Evaluation of implant osseointegration success: Retrospective study at update course

Avaliação do sucesso da osseointegração dos implantes em curso de formação: Estudo retrospectivo

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ABSTRACT

Objective: With the scientific and technological advances, the life expectancy of the population has increased over the years. With the advent of dental implants, a new possibility of treatment for oral rehabilitation was created to help or even help overcome the limits of conventional fixed dentures, removable and mainly total. Compared to conventional rehabilitation treatment on natural teeth, rehabilitation on implants has higher rates of success and longevity.

Material and Methods: For this research we evaluated the medical records of patients who received surgical treatment for implant placement in the update current school of Implantology ECO (Continuing Studies in Dentistry) in São José dos Campos, in the 2008 ‘period to 2012, in order to obtain, analyze and relate the following criteria: the patient gender; year and number of installed dental implants; the region of implant installation; the trademark of the installed implant and the successful osseointegration, or process in which there is a rigid fixation between the living bone and the surface of the implant installed. Results: According to the analyzed data, it was observed, along five years, a total of 434 implants placed in patients, mostly women in the mandibular region. However, the total loss was of 5 implants, most in the maxilla and in men, 3 of these, cone-Morse implants, one internal and one external hexagon. Conclusion: Thus, the success rate in the osseointegration implants seems to be more influenced by patient selection and surgical and prosthetic guidelines, compared the experience of the dentist.

KEYWORDS

Dental implants; Oral rehabilitation; Retrospective study.

RESUMO

Objetivo: Com os avanços científicos e tecnológicos, a expectativa de vida da população tem aumentado ao longo dos anos. Com o advento dos implantes dentários, uma nova possibilidade de tratamento para reabilitação oral foi criado para ajudar ou até mesmo superar os limites de próteses fixas convencionais, removíveis e até a total. Em comparação com o tratamento de reabilitação convencional em dentes naturais, reabilitação sobre implantes tem maiores taxas de sucesso e longevidade.

Material e Métodos: Para esta pesquisa foram avaliados os prontuários de pacientes que receberam tratamento cirúrgico para a colocação dos implantes no curso de atualização de Implantodontia da escola ECO (Estudos Continuados em Odontologia), em São José dos Campos, no período de 2008 a 2012, a fim de obter, analisar e relacionar os seguintes critérios: o sexo do paciente; ano e o número de implantes dentários instalados; a região de instalação do implante; a marca do implante instalado e a osteointegração bem sucedida, processo no qual há uma fixação rígida entre o osso vivo e a superfície do implante instalado. Resultados: De acordo com os dados analisados, verificou-se, ao longo de cinco anos, um total de 434 implantes colocados em pacientes, a maioria mulheres na região mandibular. No entanto, a perda total foi de 5 implantes, a maioria na maxila e nos homens, três deles, implantes cone-morce, um hexágono interno e dois externos. Conclusão: Assim, a taxa de sucesso dos implantes parece ser mais influenciada pela selecção do paciente e orientações cirúrgicas e protéticas, em comparação a experiência do dentista.

PALAVRAS-CHAVE

Implantes dentários; Reabilitação oral; Estudo retrospectivo.
INTRODUCTION

Over the last three decades, the rapid knowledge growth associated with scientific and technological advances have imposed significant challenges in training of dentists. With the global trend of increased elderly population who are keeping the teeth [1,2], the demand for targeted therapies and services is also increasing, not only to ensure the oral and general health, but also to improve the quality of life. Thus the treatment with dental implants has developed significantly during the past two decades [3,4].

According to the Brazilian Institute of Geography and Statistics (IBGE, 2003) the life expectancy of Brazilians has increased from 62.6 years in 1980 to 71.3 years in 2003, consequently increasing the number of elderly and the burden of dental care for this population. The loss of teeth and the need for prosthetic rehabilitation are common characteristics of elderly patients [5,6].

In this sense, dental implants have become a desirable treatment option [7,8] due to the high success rates [9], the increased interest and acceptance of the patient [10], the conservation of adjacent tooth structure, and the preservation of the alveolar bone [9].

Success criteria established for single osseointegrated implant [12-16] have minimum success rate of 85% at 5 years and 80% at 10 years.

In addition to the increased demand for this type of treatment by the population, implantodontists, general dentists, and other dentists are planning and delivering treatment through this technique attempting to attend the awareness and meet the expectations of patients regarding their oral health and aesthetic [3]. The learning in academic settings is strongly related to how students are tested or examined. The assessment should therefore be integrated, coordinated, and reflect learning outcomes. As a consequence of the knowledge obtained in undergraded, resulting in DDS degree, the supply and demand of postgraduate courses have increased.

