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Comparative Study of Immediate vs. Delayed Implant Placement Following Oral Surgical Extraction

Abstract
Dental implant placement following tooth extraction is a widely accepted treatment modality in contemporary prosthodontics. Among the available approaches, immediate and delayed implant placement protocols remain commonly employed, each presenting distinct biological and prosthodontic considerations. Despite extensive research, uncertainty persists regarding the influence of implant placement timing on short-term clinical, radiographic, and restorative outcomes, warranting additional controlled comparative investigations. A prospective comparative clinical study was conducted involving 40 patients requiring single-tooth extraction and implant-supported rehabilitation. Participants were equally allocated into two groups: immediate implant placement (n = 20) and delayed implant placement (n = 20). Clinical procedures were performed under standardized surgical and prosthodontic protocols. Outcome measures included implant survival and success rates, peri-implant marginal bone level changes, soft tissue health, prosthodontic and functional outcomes, and postoperative complications. Radiographic and clinical assessments were carried out at predefined follow-up intervals. Statistical analysis involved independent t-tests and chi-square tests, with significance set at $p < 0.05$. Both groups demonstrated high implant survival and success rates, with no statistically significant intergroup differences. Peri-implant soft tissue conditions were predominantly healthy, with minimal inflammatory changes and limited mucosal recession. Prosthodontic outcomes showed high rates of definitive prosthesis delivery and satisfactory occlusal function. Postoperative complications were minor, self-limiting, and similarly distributed between groups. Immediate and delayed implant placement protocols yielded comparable short-term clinical, radiographic, and prosthodontic outcomes when applied under standardized conditions. Implant placement timing alone did not significantly influence treatment success. Careful case selection and prosthodontically driven planning remain critical determinants of predictable implant outcomes.

Keywords: Immediate implant placement, Delayed implant placement, Marginal bone loss, Peri-implant tissue stability, Prosthodontic outcomes

INTRODUCTION

The use of dental implant as a form of treatment has been established as a pillar of modern prosthodontic and restorative dentistry due to its ability to offer predictable functional and esthetics restoration to patients with missing teeth. The unstoppable efforts to enhance the design of implants, medical procedures, and restorative measures have provided a wider range of treatments and better long-term results. Among multiple clinical factors of the success of implants, the time frame between tooth extraction and the implant placement is a very important and the most controversial topic of treatment planning. Timely and delayed protocols of implant placement remain two known methods that have certain biological, clinical, and prosthodontic implications. The additional option is the immediate implant placement whereby the direct insertion of the implant into the extraction socket is performed during the same surgery session.

This method has been popular since it has the potential to decrease the length of treatment, as well as decrease the amount of surgical operations. The delayed implantation that is conducted after a socket heals has been considered a more conservative and predictable procedure. Recent systematic review and meta-analysis found similar survival rates between immediate and delayed implant placement despite the differences in the study design and follow-up period across the reviewed studies.[1] These results demonstrate the necessity of additional controlled clinical studies that could help to clarify protocol-specific outcomes.

There have been comparative clinical studies which address the efficacy of immediate versus delayed implantation in various clinical scenarios. Surveys comparing the treatment outcomes have claimed positive outcomes of both methods provided proper case selection and surgery principles were adhered to.[2] The timing of the implants in cases of medically compromised or surgically complex patients including head and neck surgery have been proved to affect healing patterns and long-term success, thus the importance of individualized treatment planning.[3] The long-term cohort studies have also revealed that the timing of placing implants can influence the loading techniques, as well as the stability of restorations in the long term of the studies.[4] The biological healing processes involved in tooth extraction remain considered to be a cornerstone in the establishment of the nature of implant sites. Instant positioning makes use of the existing socket anatomy with close attention of primary stability and gap healing. Delayed placement permit bone remodeling and maturation although can be related to alveolar ridge resorption. Clinical assessments have established several factors that affect the effects of implants retrospectively such as bone quality, surgery and time of placement.[5] These biological variables play in close interaction with the prosthodontic consideration and restoration goals.

