少し説明が必要。(オッセオインテグレーションしないタイプのインプラントで過重負担とかんがえられます)

Two implants (No. 44 and 46) were replaced by rough surface titanium implants, in 2009, thus there were a total of twenty rough surface implants placed: ten implants in the maxillae and ten in the mandible.

Twenty-five years after the first implant, the patient started to complain of dry mouth, difficulty in chewing, and peeling of the lips. However, the patient did not suffer from dry eyes and did not take prescribed medicine. Therefore, in September 2009, several clinical tests were carried out (**Table 1**). General blood test 耳鼻科医のところで採血ですか？ (そうです) results were within the normal range. The patient was anti-Ro/SS-A antibody positive (>32) and anti-La/SS-B antibody negative. The

rheumatoid factor was slightly high as the patient's value was 17.5 IU/ml (normal range: less than 16 IU/ml).

一連の検査の順序が、よくわかりません。いつ何をやったか時系列をお教えてください。

Concerning the ophthalmological examination, the patient was negative in the fluorescent dye test and negative in the Schirmer test with the right eye measuring 7mm per 5minutes and the left eye 8mm per 5minutes. The patient did not complain of any other symptoms of autoimmune disease such as rheumatoid arthritis, systemic lupus erythematosus, or scleroderma. As for salivary flow, resting salivary flow was 0.05 ml per 5 minutes and during stimulation by gum chewing 0.8ml per 5 minutes. These values were considered very low as The Ministry of Health, Labour and Welfare of Japan defines SS (Table 1). In x-ray sialography of the parotid gland, scattered small white spots less than 1mm were observed (Fig. 3). It was classified as Stage I using Rubin and Holt classification⁸⁾.

The minor salivary gland biopsy taken from the labial mucosa showed that lymphocytic infiltration were observed around the salivary ducts and more than one focus over 50 periductal lymphocytes were seen in a 4 mm² area using light-microscopy (Fig.4). The metal patch test for allergy indicated suspected positive for palladium and negative for gold, platinum, silver, and copper. After tests were carried out, the ophthalmologist diagnosed the patient as primary SS using revised international (2002)²⁾ and Japanese (1999)⁸⁾ classification criteria for SS in 2009.

At this time, the patient was not receiving professional maintenance instructions. インプラント術後の定期検診はなかったのですか？ (おこなっています)

After diagnosis, conventional maintenance care by dental hygienists consisting of TBI (tooth brush instruction), PTC (professional tooth cleaning), and PMTC (professional mechanical tooth cleaning) for implants were conducted. EPP (examination of periodontal pocket), BOP (bleeding on probing), and PCR (plaque control record) were checked regularly as part of the peri-implant and dental examination. In PCR, the patient was found to have plaque on 23.8% of the implants. Oral hygiene condition was comparatively good although EPP showed the patient as having a probing depth of 5mm on 6 implants and BOP indicated bleeding on 60% of the peri-implant pockets (Fig. 7a). Two years later, EPP still had a

probing depth of 5 mm on 6 implants, however, the percentage of bleeding from sites of probing decreased to 16% (Fig. 7b).

In panoramic x-ray taken at the initial visit on August 1, 1983, horizontal bone resorption, one third to half of were observed in the remaining tooth roots in the mandible (Fig. 1). In 2009, In an x-ray examination, a funnel-shaped bone defect was found around the cervixes of some metal implants so a sapphire implant cervix was placed in the lower right pre-molar. Although bone defects were discovered, they did not pose a serious threat to the osseointegration of the implants. In 2012, the oral cavity of the patient was generally in good condition on the basis of the periodontal disease tests (Table 3). Invader PLUS technology⁹⁾ was used to quantify periodontitis-related bacteria in the saliva. Results showed the patient had no risk as bacteria in conjunction with periodontal disease was below the level to cause onset of disease. *A. actinomycetemcomitans* comprised less than 0.005% of the total number of bacteria present, and *P. gingivalis*, *T. forsythensis*, and *T. denticola* were found to be below 0.09%.