Therefore, this study aimed to evaluate retrospectively the osseointegration success rate of implants installed between 2008 and 2012, in the Update Course in dental implants, taught at the Center of Continuing Studies in Dentistry (ECO) in São José dos Campos, SP, Brazil.

MATERIAL AND METHODS

The sample was composed by 204 files. The patients voluntarily sought treatment in the institution. All patients received implants for oral rehabilitation.

Inclusion criteria were the presence of complete data of patients receiving at least one implant, comprising: identification, medical history questionnaire, extraoral and intraoral examinations, filling in of the date, implant type, area of installation, surgical description, and patient’s signature. Exclusion criteria for the study were incomplete medical records of patients undergoing the study treatment.

All cases used imaging and study casts for treatment planning. All implants were installed under local anesthesia, under professor’s supervision, at the institution of the course. Students were trained dentists, but with little experience in the field of implant dentistry.

The professor chose the implant trademark, type, size, and location of insertion in accordance with the prior planning. Surgical templates were manufactured meeting the needs of each patient, either for maxilla or mandible.

Preoperative protocol

All patients underwent surgery regardless of the number of implants placed or area. Prior to surgery, all patients underwent extra- and intraoral asepsis. The pre-operative drug protocol was standardized, as follows:
1) Amoxicillin (500 mg) - 2 tablets 1 hour before surgery or clindamycin (300 mg) - 2 tablets 1 h before surgery (in cases of allergy to penicillin);

2) Decadron (4 mg) - 2 tablets 1 h before surgery;

Postoperative protocol

The postoperative drug protocol was as follows:

1) Amoxicillin (500 mg) - 1 capsule of every 8 h for 7 days or clindamycin (300 mg) - 1 tablet of every 8 h for 7 days (in cases of allergy to penicillin)

2) Profenid (200 mg) - 1 tablet daily for 3 days

3) Paracetamol (750 mg) - 1 tablet every 6 h in case of pain.

All inserted implants showed primary stability above 32 N.

All patients were examined postoperatively after 2 weeks. Six months after implant placement, patients were clinically and radiographically examined to start the prosthetic treatment.

We analyzed 204 files of patients seen and treated during the five years (2008-2012). The evaluations were performed by date of appointment from June to December of each of the study years. The evaluation criteria was composed by:

- age and gender of the patients
- year of implant installation;
- number of implants installed;
- area of installation;
- the implant system;
- osseointegration success
- emergency cases

**RESULTS**

The success rate of implant osseointegration was obtained for the period of 5 years and for each year and displayed in tables. Most patients received an average of two implants. The following trademarks were used: Neodent® (Paraná / Brazil) and Sin® System implants (São Paulo / Brazil).

In total, 434 implants were installed: 289 in females and 145 in males. The mean age of patients was 50.27 years.

In 2008, a total of 22 patients (13 women and 9 men) were treated. These patients received 58 implants: 31 in the mandible and 27 in the maxilla. The average age of the patients was 50 years. No implant loss was reported in this year (Table 1).

In 2009, the total number of patients was higher (n = 39, 23 women and 16 men) and the mean age of patients was higher than that of 2008 (54.4 years). In total, 87 implants were installed.

<table>
<thead>
<tr>
<th>Year</th>
<th>N patients</th>
<th>Females</th>
<th>Males</th>
<th>Total number of implants</th>
<th>Maxilla</th>
<th>Mandible</th>
<th>Mean age</th>
<th>Loss</th>
</tr>
</thead>
<tbody>
<tr>
<td>2008</td>
<td>22</td>
<td>13</td>
<td>9</td>
<td>58</td>
<td>27</td>
<td>31</td>
<td>50</td>
<td>0</td>
</tr>
<tr>
<td>2009</td>
<td>39</td>
<td>23</td>
<td>16</td>
<td>87</td>
<td>28</td>
<td>59</td>
<td>54.4</td>
<td>4</td>
</tr>
<tr>
<td>2010</td>
<td>44</td>
<td>30</td>
<td>14</td>
<td>91</td>
<td>36</td>
<td>55</td>
<td>47.3</td>
<td>0</td>
</tr>
<tr>
<td>2011</td>
<td>55</td>
<td>34</td>
<td>21</td>
<td>116</td>
<td>39</td>
<td>77</td>
<td>48.68</td>
<td>0</td>
</tr>
<tr>
<td>2012</td>
<td>44</td>
<td>22</td>
<td>12</td>
<td>82</td>
<td>42</td>
<td>40</td>
<td>51</td>
<td>1</td>
</tr>
<tr>
<td>2008 to 2012</td>
<td>204</td>
<td>122</td>
<td>72</td>
<td>434</td>
<td>172</td>
<td>262</td>
<td>50.27</td>
<td>5</td>
</tr>
</tbody>
</table>
(59 in the mandible and 28 in the maxilla). The evaluation of implant osseointegration showed 4 implant losses (Table 1).