In a prosthodontic point of view, implant positioning timing has a direct effect on three-dimensional implant placement, emergence profiles formation, and peri-implant soft tissue stability. There have been consensus reports which have highlighted that esthetic as well as functional requirements especially in one-tooth replacement sites should inform the choice of immediate, early or delayed placement guidelines.[6] The comparison of loading and placement tactics conducted in clinical trails has provided the evidence that the correct planning in the field of prosthodontics could help to eliminate the effect of biomechanical risks and contribute to the positive results in the context of various timelines of implant placement.[7] Additional studies have been done on both radiographic and clinical studies on marginal bone behavior with immediate protocols and delayed protocols. Comparative research has shown that changes at the marginal bone level can be different according to the loading plan, the type of implant and the time of surgery.[8] The use of socket-shield techniques and sockets made of titanium has been discussed in esthetic regions as ways of improving tissue preservation during direct implant placement although its effects in the long-term outcome remain in review.[9] Consecutive reviews comparing early, immediate, and delayed placement protocols have come up with the conclusion that evidence supports various feasible practices in the event that they remain used within controlled circumstances.[10]

The occurrence of infection at the extraction sites has also affected the clinical decision making on the timing of implantation. According to meta-analytical evidence, implants may be placed immediately in the case of well-managed infected sites with the same results as those of non-infected sites.[11] Also, molar areas have some distinct anatomic issues, and systematic reviews have emphasized the role of site-specific issues in the determination of immediate or delayed protocols .[12] Narrative reviews remain focusing on the fact that the timing of implants must be established through a balance between biological healing and restorative requirements.[13] Placement has been enhanced with the help of technological changes such as computer aided design and guided surgery which have enhanced the accuracy of placement of both immediate and delayed implants. Comparative accuracy tests showed consistent positioning results across protocols in the case of using digital workflows.[14] Clinical studies in the anterior maxilla have indicated that immediate and delayed placement will produce satisfactory esthetic results in cases where there remain proper restorative plans.[15] The same has been also identified in posterior areas where site morphology and loading conditions determined clinical and radiographic outcomes.[16]

Clinical trials on comparative analysis of conventional and digitally assisted workflow procedures have additional supported the significance of standardized procedures in ensuring the predictability of implant outcomes.[17] The clinical importance of the time of implant placement has been highlighted by recent systematic reviews on esthetic-zone single-tooth replacement and has noted continuing gaps on high-quality comparative evidence.[18] Provisionalization and soft tissue management in peri-implant health maintenance have also been additional demonstrated by long-term follow-up studies on the same.[19]

Although much has been evidenced, there remains inconsistency in documented results that confirm the need to conduct more prospective comparative clinical trials assessing the use of immediate and delayed placement of implants in standardized conditions .[20]

Objectives of the Study

1. To compare the clinical and radiographic outcomes of immediate and delayed dental implant placement following oral surgical extraction.
2. To assess peri-implant tissue stability and prosthodontic outcomes associated with immediate and delayed implant placement protocols.

MATERIALS AND METHODS

2.1 Study Design

The kind of clinical study was a prospective comparative trial study aimed at comparing immediate and delayed dental implants placement after extraction of the oral surgeon. Two treatment regimens were done

under standardized clinical and prosthodontic circumstances. The patients received and were followed longitudinally to evaluate the survival of the implants, the levels of marginal bone, the health of the peri-implant tissues, the outcomes of the prostheses and the post-operative complications. The design of the study enabled the direct comparison of the results of the two implant placement techniques and reduced the variation of the procedures.

2.2 Study Setting and Duration

The research was conducted at a tertiary care dental institution, which is a Department of Prosthodontics and Implant Dentistry at a university. Clinical procedures such as tooth removal, implant, and prosthodontic rehabilitation and follow-ups were done within the same facility. The entire study period was one and a half years which included the process of patient recruitment, surgery, restorative care, and post-restorative follow-up.

2.3 Sample Size and Group Allocation

Fourty patients who needed a rehabilitation supported by implants and were in need of single-tooth extraction were included. The participants were randomly divided into two groups, the immediate implant placement group (n = 20) and the delayed implant placement group (n = 20). Allocation to a group was done according to preset clinical criteria and this was morphology of socket, availability of bones and the soft tissue. Similar group sizes were used to guarantee valid intergroup comparison.

2.4 Eligibility Criteria

2.4.1 Inclusion Criteria

The patients were aged 18 years or above who needed to replace one tooth using a dental implant. There was a need to have adequate bone volume so that it did not necessitate a lot of augmentation to be able to place the implants. The participants were showing good oral health and stable periodontal health in adjacent teeth. Lack of acute infection in the extraction site and the desire to visit the follow-up visits as scheduled were obligatory.

2.4.2 Exclusion Criteria

Patients who had uncontrolled systemic diseases, metabolic diseases which had an effect on bone healing, or impaired immune status were excluded. Exclusion was caused by active periodontal disease or untreated periapical pathology or lack of bone volume necessitating more complicated grafting techniques. It also excluded heavy smokers, persons with parafunctional habits, pregnant or lactating patients and patients who were not in a position to adhere to follow up procedures.

