Research Article

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Evaluating Immediate Implantation Techniques in Freshly Extracted Sockets

Dharmendra V Chandarana[1] Prateek Khetrapal[2] Bandish Jhala[3] Madhavi Tanna[4] Rimmy Takvani[5] Utsav Patel[6]

[1] Department of Oral and Maxillofacial Surgery, Pacific Dental College and Research Centre, Udaipur, Rajasthan, India.
[2] Department of Oral and Maxillofacial Surgery, New Horizon Dental College and Research Institute, Bilaspur, Chhattisgarh, India.
[3] Department of Periodontology, College of Dental Sciences, Amargadh, Bhavnagar, India.
[4] Dental Surgeon, Toothpick Dental Studio, Rajkot, Gujarat, India.
[5] Department of Oral and Maxillofacial Surgery, Goenka Research Institute of Dental Science, Gandhinagar, Gujarat, India.
[6] Department of Dentistry, Pacific Dental College, Udaipur, Rajasthan, India.

ABSTRACT

Background: Immediate implant placement in fresh extraction sockets is increasingly used in full-arch rehabilitation, yet the effect of implant distribution on soft tissue healing and prosthetic outcomes remains insufficiently explored.

Material and Methods: A prospective study of 50 patients compared clinical outcomes between arches restored with six or fewer implants versus more than six implants. Parameters assessed included soft tissue recession, papilla fill, esthetic score, implant stability, and prosthetic adjustments.

Results: Patients receiving more than six implants showed significantly less soft-tissue recession, greater papilla fill, higher esthetic scores, and fewer prosthetic adjustments. Implant stability was high in both groups with no significant difference.

Conclusion: Increasing the number of implants in immediate full-arch rehabilitation improves soft-tissue outcomes and reduces prosthetic complications, thereby supporting improved long-term function and esthetics.

Keywords: Immediate implant placement; Fresh extraction socket; Full-arch rehabilitation; Soft tissue outcomes.

INTRODUCTION

Immediate implant placement (IIP) following tooth extraction has gained traction as a valuable clinical strategy in implant dentistry due to its potential to preserve ridge dimensions, reduce overall treatment time, and enhance patient satisfaction compared with traditional delayed approaches. Historically, delayed protocols, where implants are placed after complete socket healing, were considered the standard to minimise complications from post-extraction bone remodeling. However, IIP offers advantages such as reduced alveolar ridge resorption and early restoration of function and aesthetics, particularly in full-arch rehabilitation settings where multiple extractions are involved [1,2].

In contexts where multiple teeth are extracted, maintaining peri-implant soft tissue contours is critical not only for aesthetic outcomes but also for long-term prosthetic success. The act of placing an implant immediately into a fresh extraction socket

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*Correspondence Dr Dharmendra V Chandarana.
Department of Oral and Maxillofacial Surgery, Pacific Dental College and Research Centre, Udaipur, Rajasthan. India.
Email: drdcomfs@gmail.com

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along with an interim prosthetic restoration has been shown to support favourable soft tissue adaptation and high prosthetic success rates, with predictable soft tissue healing and stable peri-implant contours over the early healing stages [1,3]. This approach also reduces the number of surgical interventions, shortens edentulous phases, and aligns closely with patient-centred goals for comfort and quality of life [4,5].

Soft tissue healing around implants placed in fresh sockets is influenced by biomechanical and biological factors, including primary implant stability, surgical technique (e.g., flapless vs. conventional flap), and the presence of provisional restorations acting as tissue support scaffolds [6,7]. Clinical evidence suggests that immediate provisionalization can facilitate the maturation of the peri-implant mucosa and contribute to esthetic soft tissue outcomes, particularly in regions with thin biotypes or compromised alveolar anatomy [7,8]. Notably, recent clinical data highlight consistently high implant survival rates exceeding 97% with immediate loading protocols in fresh socket scenarios, further supporting the viability of this treatment modality when appropriate case selection and meticulous surgical protocols are employed [4,9].

Moreover, systematic analyses indicate that while overall survival and success rates of immediate implants are comparable to those of implants placed in healed sites, soft tissue parameters such as mid-facial recession, keratinised mucosa stability, and esthetic scores are essential considerations in prognostic evaluations [8,10]. Such soft tissue outcomes are particularly important in full-arch prosthetic rehabilitation, where the integrity and contour of the peri-implant mucosa significantly influence prosthetic fit, function, and patient satisfaction.

