



## Assessment of Various Risk Factors for Success of Delayed and Immediate Loaded Dental Implants: A Retrospective Analysis

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### ABSTRACT

**Introduction:** Ever since its introduction in 1977, a minimum of few months of period is required for osseointegration to take place after dental implant surgery. With the passage of time and advancements in the fields of dental implant, this healing period is getting smaller and smaller. Immediate loading of dental implants is becoming a very popular procedure in the recent time. Hence, we retrospectively analyzed the various risk factors for the failure of delayed and immediate loaded dental implants.

**Materials and methods:** In the present study, retrospective analysis of all the patients was done who underwent dental implant surgeries either by immediate loading procedure or by delayed loading procedures. All the patients were divided broadly into two groups with one group containing patients in which delayed loaded dental implants were placed while other consisted of patients in whom immediate loaded dental implants were placed. All the patients in whom follow-up records were missing and who had past medical history of any systemic diseases were excluded from the present study. Evaluation of associated possible risk factors was done by classifying the predictable factors as primary and secondary factors. All the results

were analyzed by Statistical Package for the Social Sciences (SPSS) software. Kaplan–Meier survival analyses and chi-square test were used for assessment of level of significance.

**Results:** In delayed and immediate group of dental implants, mean age of the patients was 54.2 and 54.8 years respectively. Statistically significant results were obtained while comparing the clinical parameters of the dental implants in both the groups while demographic parameters showed nonsignificant correlation.

**Conclusion:** Significant higher risk of dental implant failure is associated with immediate loaded dental implants. Tobacco smoking, shorter implant size, and other risk factors play a significant role in predicting the success and failure of dental implants.

**Clinical significance:** Delayed loaded dental implant placement should be preferred as they are associated with decreased risk of implant failure.

**Keywords:** Delayed, Dental implants, Immediate, Risk.

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### INTRODUCTION

Osseointegration of dental implants, ever since its introduction in 1977, requires a minimum of 3 and 4 months for achieving proper healing.<sup>1,2</sup> Healing phase after the implant surgery, if disturbed by even through slightest of micromotion of dental implants, will cause separation of implant and bone by formation of fibrous scar tissue leading to accentuated apposition of bone.<sup>3,4</sup> This can lead to failure of the dental implant.<sup>5</sup> This nonloading period of dental implant have become shorter and

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shorter with the advancements of the technology on the implant dentistry. Immediate loading of dental implants is becoming a very popular procedure with the passage of time.<sup>6</sup> Hence, we retrospectively analyzed the various risk factors for the failure of delayed and immediate loaded dental implants.

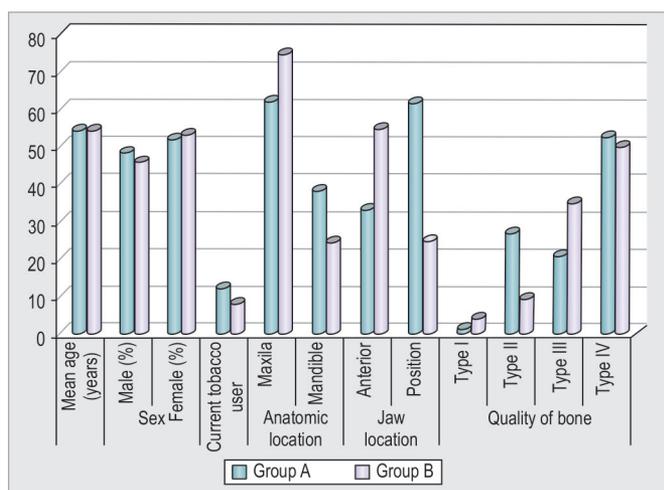
**MATERIALS AND METHODS**

The present study included retrospective analysis of 500 patients who underwent dental implant surgeries either by immediate loading procedure or by delayed loading procedures from May 2010 to June 2014. All the patients were divided broadly into two groups. Group I included patients in which delayed loaded dental implants were placed while groups II consisted of patients in which immediate loaded dental implants were placed. All the patients whose follow-up records were missing and who had past medical history of any systemic diseases were excluded from the present study. Evaluation of associated possible risk factors was done by classifying the predictable factors as primary and secondary factors. Those dental implants in which provisional restoration by bonding with adjacent teeth was done with restoration of occlusal stability on the same day of surgery of implant placement were categorized under immediate loaded dental implants. While on the contrary, those dental implants in which sufficient time period occurred between the phase of surgery and restoration placement were classified under delayed loaded dental implants. Demographic and anatomico-clinical details of the along with ration of dental implant to abutment and reconstructive procedure employed were categorized under the secondary predictor values. Clinical surgeon evaluated the bone quality as criteria given by Chuang et al<sup>7</sup> Dental implant failures as defined by removal of dental implant due to any reason were categorized under