2.5 Surgical Protocol

All types of surgery were carried out on local anesthesia with strict aseptic practice. The extraction of teeth was performed in atraumatic procedures to maintain the alveolar bone and other adjacent soft tissues. In immediate implant group, implants were fitted into the extract socket at the same surgical visit. In delayed implant group, implant was placed with a healing period between the implants to enable the soft and hard tissue development. Implant osteotomies were done according to the manufacturer rules and all primary stability was obtained.

2.6 Prosthodontic Protocol

The indication of successful osseointegration was followed by the initiation of prosthodontic rehabilitation. Abutements or cover screws were put on based on clinical indication. Conventional impression techniques, and the principles of prosthodontics were used to make definite prostheses. Occlusal adjustments were done in order to achieve functional harmony and stability. All the restorations were aimed at having good esthetic, functional and servicability.

2.7 Outcome Measures

Implant survival and marginal bone levels changes at peri-implant were used as primary outcome measures. Peri-implant soft tissue health, prosthodontic and functional performance, and postoperative complications were also the secondary outcome measures. The clinical and radiographic data were evaluated at specific follow-up periods by adopting standardized assessment protocols.

2.8 Radiographic and Follow-up Assessment

The baseline level and follow-up visits were taken using standardized periapical radiographs to measure peri-implant marginal bone levels. Similar angulation and reference points were used to take radiographs. Clinical examination, radiographic examination, and maintenance care of the patients were analyzed periodically. All biological/mechanical complications were recorded and dealt with accordingly.

2.9 Statistical Analysis

The adequate statistical software was used to conduct a statistical analysis. Variables which remain continuous were reported in terms of mean +- standard deviation and those which remain categorical reported in terms of frequencies and percentages. The independent t-test was used to carry out intergroup comparisons of continuous variables such as changes in marginal bone levels. The chi-square test was used to compare the categorical variables which included the survival of the implants and complication rates. A p-value of below 0.05 was regarded as statistically significant.

RESULTS

3.1 Demographic and Clinical Characteristics

The number of patients was 40, and they were divided equal into two groups (immediate and delayed implant placement). There were no differences in terms of baseline demographic variables such as age and sex distribution. The location of the implants was also equally distributed in anterior and posterior parts showing the right comparability of the baselines.

Table 1. Baseline Demographic and Clinical Characteristics

Parameter	Immediate Implant Group (n = 20)	Delayed Implant Group (n = 20)	p-value
Age (years, mean ± SD)	42.6 ± 8.3	44.1 ± 7.9	0.54
Male, n (%)	12 (60%)	11 (55%)	0.75
Female, n (%)	8 (40%)	9 (45%)	0.75
Anterior implant site, n (%)	9 (45%)	10 (50%)	0.76
Posterior implant site, n (%)	11 (55%)	10 (50%)	0.76

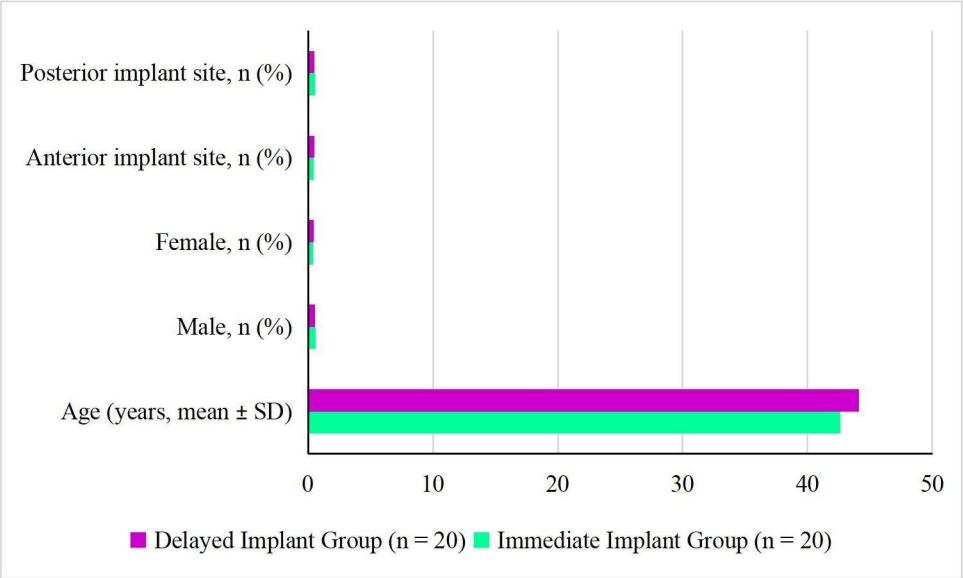

Figure 1. Comparison of Baseline Demographic and Clinical Characteristics Between Immediate and Delayed Implant Groups

Figure 1 depicts the occurrence of the baseline demographic and clinical variables between the immediate and delayed implementing groups. The average age in the delayed implant group was a little bit higher as compared to the immediate implant group though both groups exhibited similar age distributions. The sex distribution was also the same and there was a slight preponderance of male respondents in both groups. Anterior and posterior representation in the distribution of the implant sites in the two groups was balanced. In general, the graphical comparison shows the similarity of the baseline features of the study groups, which proves the appropriate comparability of the groups before assessing clinical and radiographic outcomes.

