

Assessment of early and late implantation

failure of teeth: A single-center experience with 297 implanted teeth

Evaluación de la falla de implantación temprana y tardía de los dientes: una experiencia de un solo centro con 297 dientes implantados

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Received/Recibido: 01/28/2021 Accepted/Aceptado: 02/15/2021 Published/Publicado: 06/10/2021 DOI: <http://doi.org/10.5281/zenodo.5218641>

Resumen

Antecedentes: el fracaso temprano y tardío de la implantación de dientes generalmente se atribuye a las condiciones locales de los dientes, los factores de riesgo, los procedimientos quirúrgicos de 1 o 2 etapas, la calidad de los materiales protésicos y la profesión del cirujano. **Objetivos:** Este estudio tuvo como objetivo evaluar la tasa de fracaso temprano y tardío de la implantación dental. **Materiales y métodos:** Este estudio prospectivo, unicéntrico, realizado en la Consultant Clinic of Dental Implant en el Departamento de Odontología del University College of Al-Rafidain en Bagdad-Iraq durante 2017-2020. Se incluyó en el estudio a un total de 141 pacientes (80 mujeres y 61 hombres). Se implantó un total de 297 dientes mediante un procedimiento de 1 y 2 etapas. **Resultados:** Dieciséis pacientes fueron tratados con 1 etapa y 125 pacientes con un procedimiento de 2 etapas. La tasa de falla temprana fue de 30 de los 297 dientes implantados, mientras que la tasa de falla tardía fue insignificante. El tabaquismo y la diabetes mellitus como factores de riesgo de fracaso de la implantación constituyeron porcentajes pequeños. **Conclusión:** Se concluye que el fracaso temprano de la implantación de dientes no es una complicación grave, mientras que el fracaso tardío es insignificante. Además, un procedimiento de 2 etapas es eficaz como un procedimiento de 1 etapa.

Palabras clave: *Implantación de dientes, Fracaso temprano, Fracaso tardío, 1 etapa, 2 etapas*

Abstract

Background: Early and late failure of teeth implantation usually attributed to local conditions of the teeth, risk factors, surgical procedures whether 1-stage or 2-stage, quality of prosthetic materials, and the surgeon 'profession. **Objectives:** This study aimed to assess the early and late failure rate of dental implantation. **Materials and methods:** This prospective, single-center study done in the Consultant Clinic of Dental Implant in the Department of Dentistry at the University College of Al-Rafidain in Baghdad-Iraq during 2017-2020. A total number of 141 patients (80 females and 61 males) were included in the study. A total number of 297 teeth were implanted using a 1-stage and 2-stage procedure. **Results:** Sixteen patients were managed with 1-stage and 125 patients with a 2-stage procedure. The early failure rate was 30 out of 297 implanted teeth, while the late failure rate was negligible. Smoking and diabetes mellitus as risk factors of implantation failure constituted small percentages. **Conclusion:** It concludes that early failure of teeth implantation is not a serious complication, while the late failure is negligible. Moreover, a 2-stage procedure is as effective as a 1-stage procedure.

Key words: *Teeth Implantation, Early Failure, Late Failure, 1-Stage, 2-Stage*

Introduction

Dentistry aimed to restore the patient to normal function; aesthetic and speech by replace the missing tooth, what make dental implant important option in restoring missing teeth the high ability to achieve these goals with high efficiency¹. Previous studies mentioned that 2-3% of implanted teeth are lost during the process of healing². Some authors reported that the failure rate is ranged between 0.3 and 1.3% per year using different surgical approaches³. Several factors play roles

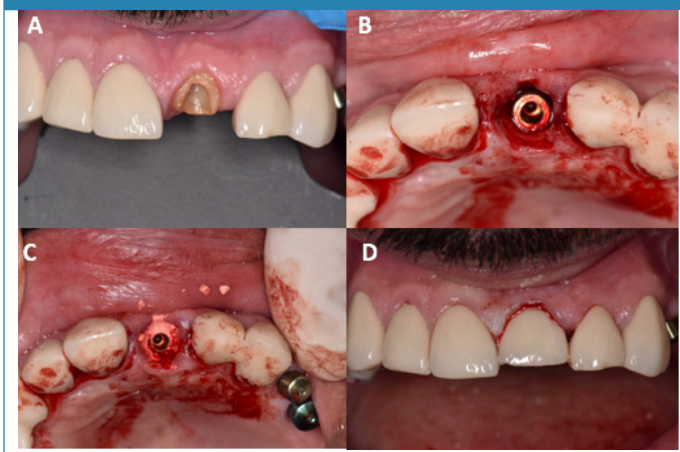
in the implanting teeth failure, periodontal diseases, poor oral hygiene, bad social habit e.g. smoking, and chronic diseases e.g. diabetes mellitus^{4,5}. In addition, dentist profession and implant systems or design are also involved in the survival rate of implanting teeth^{6,7}. In one systemic review, a survival rate of more than 50% over 5-years was reported without any significant technical or biological, or aesthetic complications⁸. Early implant failure was reported at individual and implant