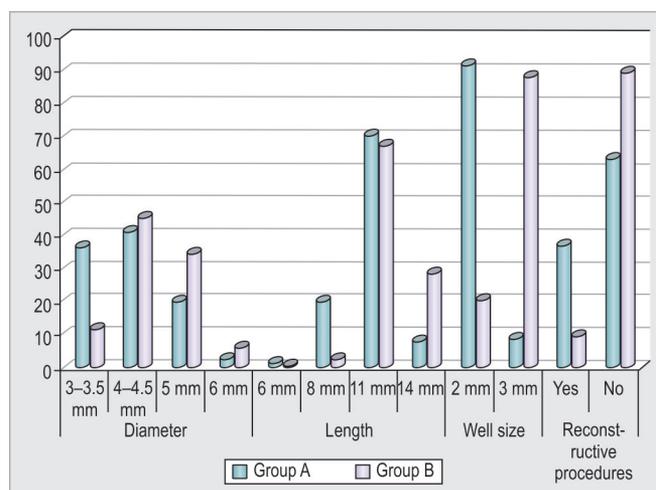
outcome variables. Time gap from the point of insertion of dental implant to the point of implant failure in months was categorized under the outcome variables. All the results were analyzed by Statistical Package for the Social Sciences (SPSS) software. Kaplan–Meier survival analyses and chi-square test were used for assessment of level of significance, and p-value of less than 0.05 was considered to be significant.

**RESULTS**

Graph 1 shows the demographic details of the patients included in the present study. Mean age of the patients in group I was 54.2 years, while in group II patients mean age was 54.8 years; 48.2% of the total patients in group I were males, while in group II 46.3% were males. Only 8.2% of the total patients in the immediate loaded dental implant group were current tobacco smokers. Maximum number of dental implants was placed in maxillary arch. In groups I and II, 61.8 and 74.8% of the total dental implants were placed in maxillary arch. More number of dental implants was placed in posterior tooth region in group I patients, while in group II patients more number of dental implants were placed in the anterior region. Most of the patients in both the groups had jaw bone of type IV. Graph 2 shows the clinical details of the dental implants inserted in the patients in both the groups. Maximum patients in both the groups received dental implants of diameter 4 to 4.5 mm. As far as length of the dental implants is concerned, most of the dental implants placed in both the groups were of 11 mm length. Over 35% of the patients in group I received reconstructive procedures while in group II, and only approximately 10% of the patients received reconstructive procedures. Statistically significant results were obtained while comparing the clinical parameters of the dental implants in both the groups while demographic parameters showed



**Graph 1:** Demographic details of the patients



**Graph 2:** Clinical details of the dental implant procedure done in the patients (percentage)

**Table 1:** p-value for comparison of various demographic and clinical parameters between groups I and II

Variable	p-value
Mean age (years)	0.42 NS
Sex	0.86 NS
Current tobacco users	0.71 NS
Anatomic location	0.02 S
Jaw location	0.04 S
Quality of bone	0.64 NS
Diameter	0.02 S
Length	0.03 S
Well size	0.01 S
Reconstructive procedures	0.04 S

NS: Nonsignificant; S: Significant

**Table 2:** Kaplan–Meier 1-year survival estimates

Time	Percentage survival (95% confidence interval)		p-value
	Group I	Group II	
12 months	96.5	90.5	0.002 S

S: Significant

nonsignificant correlation, as shown in Table 1. Table 2 highlights the Kaplan–Meier 1-year survival estimates. Significant results were obtained while comparing the two study groups.