3.2 Implant Survival and Success Rates

Table 2 shows the success and survival of the implants after the two study groups. Each group was implanted with 20 implants. At the follow up, 19 implants survived in the immediate implant placement group, and all 20 implants survived in the delayed implant placement group leading to a survival rate of 95 and 100 respectively. The immediate group had 90% and the delayed group had 95% success rates of implants. No statistically significant difference in the implant survival and success rates between the two protocols was observed and the clinical performance of the immediate and delayed placement of implants in the case of oral surgical extraction is similar.

Table 2. Implant Survival and Success Outcomes

Outcome Parameter	Immediate Implant Group	Delayed Implant Group	p-value
Implants placed (n)	20	20	0.31
Implants survived (n)	19	20	0.31
Implant survival rate (%)	95.0	100.0	0.31
Implant success rate (%)	90.0	95.0	0.28

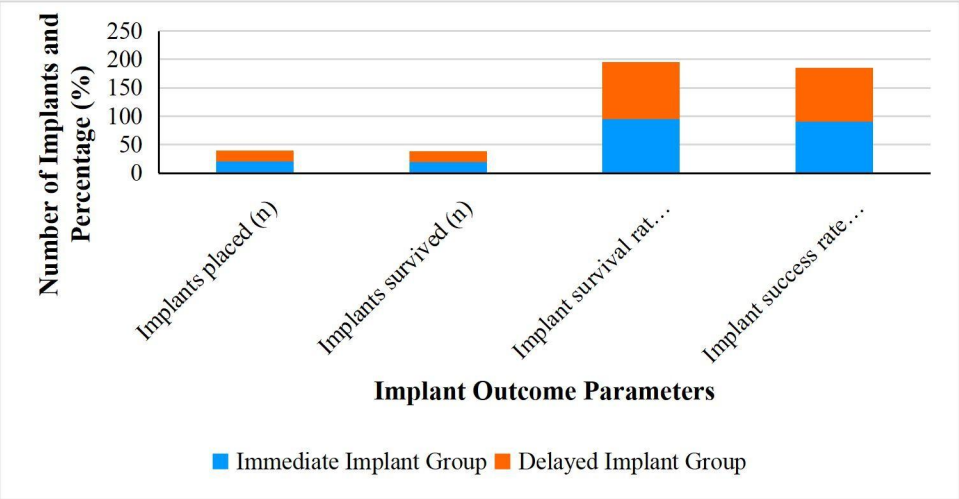

Figure 2. Comparison of Implant Survival and Success Outcomes Between Immediate and Delayed Implant Placement Groups

The results of the parameters of implants outcome remain illustrated in Figure 2 whereby the parameters remain indicated in both the immediate and delayed group of implant placement. The numbers of all implants put on and those who survived in the follow-up period remain indicated in each of the groups. Both treatment protocols possessed high rates of both implant survival and implant success with slightly higher values recorded in the delayed implants group. The graphical illustration shows that immediate and delayed implant placement showed similar clinical outcomes in terms of survival and success, proving that both the protocols were reported to yield good survival and success results when used on standardized surgical and prosthodontic conditions.

3.3 Marginal Bone Level Changes

Table 3 is a summary of the radiographic levels of marginal bones change that occurred around implants in both groups. There were no significant differences in mean bone levels at baseline between the immediate placement of the implant (0.32 +- 0.14 mm) and the delayed placement of the implant (0.29 +- 0.12 mm). Mean bone levels at the last follow-up had reached 1.44 +- 0.38 mm and 1.36 +- 0.35 mm in the immediate and delayed groups respectively. The immediate and the delayed groups recorded a mean marginal bone loss of 1.12 +- 0.36 mm and 1.07 +- 0.33 mm, respectively. In intergroup comparison, there was no statistically significant difference and this showed that both protocols of placing implants have similar peri-implant bone stability.