Taken together, current evidence underscores that IIP combined with interim prosthetic restoration is a predictable and effective therapeutic option for full-arch rehabilitation following multiple extractions, balancing both biologic healing and prosthetic performance outcomes. Nevertheless, the technique demands careful clinical judgment, adherence to evidence-based protocols, and further investigation into how various parameters affect long-term esthetic and functional results.

MATERIAL AND METHODS

This prospective observational study was conducted in the Department of Oral and Maxillofacial Implantology over a period of twelve months. The study focused on the clinical evaluation of immediate implant placement in fresh extraction sockets followed by interim prosthetic restoration in patients requiring full-arch rehabilitation after multiple extractions. Ethical approval from the institutional review board was obtained prior to commencement, and all participants provided informed consent.

A total sample of fifty patients was selected using consecutive sampling. Patients between 20 and 70 years of age who required extraction of multiple teeth in at least one arch and demonstrated adequate bone volume to achieve primary implant stability of at least 35 Ncm were included. All participants were in generally good systemic health (ASA I or II) and willing to undergo immediate implant placement with provisional restoration. Patients were excluded if they had active infections in extraction sites, uncontrolled systemic conditions such as diabetes or hypertension, heavy smoking habits exceeding ten cigarettes per day, pregnancy or lactation, or untreated periodontal disease.

Preoperative assessment included a comprehensive clinical examination with evaluation of periodontal health, soft tissue biotype, and diagnosis of failing teeth. Cone-beam computed tomography (CBCT) was used to assess bone morphology, socket integrity, and prosthetically driven implant positioning. Diagnostic impressions were taken, and a surgical guide was fabricated for accuracy.

Atraumatic extraction was performed using periotomes and luxators under local anaesthesia (2% lidocaine with epinephrine 1:100,000) to preserve surrounding bone, particularly the buccal plate. The extracted sockets were degranulated and inspected for defects. The implants were placed immediately into the fresh sockets following standard osteotomy preparation. Implant positioning was maintained toward the palatal or lingual aspect to preserve buccal bone. Primary stability between 35 and 45 Ncm was ensured for all implants. When the gap between the implant surface and socket wall exceeded 2 mm, particulate bone graft material was used to fill the space.

Flapless surgery was preferred, though minimal flap reflection was performed when socket morphology required enhanced visualization.

Within 24 to 48 hours of implant placement, each patient received a screw-retained interim full-arch prosthesis. Occlusion was adjusted to provide light centric contact while eliminating all lateral contacts to avoid micromovements during osseointegration. Patients were advised to maintain a soft diet for six weeks to reduce functional load on the immediate restorations. Postoperative care included a standard regimen of antibiotics for five days, analgesics as required, and a chlorhexidine 0.12% mouth rinse twice daily for two weeks. Patients were instructed to avoid brushing the surgical area during the first postoperative week.

Follow-up examinations were conducted at one week, one month, three months, six months, and at the final evaluation between nine and twelve months. Soft tissue healing, pain, swelling, and prosthesis adaptation were examined clinically. Radiographic evaluations were performed to assess marginal bone levels and peri-implant radiolucency. Implant stability was measured using resonance frequency analysis at the six-month visit.

The primary outcomes assessed included soft tissue healing parameters such as gingival margin stability, papilla formation, and recession changes, as well as implant survival and interim prosthesis performance. Secondary outcomes included marginal bone level changes measured at mesial and distal surfaces, patient satisfaction using a ten-point visual analogue scale, and any complications that occurred during healing or loading.

Data were analysed using SPSS version 26. Quantitative variables such as soft tissue measurements and bone levels were presented as mean values with standard deviations and were compared using paired t-tests. Categorical variables including implant survival and complication rates were expressed as frequencies and percentages. A p-value of less than 0.05 was considered statistically significant.

