2010년 8월 석사학위논문 4급 골질에 식립된 덴티스 임프란트의 후향적 연구 박 승 철

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석사학위논문

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도 목 차

ABSTRACT

Retrospective study of Dentis implant system placed in type IV bone quality

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본 연구의 목적은 type Ⅳ 골질에서 Dentis 임프란트를 식립한 후 경과 관찰 기간 중 임프란트의 안정성을 평가하여 임상적 유용성에 대하여 평가하는 데 있다.

2007년 3월부터 2008년 6월까지 시술을 받은 환자 20명을 대상으로 1) 임프란트 식립 직후 및 이차 수술 후 Periotest® 또는 Osstell mentor로 고정값을 측정하여 임프란트의 안정성, 2) 식립 부위의 분포, 3) 성공률 및 실패율을 조사하였다.

식립된 임프란트 수는 총 47개로 식립 부위별 분포를 살펴보면 상악 전치 2개, 상악 소구치 12개, 상악 대구치 22개, 하악 전치 5개, 하악 소구치 1개, 하악 대구치 5개로 나타났고, 식립된 지대주의 평균 직경/길이는 4.25mm/11.53mm였다. 임프란트 식립 중 동반된 골이식술로는 상악동 거상술이 27개, 나사산 노출부의 골이식이 8개, 발치 후 즉시식립이 1개였고, 시행하지 않은 경우가 11개였다. 식립 후 Periotest®를 이용하여 측정한 초기 고정값은 평균 3.4로 나타났고 이차 수술시 측정한 고정값은 -3.04로 양호한 골유합을 보이고 있었으며 식립 후 부여한 치유 기간은 평균 5.73개월이었다. 경과 관찰 기간 중 조기 실패한 임프란트는 1개(1/47)로 97.87%의 성공률을 보였으며, 보철 후(평균 경과 관찰기간: 12.19개월)에는 기능 중 실패한 경우는 없었다.

본 연구의 임상 결과에 의하면 Dentis 임프란트는 type Ⅳ 골질에서 우수한 결과를 보여주는 것으로 나타났다.

I. Introduction

Osseointegrated implants have been introduced in Korea in the the early 1990s. After this introduction, indications for use in the clinics have expanded, with evidence of success in diverse restoration cases. In 1997, the AVANA® implant system was the first Korean dental implant product commercialized. Additionally, active research over the years in Korea has resulted in the development of diverse and advanced dental implant products for worldwide commercialization. One such example is the Dentis implant system which began its commercialization in 2005. It has been used in clinics for several years and is at the stage of assessing its long-term success. Additionally, in order to facilitate advancement in the Korean implant systems, more bench-top research and clinical data will be required to validate the efficacy of the implant system.

Dentis implant has three general fixture designs (internal, external, and submerged) that is of clinical significance. Being compatible with Branemark, ITI, and Astra implant system, the Dentis implant is a product developed to be applied diversely according to esthetical areas or bone condition and the microthread of the upper area of fixture provides primary stability as well as minimizes the loss of bone. Since the fixture is to be inserted within the alveolar bone, its surface is treated with resorbable blast media (RBM), thereby resulting in an ideal surface roughness value (Ra) of 1.5-1.8 ㎛ that is required for osseointegration. The design characteristic of fixture includes threads that have safe cutting edges and self-tapping grooves to reduce the excess bone-implant friction force during implant placement as well as to allow bone to be in contact with the implant during placement in order to attain early fixation capacity and

excellent osseointegraion.[1)]

Since the success of dental implants in type IV bone is often lower when compared to other bone types,[2)] the purpose of this study was to place Dentis implants in type IV bones.[3)] Clinical efficacy of the implants will be evaluated by measuring implant stability (success rate, viability) during the follow up observation.

Ⅱ. Patients and methods

Patients: This study was conducted from March 2007 to June 2008 on patients who visited the department of oral and maxillofacial surgery, outpatient clinic, Chosun University Dental Hospital and was treated with the implantation procedure. The patients included subjects for this study were 20 patients (male: 11 patients, female: 9 patients), with a mean age of 44.7 years (21-65 years). A total of 47 implants were placed in these patients.

Methods: The patient's data were collected using the computed medical record of the Chosun University Dental Hospital, indicating surgical procedures and prosthesis performed by several surgeons. Parameters used for measurement included (1) implant stability assessed by measuring the fixation value immediately after implant placement or after second surgery using a Periotest® (Siemens AG, Benssheim, Germany) or Osstell mentor (Integration Diagnostics AB, Goteborg, Sweden), (2) implant distribution with respect to placement sites, and (3) success rate as well as failure rate of the implant.

Ⅲ. Results

Of the 47 total implants placed in the 20 patients, 2 implants were placed in the maxillary anterior teeth site, 12 implants were placed in the maxillary premolar teeth site, 22 implants were placed in the maxillary molar teeth site, 5 implants were placed in the mandibular anterior teeth site, 1 implants was placed in the mandibular premolar tooth site, and 5 implants were placed in the mandibular molar teeth site (Figs. 1, 2). The mean diameter and length of the placed abutment was 4.25 mm and 11.53 mm, respectively.