Table 3. Radiographic Marginal Bone Level Changes

Parameter	Immediate Implant Group (mean ± SD, mm)	Delayed Implant Group (mean ± SD, mm)	p-value
Baseline bone level	0.32 ± 0.14	0.29 ± 0.12	0.47
Bone level at follow-up	1.44 ± 0.38	1.36 ± 0.35	0.48
Mean marginal bone loss	1.12 ± 0.36	1.07 ± 0.33	0.52

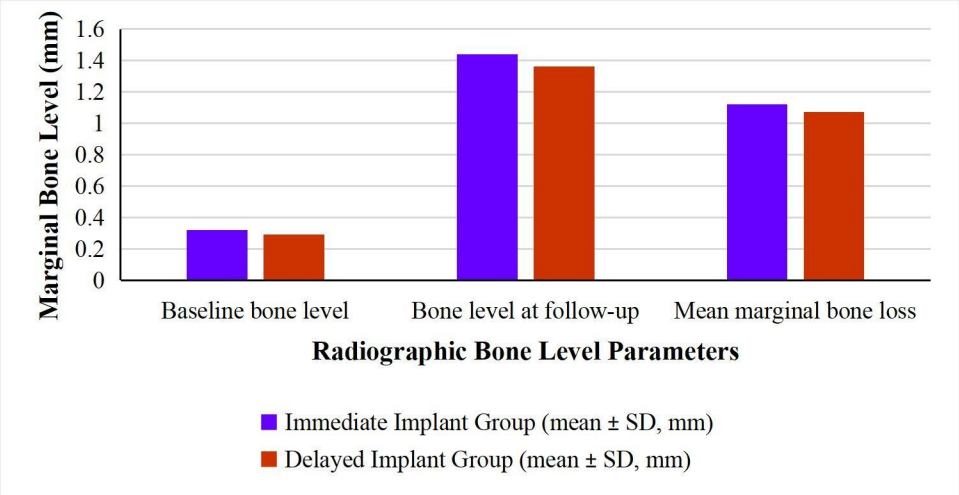

Figure 3. Radiographic Comparison of Marginal Bone Level Changes in Immediate and Delayed Implant Placement Groups

Figure 3 shows the radiographic evaluation of the peri-implant bone levels of immediate and delayed implant placement groups. The two groups had similar levels of bone at the baseline before the implants were placed. The follow evaluation showed that both groups had increased levels of measured bone at follow-up evaluation, which is physiological remodeling during the process of osseointegration. The average marginal bone loss was within clinically acceptable values in both protocols but it was slightly less in the delayed implant group. In general, this figure indicates comparable peri-implant bone stability with immediate and delayed placement of the implants in case standardized surgical and prosthodontic protocols were used.

3.4 Soft Tissue and Peri-Implant Tissue Outcomes

Table 4 shows the peri-implant soft tissue in both the treatment groups in the follow up period. In both immediate and delayed implant placement group, 18 implants (90%) and 19 implants (95), respectively, had healthy peri-implant mucosa. Mild peri-implant soft tissue inflammation was noted in 2 cases (10) in immediate group and 1 case (5) in delayed group. There was a shallow mucosal recession in 1 implant (5 percent) in immediate group and 2 implants (10 percent) in delayed group. In general, peri-implant soft tissue conditions were also favourable and similar between the two protocols of implant placement.

Table 4. Peri-Implant Soft Tissue Outcomes

Soft Tissue Parameter		Immediate Implant Group (n, %)	Delayed Implant Group (n, %)
Healthy peri-implant mucosa		18 (90%)	19 (95%)
Mild inflammation		2 (10%)	1 (5%)
Shallow mucosal recession		1 (5%)	2 (10%)