## DISCUSSION

One of the expectations of the clinician and the surgeon is to obtain an effective and successful osseointegration after dental implant placement into the jaws. Two-step insertion of dental implants is a traditional protocol described and advocated by numerous surgeons in the past.<sup>8-10</sup> Two-step placement of dental implants provide numerous advantages like adequate osseointegration within time period varying from 3 to 6 months of time which depends on numerous parameters like position of the implant in relation the crest of the bone, time period required for osseointegration, and the maintaining of a load-free atmosphere in the implant region for a specific period of time.<sup>11,12</sup> On the contrary, in the past one or two decades, single-step implant or immediate placements of implants have also become a popular treatment option.<sup>9,11</sup> Hence, the second step, i.e., surgical placement of implant for crown fabrication or denture insertion, gets eliminated. As hypothesized by one of the researcher, osseointegration is unaffected by the maintenance of exposed dental implants soon after the treatment procedure. Apart from the reduction in the number of steps in the procedure, immediate loading of dental implants provides a more acceptable and comfortable environment for the patients.<sup>12</sup> Hence, we comparatively evaluated the prognosis and risk factors in patients undergoing immediate and delayed loading dental implants. Hence, we

retrospectively analyzed the various risk factors for the failure of delayed and immediate loaded dental implants.

Statistically significant results were obtained while comparing the overall 12-month dental implant survival rate among immediate loaded and delayed loaded implants (Tables 1 and 2). Survival rate of immediate loaded dental implants was less than delayed loaded dental implants. Dental implants placed in patients with current habit of tobacco were at a higher risk of being failed as compared to nonusers (Table 1). Similar results were reported in the past studies by Ibanez and Jalbout<sup>13</sup> and Piattelli et al<sup>14</sup> in collaboration with the results of previous researches, and results of our study highlight immediate loading of dental implants, use of tobacco, and placement of shirt implants and maxillary region are the identifiable risk factors in the implant failure. Crespi et al<sup>15</sup> assessed the bone levels in the crest region clinically in the vicinity of the single implants in a fresh extraction sockets in the maxillary esthetic region either through single-step or through two-step technique. They included 40 patients for this randomized clinical study. In 20 patients, immediate dental implants were placed while in the remaining 20 patients, delayed placement of dental implants in two steps was done. They did not observe any statistically significant difference clinically between the implants in the two groups after a 2-year follow-up. From the results, they concluded that both the techniques of dental implant placements show comparable clinical outcome. Block et al<sup>16</sup> compared the hard tissue and soft tissue reactions in patients receiving immediate and delayed placement of dental implants. They analyzed 76 patients and divided them into two study groups based on the technique or procedure of placement of dental implants. No significant difference was obtained by them in terms of implant integration of level of crestal bone interdentally bone in the patients of both the groups. From the results, they concluded that in terms hard tissue changes, crestal bone levels in patients receiving delayed and immediate type of dental implants show no significant alteration. Lindeboom et al<sup>17</sup> evaluated the clinical outcome of immediately loaded solid plasma sprayed implants in comparison to the immediate loaded dental implants placed in the maxillary region. They assessed a total of 48 patients with the mean age of 42.3 years. From the results, they conclude that no significant differences occur on terms of bone loss and soft tissue changes in both immediate and delayed placement of dental implants. Mijiritsky et al<sup>18</sup> assessed the survival of immediately placed dental implants in the fresh extraction sockets in the anterior maxillary region. They evaluated 16 patients in which a total of 24 dental implants were placed. They observed a mean marginal bone loss of approximately 0.9 mm, starting from the time of starting of dental

implant placement. From the results, they concluded that successful implant integration of immediate loading of the dental implants occur in the maxillary anterior region. Calvo-Guirado et al<sup>19</sup> prospectively evaluated the success rates of dental implants placed in the maxillary region. They observed that out of a total of 61 dental implants placed, failure occurred only in a single dental implant while one implant was lost on follow-up. From the results, they concluded that in the area around the successful dental implants, minimal amount of crestal bone loss occurs. Susarla et al<sup>20</sup> estimated the survival rate of delayed and immediate loaded dental implants. From the results, they concluded that higher risk of failure is associated with the immediate loaded dental implants. Zhu et al<sup>21</sup> evaluated the clinical differences between the outcome of immediate and delayed loading of dental implants. From the results, they concluded that despite of the convenience and comfort of the immediate loaded dental implants, clinical outcome comparable to conventional method of loading of dental implants cannot be reached.

## CONCLUSION

From the above results, it can be concluded that higher risk of dental implant failure is associated with immediate loading dental implants. Furthermore, certain risk factors like tobacco smoking and shorter implant size play a significant role in the failure of implants. A clinician should, therefore, analyze all these factors before planning an implant surgery.

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