In 2010, 44 patients were treated (30 women and 14 men), with lower mean age of patients than that of previous years (47.03 years). In total, 91 implants were installed (55 in the mandible and 36 in the maxilla). No implant was lost (Table 1).

In 2011, 55 patients were treated (34 women and 21 men), with lower mean age than those of 2008 and 2009, but higher than that of 2010 (48.68 years). In total, 116 implants were installed (77 in the mandible and 39 in the maxilla). No implant was lost (Table 1).

Finally, in 2012, a small number of patients were treated (n = 34, 22 women and 12 men), with average age of 51 years. In total, 82 implants were installed (40 in the mandible and 42 in the maxilla). One implant was lost (Table 1).

During the 5 year period, a total of 434 implants were installed, mostly in women, in the mandible. Five implants were lost during this period, mostly in maxilla and in men. Of these 5 losses, 3 were morse taper implants, one was internal hexagon implant, and one was external hexagon implant (Table 2). The confidence interval (CI) estimation of the implant loss prevalence of the sample (n = 204) was five losses (2.45%). Considering a 95% CI, the implant loss prevalence would range from 0.8% to 5.62% over five years.

**DISCUSSION**

Although implant-supported prosthetic rehabilitation shows higher rates of success and longevity [12], failures might occur. The osseointegration failures in implant-bone interface may occur before or after the prosthesis delivery with infection, delayed healing, and overload [17]. The early loss causes might be: overheating, infection and trauma during surgery, bone amount/quality, lack of immediate primary stability, and incorrect indication. On the other hand, late implant loss can occur due to peri-implantitis, occlusal trauma, and overload [18]. In this study, two losses occurred one year after the prosthesis delivery and one just after the prosthesis delivery, corroborating the literature. The reasons for two losses were not reported.

The success of any implant procedure depends on the relationship among many phenomena: biocompatibility of the material; implant macro- and microscopic surface; the area of installation; health (uninfected) and morphological context (bone quality); the surgical technique alone; the undisturbed healing phase; prosthetic design; prosthetic material used; patients' hygiene; and systemic factors [12,14,17].

In our study, we assessed the implant site and the patient's gender. The success rate of implants placed in the mandible (99.61%) without statistically significant differences from the maxilla (97.67%) was similar to that of other studies [19,20]. However, these results differ from studies of Jem T et al. [21] Adell R et al. [22] Susin C et al. [23] Lazzara RJ et al. [24] which show higher success rates in the maxilla. Considering the patient's gender, the percentage of success in women (99.18%) and in men (94.44%) was different from that.
of the study of Babbush CA e Shimura M [19], in which the highest percentage of success was reported in males. In all of these studies, although the authors consider the location of implant installation and the patient’s gender, they did not report the possible causes of implant failures.

In addition to discussing the possible causes of osseointegration failure, this study also aimed to determine whether the professional experience would influence on the final outcome. Some authors believe that the limited clinical experience can be considered a risk factor for implant success [25]. However, studies comparing the outcome of implants placed by students or experts demonstrated high osseointegration success rates [26-28]. In this study, the success rate obtained from 2008 to 2012 by newly-graduate students was 98.84%, higher than that (95.2%) obtained in the private practice in the study of Ribeiro FS et al. [28]. Among prosthetic platforms and implant types used in this study, two were also present in the study of Ribeiro FS et al. [28]: external hexagon/cylindrical and internal hexagon/cylindrical-conical. In addition to the implant type, the average age of the patients can be compared. The average age of the study of Ribeiro FS et al. [28] was shorter (45.4 years) than that of the present study (50.27 years). The total implant loss of this present study was similar to that of the study of Nixon K et al. [29] (98.4%) in 1,000 implants placed at private practice. Accordingly, our study showed a satisfactory outcome, with small losses reported. The mean age of 50 years also represented the highest percentage in the study [29].

Thus, according to the results obtained, we agree with Melo M et al. [26]; Vidal R et al. [27]; Ribeiro FS et al. [28], because the dentist’s experience was not a risk factor for implant failure.

CONCLUSION

It was concluded that the success rate seems to be more influenced by patient selection and surgical/prosthetic guidelines than by the dentist’s experience.

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REFERENCES