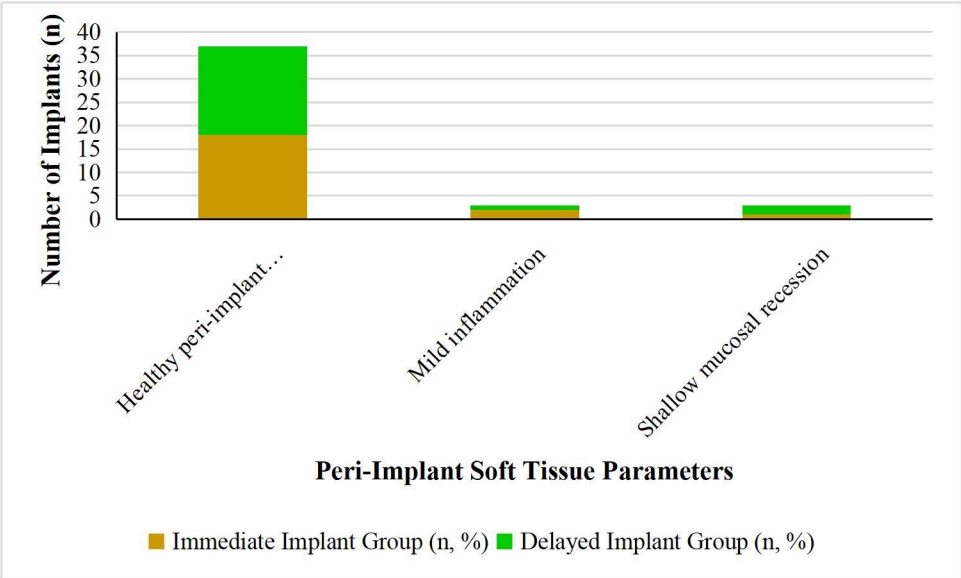

Figure 4. Distribution of Peri-Implant Soft Tissue Conditions in Immediate and Delayed Implant Placement Groups

Figure 4 shows the condition of the peri-implant soft tissues at the immediate and delayed implant placement groups at the follow-up period. Most of the implants in these two categories had healthy peri-implant mucosa, which showed good soft tissue healing and preservation. Mild inflammatory changes were infrequently present and were only present in a limited number of implants in each of the groups. Shallow mucosal recession was also low and was equally allocated in the two protocols. Comprehensively, the peri-implant soft tissue condition illustrates satisfactory results of both immediate and delayed implant placement, as the ratio of biological stability in standardized surgery and prosthodontic care.

3.5 Prosthodontic and Functional Outcomes

The summary of the prosthodontic and functional outcomes of both groups of study is presented in Table 5. Firm prosthetic restorations were provided successfully in the immediate implant placement group (19 implants) and all 20 implants in delayed implant placement group. The immediate group recorded 2 cases and the delayed group recorded 1 case of minor complications in the use of the prosthetics at the follow-up period. Functional evaluation revealed a good level of occlusal performance in 18 implants (95) in the immediate group and 19 implants (95) in the delayed group. In general, the results of prosthodontics were positive and similar to those obtained with immediate and delayed deployment of implants.

Table 5. Prosthodontic and Functional Outcomes

Prosthodontic Parameter	Immediate Implant Group	Delayed Implant Group
Definitive prosthesis delivered (n)	19	20

Minor prosthetic complications (n)	2	1
Satisfactory occlusal function, n (%)	18 (95%)	19 (95%)

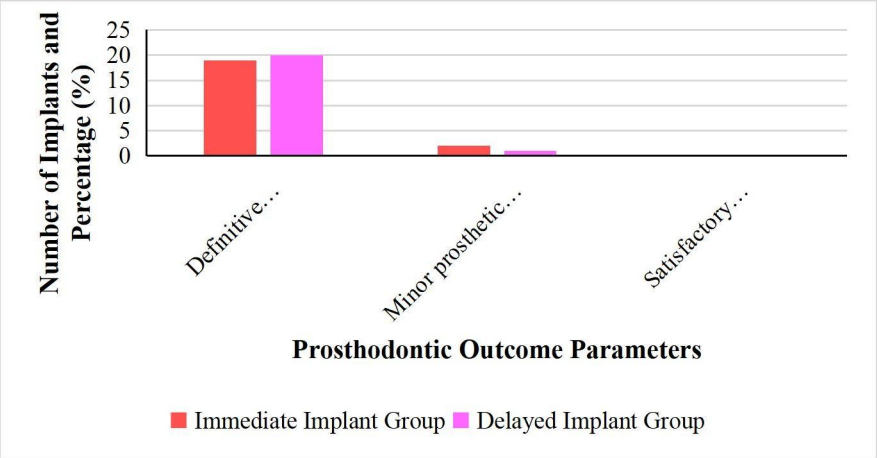

Figure 5. Comparison of Prosthodontic and Functional Outcomes in Immediate and Delayed Implant Placement Groups

Figure 5 shows the prosthodontic and functional results of the immediate and the delayed implant placement groups. There were also positive restorative predictability with definitive prosthetic restorations delivered in almost all implants in both groups. The occurrence of minor complications of prosthetics was very few and in a small number of cases and the same was fewer in the delayed implant group. In both protocols, the majority of restorations had satisfactory occlusal performance as demonstrated in functional assessment. In general, the number shows that similar success in the use of prosthodontics and functional stability of immediate and delayed implantation occurred under the condition of using standardized restorative procedures.