RESULTS

Table 1 presents the comparative clinical outcomes based on the implant distribution number (IDN) among the study population of 50 patients, with 20 patients receiving six or fewer implants and 30 patients receiving more than six implants. The average soft tissue recession was notably higher in the group with IDN ≤6, showing a mean value of 1.0 ± 0.3 mm, whereas the group with IDN >6 demonstrated significantly less recession at 0.6 ± 0.2 mm, and this difference was statistically significant ($p < 0.01$). Papilla fill also showed a favourable trend in the higher implant distribution group, where 82% of patients achieved complete papilla fill compared to 48% in the lower IDN group, again demonstrating a statistically significant association ($p = 0.02$).

Esthetic outcomes were evaluated using a standard esthetic scoring system, with the IDN >6 group achieving a higher mean score of 8.6 ± 0.4 compared to 7.8 ± 0.5 in the IDN ≤6 group. This difference reached statistical significance ($p < 0.05$), indicating that a greater number of implants contributed positively to overall esthetic performance. Implant stability at six months was high in both groups, although slightly better outcomes were observed in the IDN >6 group, with 98% stability compared to 92% in the IDN ≤6 group. However, this difference was not statistically significant ($p = 0.10$), suggesting that implant stability is largely maintained regardless of distribution when performed under appropriate protocols.

Prosthetic adjustments were more frequently required in patients with fewer implants. Five cases in the IDN ≤6 group required minor adjustments during the follow-up period compared to only three cases in the IDN >6 group. Although not subjected to statistical testing, this pattern reflects the increased mechanical and occlusal load borne by fewer implants, often necessitating refinement. Overall, the table demonstrates that a higher implant distribution tends to favour better soft tissue outcomes, improved esthetics, and reduced prosthetic complications in full-arch immediate implant rehabilitation.

Table 1: Clinical outcomes based on implant distribution (n = 50)

Parameter	IDN ≤6 (n=20)	IDN >6 (n=30)	P value
Avg. Soft Tissue	1.0 ±	0.6 ±	<0.01

Recession (mm)	**0.3**	**0.2**	
Papilla Fill (Complete %)	**48%**	**82%**	**0.02**
Esthetic Score (mean ± SD)	**7.8 ± 0.5**	**8.6 ± 0.4**	**<0.05**
Implant Stability at 6 months	**92%**	**98%**	**0.10 (NS)**
Prosthesis Adjustments Needed	**5 cases**	**3 cases**	**–**

DISCUSSION

The present study evaluated the influence of implant distribution on soft tissue healing and prosthetic outcomes following immediate implant placement in fresh extraction sockets, with particular emphasis on comparing cases with six or fewer implants to those receiving more than six implants. The results demonstrated that a greater number of implants per arch was associated with improved soft tissue behaviour, including reduced gingival recession and enhanced papilla fill. These findings align with recent evidence indicating that optimized implant distribution can improve peri-implant mucosal contour and soft tissue stability due to decreased biomechanical stress and more favourable load distribution across the arch [11]. Immediate implant placement inherently relies on the preservation of socket architecture, and studies have emphasized that distributing occlusal forces across a larger number of implants can minimize micro-movements during early healing, thereby enhancing mucosal maturation patterns [12].

The current findings further showed that the esthetic scores were significantly higher in the group with more than six implants, reflecting improved soft tissue architecture and prosthesis adaptation. This observation is consistent with recent clinical trials demonstrating that full-arch immediate implant protocols incorporating wider implant distribution are associated with superior pink esthetic outcomes and reduced postoperative soft tissue collapse [13]. Soft tissue changes around immediate implants are influenced not only by surgical technique but also by the ability of the prosthesis to act as a scaffold; therefore, a larger implant number enhances cross-arch stabilization, supporting peri-implant mucosal form during the early critical healing period.

Implant stability at six months was similarly high in both groups, although marginally increased in the cohort with more implants. A systematic review on full-arch immediate loading highlighted that primary stability is not compromised when multiple implants are used, and the reduced cantilever effects contribute to long-term mechanical success [14]. Biological stability is closely linked to implant distribution because excessive load on fewer implants may predispose to micro-strain in the surrounding bone. The reduced need for prosthesis adjustments in arches with more than six implants observed in this study aligns with growing evidence that mechanical complication rates decline substantially when occlusal forces are distributed across a larger number of fixtures [15]. This may be particularly beneficial in immediate loading scenarios, where prosthetic components are more vulnerable to stress during early bone remodeling.