levels by 0.8% and 0.5% in one study, and patients aged >40 years, or currently smokers or those with chronic diseases had a higher percentage of early implant failure⁹. Sakala et al (2012) 10 attributed suboptimal design of dental implantation and improper prosthetic constructions are the causes of implant failure as they observed that early failure is associated with surgical trauma and infection, while the late failure is related to the occlusal overload and periimplantitis¹⁰. In order to eliminate the dentist profession and the materials used in the dental implantation as contributor factors of implant failure, this a single-center study was conducted to assess the requirements of the surgical approaches that improve the survival rate of implantation with a minimum complication.

Material and methods

This prospective study was done in the Consultant Clinic of Dental Implant in the Department of Dentistry at the University College of Al-Rafidain in Baghdad-Iraq during 2017-2020. A total number of 141 patients (80 females and 61 males) were included in the study. The median age of the participants is 50 years with a range of 20-70 years. All the patients were recruited from single-center, and a single surgical team comprised of the maxillofacial specialist surgeon and paramedic staff carried on the surgical procedure and the follow-up. A total number of 297 implanted teeth belonged to 141 patients were studied. Sixteen out of 141 patients were subjected to immediate placement procedure. In brief, patients without any evidence of local inflammation or recent infection (which excluded by clinical observation and pre-operative radiological pictures), and without clinical evidence of traumatic or pathological periapical lesions were undergone tooth implantation. Non-restorable tooth extraction was carried on under local anesthesia, and a fixture of the implant was immediately inserted in the socket. Bone graft in form of hydroxyapatite was used to fill the gap if it is of ≥ 2 mm depth to enhance the Osseo integration. as seen in figure 1. 125 out of 141 patients were electively planned for tooth implantation.

Fig 1. (A): un restorable central incisor (B) implant inserted in the fresh socket (C) bone graft to fill the gap around the implant (D) temporary crown inserted

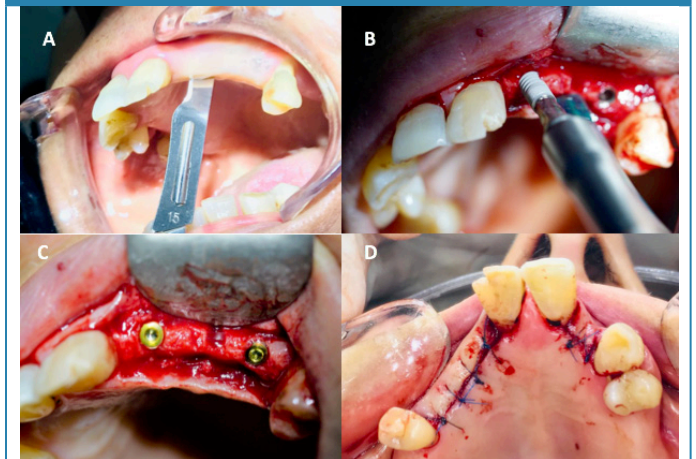


In brief, the tooth implanted in the edentulous ridge either by a rising flap or flapless then follow the drilling sequence according to the operating implant system used and insert the implant with primary torque > 35 Newton. A straight flange in solid screw endosseous implant with diameter ranged from 3.3 mm to 4.8 mm and length range from 8mm to 14 mm was used. as seen in Fig 2

Two operating implant system were used in this study, including Easy Box surgical case (Easy implant, France), and T6 Nucleoss implant (Nucleoss implant system, Turkey)

The primary outcome measure is determining the rate of early and late failure of teeth implantation in patients subjected to implantation immediately after tooth extraction or after a latent period (which exceeding three months) from teeth extraction.

Fig 2. (A) flap incision using scalpel 15 (B) implant fixture insertion in native bone (C) implant in its final position and cover screw in (D) closure with nylon 5/0 interrupted sutures



Statistical analysis

The results are expressed as a number, percentage, median, and mean \pm SD. The p-value was calculated using the difference between proportions test, taking p-value ≤ 0.05 is the lowest limit of significance. Excel 2010 software program was used for analyzing the data and plotting the figures.