Sinus grafting was performed on 27 sites (right : left = 14 : 13) during implant placement, whereas bone grafting was performed on 8 sites for implants with exposed screw threads. Immediate implant placement after post-extraction was performed on 1 site, whereas the other 11 sites did not receive immediate implant placement after post-extraction.

Using Periotest®, an average early fixation value after placement was observed to be 3.4, whereas -3.04 was indicated as an average fixation value measured during the second surgery. The implants were observed to be well-osseintegration, with an average the healing period of 5.73 months after implant placement. Mean follow-up observation period was 12.19 months. One early implant failure was observed during follow-up period, suggesting a 97.87% success rate. No failure was observed after prosthesis or during loading.

Ⅳ. Discussion

Prosthetic treatments using implants have continuously improved after introducing implants in Korea for the first time in the early 1990s. At present, implant therapy has become a predictable treatment procedure. Implants used are classified broadly either as threaded or non-threaded implants. The press-fit cylindrical implants used in the past are hardly used in recent days due to the rapid downward progression of bone destruction and thereby resulting in poor therapeutic outcome. The threaded implant is designed to increase early implant stability of implants by maximizing early bone-implant contact, increasing the surface area, and distributing stress. The trend to develop and commercialize double-threaded or the triple threaded implants for type IV bones have been reported to generate less heat and demand more torque.[4)]

In addition to implant design, diverse surface treatment techniques are continuously developed with goals to improve clinical outcomes. Blasting surface treatments are used modify surface texturing by spraying rough particles of various diameters. In many instances, aluminum oxide (Al_2O_3), titanium dioxide (TiO_2), and calcium phosphate (CaP) particles are used for the blasting treatment. Among the three particles mentioned, the high impact force from use of Al_2O_3 is a shortcoming since it's residual Al_2O_3 particles are known to impinge on the soft titanium implant surfaces. As a result, acid etching is required to remove these residues after blasting treatments. Surfaces blasted with CaP particles are also known as resorbable blast material (RBM surface). The RBM surface is a biocompatible roughened surface that increases surface area as well as promotes early osseointegration. With no residues and the enhancement of surface roughness

observed after blasting, early fixation of RBM surface implants and resorption of the CaP have been reported in an *in vivo* study.[4)]

Previous studies have also reported low success rate for implants placed in type IV bone when compared to implants placed in type I, II, and III bones.[5-7)] In one particular study, 97% of the Branemark implants placed in type I, type II and type III bones were successful, whereas only 65% success rates was reported for implants placed in type IV bones.[8)] As such, it was suggested that knowing the bone quality prior to surgery pre-determined implant success or failure.

In addition to bone quality, the ability to achieve initial implant stability is one of the many fundamental criteria for osseointegration.[9)] However, many elderly patients receiving implants have insufficient bone volume or poor bone quality. Areas with low bone density are typically observed in the posterior region of the jaw. In reviewing literatures on bone quality within the jaw,[10-12)] D1 bones are rarely present in the maxilla whereas approximately 8% are found in the mandible. D1 bone is 3 times more often found in the mandibular anterior tooth area when compared to the mandibular molar area. D2 bone is most prevalent the mandible, with two-third of the mandibular anterior tooth area and half of the mandibular molar area being formed by D2 bones, respectively. D3 bone is prevalent in the maxilla, with more than 50% and 65% of the patients having D3 bone in the maxillary molar area and the maxillary anterior tooth area, respectively. D3 bone is also found in 25 % of the mandibular anterior tooth area and approximately 50% of the mandibular molar area. D4 bone is observed in approximately more than approximately 40% of the maxillary molar area, whereas less than 10% of the maxillary anterior tooth area is made up of D4 bone.

For patients with insufficient bone volume, bone formation may be induced using a variety of bone graft materials. In 5-year study on

66 titanium implants placed within regenerated bones of partially edentulous patients, Busher et al. reported a 100% 5-year viability and 98.3% success rate when the site was reconstructed with autologous bone graft and using a nonresorbable membrane.[13] Other studies have also reported substantial improvement in success rates when using osteotome[14] or plasma with rich platelets[15,16] are used in implant sites having type IV bone.[3,17] In addition, the selection of fixture design suitable for the patient's alveolar condition is important. Using different implants with respect to bone quality, Misch et al have reported a 100 % success rate for implants placed in D1 bone, a 98.4% success rate for implants placed in D2 bone, a 99% success rate for implants placed in D3 bone, and a 100% success rate for implants placed in D4 bone.[17] In another study conducted on the type IV bone, there was a 100% accumulation viability, with 5 out of 178 implants failed or a 98.8% of high success rate.[3] In this study, 1 early implant failure out of 47 placed implants was observed follow-up period, representing 97.9% success rate. No failure was observed after prosthesis installation or during loading. The early implant failure site was at #16, where the tooth was extracted due to periodontitis, and implant mobility was observed at 5 months after the implant was simultaneously placed with the maxillary sinus elevation. Failure of the bone to heal after guided bone regeneration (GBR) as a result of the presence of residual inflammatory tissues, insufficient residual bone, etc. was speculated to be one of the causes of the early implant failure.