3.6 Complications and Adverse Events

Table 6 shows the complications and negative events that took place in the two study groups in the period of follow-up. There were 3 patients (15%), and 2 patients (10%), respectively who were mentioning transient postoperative discomfort in the immediate implant placement group and delayed implant placement group. The immediate group (10% and delayed group 5%) had 2 cases (10%) and 1 cases (5) of soft tissue inflammation respectively. Slow soft tissue healing in 1 patient (5%)- in the immediate group or 2 patients (10%)- in the delayed group. The complications were all minor and they were resolved without additional intervention and no major adverse event was witnessed in either the group.

Table 6. Complications and Adverse Events

Complication Type	Immediate Implant Group (n, %)	Delayed Implant Group (n, %)
Transient postoperative discomfort	3 (15%)	2 (10%)
Soft tissue inflammation	2 (10%)	1 (5%)
Delayed soft tissue healing	1 (5%)	2 (10%)

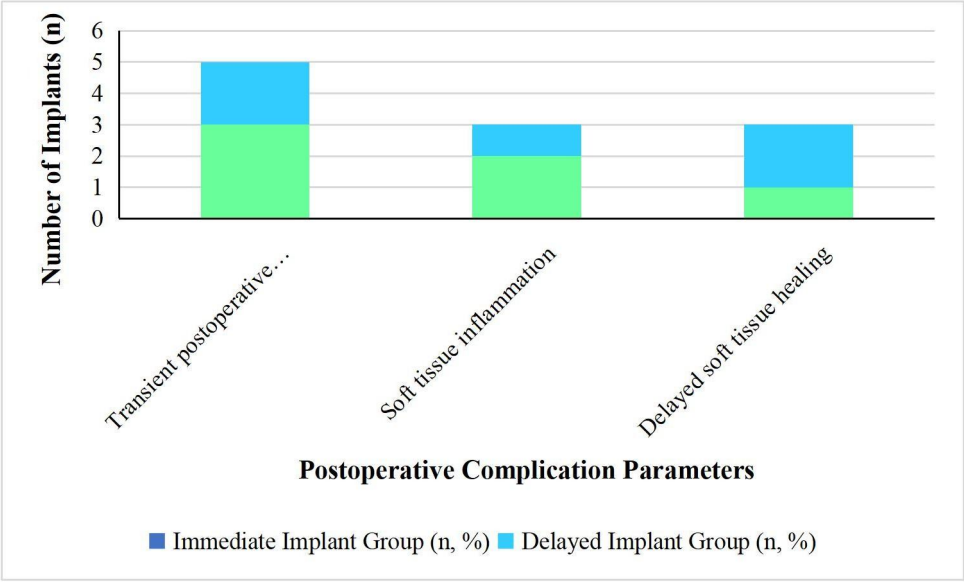

Figure 6. Distribution of Postoperative Complications in Immediate and Delayed Implant Placement Groups

Figure 6 shows compliments of the postoperative performances observed between the immediate and delayed implant placement groups in the follow up period. The most common complication reported in both groups was transient postoperative discomfort although this was slightly higher in immediate implant group. In a few instances, it observed soft tissue inflammation, and it was equally distributed in each protocol. Delayed soft tissue healing was extremely rare and was a bit higher in delayed implant placement group. The complications reported were all minor and could be solved with a regular postoperative treatment, which shows a positive safety profile of both strategies of placing the implants.

DISCUSSION

The study analysed clinical, radiographic, and prosthodontic outcomes of immediate and delayed placement of implants after extraction of the oral surgery. Demographic and clinical characteristics were used to establish baseline comparability between groups, which guaranteed intergroup comparisons (Table 1). In both protocols, the success and survival rates of implants were high and there were no statistically significant differences in both (Table 2). Radiography has shown similar changes in level of marginal bone loss, where mean bone loss in both placement methods is within acceptable range of clinically acceptable bone loss (Table 3). Evaluation of the peri-implant soft tissue indicated that there were more healthy mucosal conditions in both groups with little inflammatory alterations and small shallow mucosal recession (Table 4). The results of the prosthodontic rehabilitation were positive, showing good rates of ultimate provision of the prosthesis, and satisfactory occlusal prosthesis, but few complications of the prosthetic (Table 5). Postoperative complications were mild, self-limiting, and equally divided in both groups, which favours the clinical safety of both methods (Table 6). The cumulative evidence of these results suggests that there remain no significant differences between immediate and delayed protocols of implant placement that resulted in a similar short-term outcome regarding biological and restorative outcomes when the surgical and prosthodontic conditions were kept to a minimum.