Results

A total number of 141 participants have completed the study. Female to male ratio is 1.31: 1, and the mean \pm SD of the age is 46.4 ± 12.8 years. Current smoking is reported in 7.8% of the participants (11 out of 142), and 9 out of 141 patients had a history of diabetes mellitus. Figure 3 shows that the distribution of teeth implantation according to the site. The ratio of the maxillary-to mandible teeth implant is 1.71:1 (89 versus 52) which is significantly ($p < 0.001$) differed. The number of implanted teeth ranged between 1 and 8 with a median value of 2. Figure 4 shows the frequency distribution curve of the number of implanted teeth per patient. The majority of patients (47.5) had a chance to implant two teeth at the time of the study, while none of the participants was implanted seven

teeth in this study. Thirty teeth were implanted immediately after teeth extraction in 16 patients, while 267 teeth were implanted at least 3 months after extraction in 125 patients. Early failure was reported in 4 out of 30 (13.3) implanted teeth immediately after extraction compared with 7.5% (20 out of 267) implanted teeth after a latent period of extraction, which non-significantly ($p>0.05$) differed. Smoking and diabetes mellitus as risk factors of early failure was observed in one smoker and one patient with diabetes mellitus. All 297 implanted teeth did not show any evidence of latent failure up to three years following-up.

Figure 3. Distribution of patients according to the site of the implanted teeth

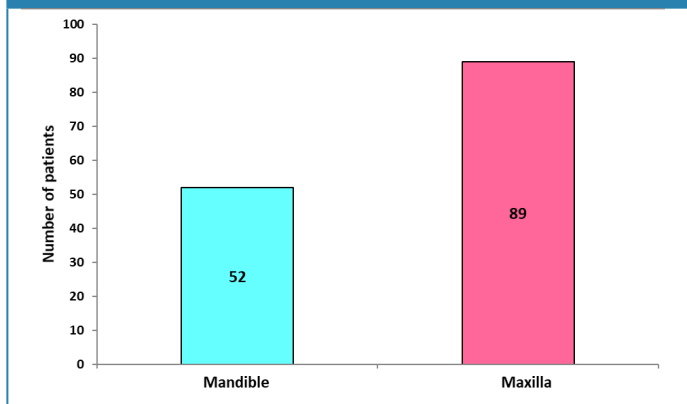
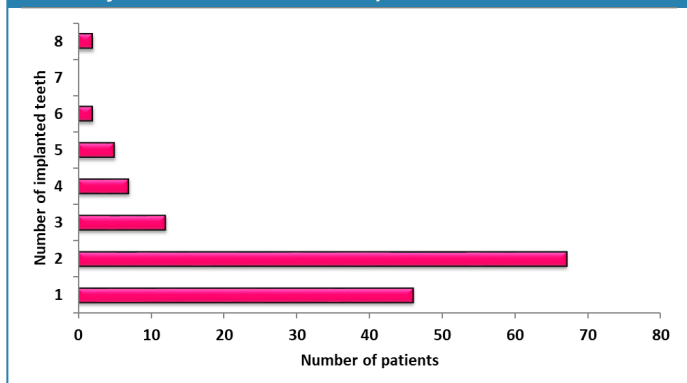


Figure 4. Frequency distribution bar plot of the number patients who subjected to the number of implanted teeth



Discussion

The results of this study derived from single-center in Baghdad-Iraq highlight many points that indicate the specificity of dental implantation in Middle East Countries. The mean age of patients in this study is 46.4 years, while the age of patients in the developed countries is more 70 years which is higher than the corresponding patient's age of this study¹¹. The ratio of female-to-male patients that attended dental implantation is 1.31 to 1.0, and this could explain the low rate of implantation failure as the gender male is considered as a risk factor¹². In the study, smoking is not considered an important risk factor as reported by others¹³ because only one smoker patient

showed implantation failure. Also one out of nine diabetic patients showed early implant failure, which indicates that diabetes is not the only cause of implantation failure rate¹⁴. Early failure rate was significantly higher in teeth implanted in the maxilla site compared with the mandible site (22 versus 8, $P<0.05$). This finding agreed with others, as the surgical procedure of teeth implantation in the maxilla required many specifications¹⁵. The maximum number of implanted teeth is eight, which agreed with others¹⁶. Bone grafting was carried on to fill the gap if it is of ≥ 2 mm depth to enhance the Osseo integration as recommended by others¹⁷. The survival rate of implanted teeth with a 1-stage placement procedure is effective as a 2-stage procedure, which agreed with other studies¹⁸. The strength of this study included, the number of implanted teeth is higher compared with other studies because the data of this study obtained from one center within a short period¹⁹. This study was carried on the Teaching Dental Clinics, and the undergraduate students have a chance to practice teeth implantation^{20,21}.

Conclusion

Early failure of teeth implantation is not a serious complication, while the late failure is negligible. Moreover, a 2-stage procedure is effective as a 1-stage procedure, and every effort is needed in the maxilla-teeth implantation to reduce the early failure rate.

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