Concerning dental caries, at the initial examination, there were 2 natural teeth in the maxillae and 6 in the mandible, the number of cavities in the natural teeth were low. これは初診時のことを言っているのですか？

In 2012 a test was done to quantify the number of oral bacteria in the saliva to check for risk of developing caries. The results showed a high number of the caries causing bacteria *Streptococcus mutans* was present (84,000), comprising 3.5% (ideal percentage being less than 0.1%) of the total bacteria found in the oral cavity (Table2). However, the patient no longer had natural teeth so she did not have any risk of developing caries. 意味ありますか？

Upon diagnosis in September 2009, the patient also started an oral wetting care program every three to four weeks. The program consisted of salivary glands massage, education on rehydration, education on improving eating habits, and utilization of the wetting gel (Oralbalance[®], Laclede Inc., USA) and the wetting oral spray (Wet-care[®], Kissei Pharmaceutical Co., Ltd. Japan). The wetting gel was prescribed at first, but the patient disliked the taste and discontinued its use. The importance of moisturizing and instructions on how to gargle using azulene sulfonic acid sodium (Hachiazure[®], Oriental Pharmaceutical

and Synthetic Chemical Co., Ltd. Japan) as well as instructions on how to use multipurpose mouth conditioner (Mouth Conditioner[®], Okina Co., Ltd. Japan) were explained. 書き方を変更。

However, the patient stopped using all of the products. Thereafter, 5-mg of pilocarpine hydrochloride tablets (Salagen[®], Kissei Pharmaceutical Co., Ltd. Japan) were administered to be taken 3 times daily (15-mg/d) to improve oral dryness. However, the patient discontinued its use after 5 weeks and salivary flow could not be checked.

The patient received implant operations seven times over a span of 25 years from 1984 to 2009.

Twenty of the loaded 22 titanium solid implants are still functioning. Two sapphire aluminous implants were lost. Although the total survival rate was 90.9 %, survival rate of rough surface titanium implants was 100% at the final visit. Though the patient became completely edentulous, the oral hygiene of the patient at the final appointment was average (Fig. 5-6). The patient gave consent to be a part of this study.

Discussion:

Sjögren's syndrome (SS) has been defined as an autoimmune disease in which the patient's lymphocyte damages both the salivary and lacrimal glands, causing reduced saliva and tear production leading to xerostomia and keratoconjunctivitis sicca¹⁾. Half of these patients also possess other autoimmune diseases such as rheumatoid arthritis, systemic lupus erythematosus (SLE), or scleroderma. When SS occurs alone, it is referred to as primary SS²⁾. The main symptoms of SS are keratoconjunctivitis sicca and xerostomia resulting from lymphocytes that infiltrate the lacrimal and salivary glands¹⁰⁾. The prevalent cause of xerostomia is medication (reference). Anticholinergics, such as psychotropic agents and antihistamines, and diuretics can dry the oral mucosa¹¹⁾. However, in this case, when the patient was diagnosed with SS, she was not taking any medication and did not complain about other symptoms. Therefore, an optician diagnosed primary SS, but the cause was unknown.

Isidor et al. evaluated the outcomes of treatment with implant-retained prostheses in eight patients suffering from SS⁴⁾. Treatment with implant-retained prostheses considerably increased the prosthetic comfort and function of the patients. Implant-retained prostheses offered a solution to the problems experienced by edentulous patients with SS⁵⁾. Binon, in a long-term follow-up study concerning SS and

implant-retained prostheses, reported that implants and prostheses have remained stable and functional for 13 years⁶. Furthermore, Spinato et al. found that radiographic check-ups did not reveal any peri-implant bone loss after 1 year of loading¹². Implant treatment may, therefore, be an alternative approach for patients with SS⁶. In this study, 2 aluminous implants, out of the 22 implants placed spanning 7 operations, were lost due to dental caries in teeth supporting the superstructures. Aluminous implants did not osseointegrate with alveolar bone. The remaining implants were rough surface titanium and functioned normally over 10 years. As a result, xerostomia caused by primary SS did not appear to influence the retention of rough surface titanium implants.

In this case, if xerostomia had been diagnosed earlier, systematic treatment could have prevented the outbreak of caries, and thus decreased the number of implants performed. Most SS patients no longer produce sufficient quantities of protective saliva. Not only does it cause dry mouth, but also cause damage to the teeth. Saliva's protective properties help recoat the teeth with important minerals that delay the occurrence of caries and infections¹³. Consequentially, decreased production of saliva leads to patients having a higher chance of caries and infections and preventive care should be conducted with SS in mind¹³. It is essential to carefully instruct SS patients on how to brush and floss properly and conduct regularly scheduled check-ups. Additionally, fluoride should be prescribed to strengthen the enamel and prevent caries.