V. Conclusion

In this study, Dentis implants were placed in type IV bone and the prognosis was assessed. One early implant failure was observed during follow-up. No implant mobility was observed during loading or after installation of the prosthesis. Based on this short clinical observation, Dentis implants were found to exhibit good results in the type IV bone quality. However, due to the limits of this study, including the number of study subjects and the study period, future studies should include increasing the study period as well as increasing size of the populations for the study.

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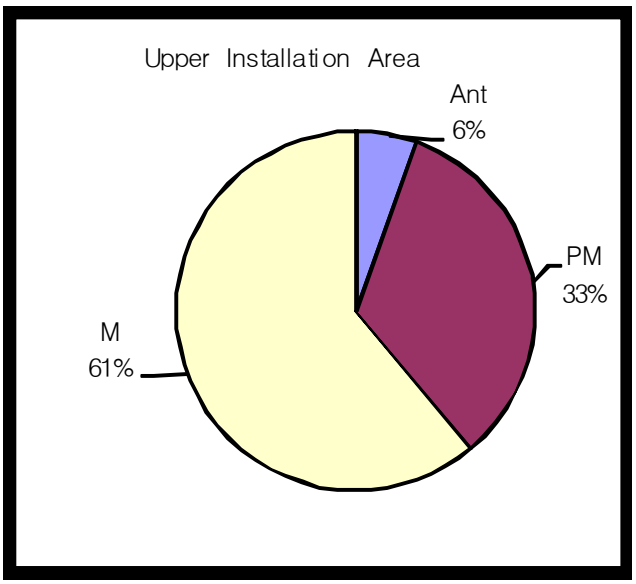

Fig 1. Distribution of fixtures in maxilla. The majority of fixtures were installed in molar area (67%), and premolar and anterior region was 30% and 3% (Ant.: anterior, PM: premolars, M: molars).

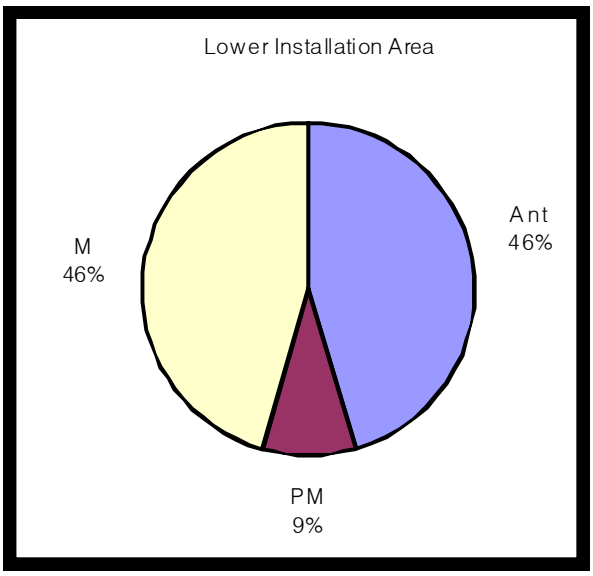

Fig 2. Distribution of fixtures in mandible. 56% of all fixtures were placed in the molar region, and no fixtures were placed in premolar region (Ant.: anterior, PM: premolars, M: molars).

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	영어 : Retrospective study of Dentis implant system placed in type Ⅳ bone quality				

본인이 저작한 위의 저작물에 대하여 다음과 같은 조건아래 조선대학교가 저작물을 이용할 수 있도록 허락하고 동의합니다.

- 다 음 -

1. 저작물의 DB구축 및 인터넷을 포함한 정보통신망에의 공개를 위한 저작물의 복제, 기억장치에의 저장, 전송 등을 허락함
2. 위의 목적을 위하여 필요한 범위 내에서의 편집·형식상의 변경을 허락함. 다만, 저작물의 내용변경은 금지함.
3. 배포·전송된 저작물의 영리적 목적을 위한 복제, 저장, 전송 등은 금지함.
4. 저작물에 대한 이용기간은 5년으로 하고, 기간종료 3개월 이내에 별도의 의사 표시가 없을 경우에는 저작물의 이용기간을 계속 연장함.
5. 해당 저작물의 저작권을 타인에게 양도하거나 또는 출판을 허락을 하였을 경우에는 1개월 이내에 대학에 이를 통보함.
6. 조선대학교는 저작물의 이용허락 이후 해당 저작물로 인하여 발생하는 타인에 의한 권리 침해에 대하여 일체의 법적 책임을 지지 않음
7. 소속대학의 협정기관에 저작물의 제공 및 인터넷 등 정보통신망을 이용한 저작물의 전송·출력을 허락함.

동의여부 : 동의(○) 반대( )

2010 년 8 월 일

저작자: 박 승 철 (서명 또는 인)

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