The lack of substantial differences in survival, bone stability, and soft tissue outcomes indicates that the time of the implant placement is not a defining factor of the short-term clinical success in the suitably chosen cases. The benefits of immediate placement of the implant remain that it takes lesser time to be treated and less surgical procedures, which can help increase the convenience and acceptability of the patient. On the other hand, the delayed placement enables the healing of the socket, as well as the maturation of tissues, which can be useful in locations with impaired local conditions. The results highlight the criticality of case-selection, atraumatic extraction and positioning of implants by the goal of prosthodontics. In the instances where these principles remain adhered to, both protocols seem to be able to deliver foreseeable clinical results. The similarity between the complication profiles also indicates that both options do not entail any extra biological risk when carried out with the help of controlled clinical protocols. Prosthodontically, definitive delivery of prostheses at high rate and constant occlusal performance in both groups demonstrates the predictability of the restorative nature of implant delivery irrespective of the time of placement. The positioning of the implant and compliance with the principles of restorative preparation were important in the achievement of functional and esthetic integration in correct positioning of the implant in three dimensions. The minimal rate of complications in the application of the prosthetic indicates that there is sufficient biomechanical stability and occlusal control in the two protocols. There was no sacrifice of restorative outcomes when immediate implant placement was done and that the optimization of implant stability and prosthetic planning was done. Equally, the postponed placement provided consistent restorative environments by virtue of the healed ridge structure. These results support the importance of the prosthodontic planning as an important factor predetermining the outcome of long-term implantation. The current results can be compared to the current systematic reviews and meta-analysis that indicate the same proportions of survival and tissue usage of immediate and delayed implant placement guidelines. Recent findings have shown that immediate placement with proper surgical and restorative measures can produce stable soft and hard tissue results as compared to delayed protocols.[21] Equally, the systematic comparisons of post extraction ridge structure preservations and immediate implant placements have highlighted the importance of clinical protocol in addition to time in clarifying the outcome.[22] The radiographic results of the current study have been supported by the meta-analytical data that evaluated the changes of soft and hard tissues after placement or restoration of the teeth in esthetic areas found that there was no significant difference between the protocols of marginal bone loss.[23] It has been pointed out in clinical consensus publications that placing implants into fresh extraction sockets can be predicted by the correct choice of cases and surgery.[24] Moreover, multicenter studies indicate that immediate placement in both infected and non-infected sites could give positive results, which supports the biological viability of immediate protocols.[25]

The major strength of the study is its prospective comparative study with standardized surgical and prosthodontic procedures and minimized the variability of procedures. The assessment of the performance of implants was elaborate in that the various outcome domains such as the clinical, radiographic, soft tissue and prosthodontic and complication profiles were incorporated. Nonetheless, there remain some restrictions which ought to be considered. The limited sample size and short term follow up can be used as a

limitation in extrapolation of the results to long term outcomes. Also, no evaluation of advance esthetic indices and patient-reported outcome were used, which could also additional enhance future research. Nevertheless, the internal consistency of the methodology and the results when they were compared underlines the fact that the findings were valid. According to the results of the observed outcomes, the immediate and delayed protocols of implant placement can be proposed in clinical practice in case of proper selection of cases and standardized protocols. Straight away placement can be an option in locations that have good socket morphology and remain also stable enough at the primary level, whereas delayed placement suits where there is a need to have tissue healing or site optimization. Planning based on prosthodontics, the carefulness of the surgery and other follow-up remain very crucial to the predictability of the results regardless of the time of implant placement.

CONCLUSION

The prospective comparative clinical trial was a study that assessed clinical, radiographic, peri-implant tissue, and subsequent prosthodontic of immediate and delayed dental implant placement after oral surgical extraction. Under the study constraints, the two methods of implant placement had good survival rates, success rates, constant marginal levels of the peri-implant bone, good soft tissue, and predictable prosthodontic outcomes. The lack of statistically significant differences between groups suggests that timing of implant placement when implemented under standardized surgical and prosthodontics procedures did not have a negative effect on the short-term clinical performance. The benefit of immediate implant placement was seen to have a shorter period of treatment without sacrificing the biologic stability or the success of the restoration so long as there was sufficient primary stability and positive local responses. The results apply pressure on the fact that the ability to select patients carefully, atraumatic methods of removal, positioning of the implants on the basis of the prosthodontics, and efficient planning of the restorations play a more important role in determining the successful results rather than the time of the implant placement. It is suggested that future research with more extensive sample sizes, longer follow-ups and incorporation of advanced esthetic parameters and patient-oriented outcomes can help to shed more light on long-term variations among implant placement protocols. Though, the findings of the current study justify the immediate and delayed implant placement as predictable and effective treatment methods in the modern implant dentistry.

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