In order to stimulate saliva production, sugar-free gum or sugar-free candy can be recommended. SS patients frequently sip water throughout the day to alleviate the symptoms of dry mouth. However, over sipping will wash away the saliva, therefore the patients lose the protective benefits of the saliva. Massaging the salivary glands, especially the parotid glands located anterior to the ears has been recommended, however, its usefulness was not clear in this case¹⁴. Although pilocarpine hydrochloride tablets (Salagen[®], Kissei Pharmaceutical Co., Ltd. Japan) and cevimeline hydrochloride hydrate tablets (Evoxac[®], Daiichi Sankyo Co., Ltd. Japan) are currently indicated for the treatment of radiation-induced xerostomia, their effects on dry mouth or dry eyes in patients with SS are unclear¹⁴. In this study, pilocarpine tablets were prescribed for the patient, but the quantity of the saliva did not respond to pilocarpine stimulation. The clinical implications of this finding need further investigation.

Conclusion:

We have maintained dental implants for ten years in an implant patient affected by xerostomia caused by primary SS one year after implant treatment. Xerostomia did not appear to influence maintenance of dental implants in the patient.

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References :

- 1) Fox RI, Stern M, Michelson P. Update in Sjögren syndrome. *Curr Opin Rheumatol.* 2000; 12(5): 391-8.
- 2) Vitali C, Bombardieri S, Jonsson R, Moutsopoulos HM, Alexander EL, Carsons SE, Daniels TE, Fox PC, Fox RI, Kassan SS, Pillemer SR, Talal N, Weisman MH, and the European Study Group on Classification Criteria for Sjögren's Syndrome: Classification criteria for Sjögren's syndrome: a revised version of the European criteria proposed by the American-European Consensus Group, *Ann Rheum Dis.* 2002; 61:554–558.
- 3) Binon PP, Fowler CN. Implant-supported fixed prosthesis treatment of a patient with Sjögren's syndrome: a clinical report. *Int J Oral Maxillofac Implants.* 1993 ; 8(1) : 54-8.1)
- 4) Isidor F, Brøndum K, Hansen HJ, Jensen J, Sindet-Pedersen S. Outcome of treatment with implant-retained dental prostheses in patients with Sjögren syndrome. *Int J Oral Maxillofac Implants.* 1999; 14(5): 736-43. (54 Brånemark dental implants were placed in 8 women. No implants were lost, but 7 implants in 4 patients were clinically not osseointegrated at the time of the abutment connection procedure.)
- 5) Payne AG, Lownie JF, Van Der Linden WJ. Implant-supported prostheses in patients with Sjögren's syndrome: a clinical report on three patients. *Int J Oral Maxillofac Implants.* 1997; 12(5): 679-85.
- 6) Binon PP. Thirteen-year follow-up of a mandibular implant-supported fixed complete denture in a patient with Sjögren's syndrome: a clinical report; *J Prosthet Dent.*, 2005 :94:409-413,
- 7) Rubin H, Holt M. Secretory sialography in diseases of the major salivary glands. *AJR Am J Roentgenol.* 1957; 77: 575-598.
- 8) Fujibayashi T. et al. Revised Japanese criteria for Sjögren's syndrome (1999): availability and validity. *Mod Rheumatol.* 2004; 14: 425-434.
- 9) Tadokoro K. et al. Rapid quantification of periodontitis-related bacteria using a novel modification of Invader PLUS technologies. *Microbiol Res.* 2010; 165: 43-49.
- 10) Kruszka P, O'Brian RJ. Diagnosis and management of Sjögren syndrome. *Am Fam Physician.* 2009; 79(6): 465-70.
- 11) Wall GC, Magarity ML, Jundt JW: Pharmacotherapy of xerostomia in primary Sjögren's syndrome.

Pharmacotherapy. 2002; 22(5) : 621-9.

- 12) Spinato S, Soardi CM, Zane AM. A mandibular implant-supported fixed complete dental prosthesis in a patient with Sjogren syndrome: case report. *Implant Dent.* 2010; 9(3): 178-83.
- 13) Astor FC, Hanft KL, Ciocon JO. Xerostomia: a prevalent condition in the elderly. *Ear Nose Throat J.* 1999; 78(7): 476-9.
- 14) Blom M, Kopp S, Lundeberg T: Prognostic value of the pilocarpine test to identify patients who may obtain long-term relief from xerostomia by acupuncture treatment. *Arch Otolaryngol Head Neck Surg.* 1999; 125(5): 561-6.

To do

What is the objective?

What is the conclusion?

Where does oral maintenance come into play?