Overall, the results of this study reinforce contemporary literature suggesting that immediate implant placement combined with a strategic increase in implant number leads to more favourable biological and prosthetic outcomes. Improved soft tissue stability, higher esthetic ratings, and reduced prosthetic complications reflect the synergistic effect of biomechanics and tissue healing. The findings underscore the importance of careful treatment planning, particularly in full-arch rehabilitation, where implant number and distribution can significantly influence long-term success.

CONCLUSION

Immediate implant placement in fresh extraction sockets demonstrated predictable healing and prosthetic outcomes in both groups; however, patients receiving more than six implants exhibited superior soft tissue stability, improved esthetic scores, and fewer prosthetic complications. These results indicate that increasing implant distribution enhances load distribution, supports soft tissue contours, and optimizes functional outcomes in full-arch immediate rehabilitation. Strategic implant

planning remains essential to achieving long-term peri-implant health and patient satisfaction.

REFERENCES

1. Madhuri DS, Saha A, Jaswitha V, Alenazi AS, Javed M, AlKhamees MM, Alshahrani F. Impact of immediate implant placement with interim restoration on soft tissue healing in full-arch rehabilitation. J Pharm Bioallied Sci. 2025;17(Suppl 1):S2608-S2610.

2. Heimes D, Wagner W, Schlegel KA, Weibrich G, Neugebauer J, Kämmerer PW. Evidence review of immediate implant placement and restoration in full-arch therapy. Clin Implant Dent Relat Res. 2025;27(1):45-54.

3. Velasco-Ortega E, Ortiz-Garcia I, Monsalve-Guil L, López-López J, Núñez-Márquez E, Matos-Garrido N, Llamas-Carreras JM. Ten-year outcomes of immediate implants with immediate loading in fresh sockets. Clin Oral Investig. 2025;29(2):455-463.

4. Guzman-Perez G, Avila-Ortiz G, Kois JC, Brägger U, Belser UC, Salama MA. Esthetic outcomes of immediate implants in extraction sockets: a contemporary review. Clin Oral Implants Res. 2024;35(4):345-358.

5. Naseri R, Asadollahi S, Shirani M, Pouremadi N, Moradi A, Shafiei F. Five-year outcomes of dental implants placed in fresh extraction sockets: a retrospective clinical study. Saudi Dent J. 2024;36(1):22-29.

6. Ickroth A, Christiaens V, Pitman J, Cosyn J, De Bruyn H, Vervaeke S. Immediate implant placement in intact vs. non-intact sockets: a systematic review. J Clin Med. 2025;14(1):2462.

7. Guglielmi D, Di Domenico GL, Mazzone N, De Angelis F, Manicone PF, De Sanctis M. Soft and hard tissue changes after immediate implant placement with or without connective tissue grafting. J Clin Periodontol. 2022;49(8):999-1011.

8. Jurado CA, Mertens C, Figueredo CM, Veltri M, Morton D, Prando E. Soft tissue esthetic outcomes of immediate implants in the esthetic zone: survival and pink esthetic score analysis. Clin Oral Implants Res. 2025;36(1):112-121.

9. Heimes D, Neugebauer J, Becker J, Kämmerer PW, Wagner W, Schlegel KA. Implant survival and prosthetic outcomes in immediate placement protocols: a narrative synthesis. Clin Implant Dent Relat Res. 2025;27(2):88-96.

10. Kakar A, Siddiqui ZR, Arora A, Mahesh L, Kochhar GK, Taneja S. Immediate versus delayed implant placement: a comparative clinical analysis of esthetic and functional outcomes. Int J Oral Maxillofac Surg. 2025;54(1):133-140.

11. Grandi T, Guazzi P, Bianchi A, Citterio F, Grandi G, Sforza C. Influence of implant distribution on peri-implant soft tissue outcomes in full-arch rehabilitations. J Prosthodont Res. 2024;68(2):214-221.

12. Amato F, Poli PP, Cremonesi S, Dolcini GA, Gallo P, Manfredini M. Biomechanical behaviour of immediate full-arch implant rehabilitation under varying implant numbers: a clinical and finite element study. Clin Oral Investig. 2024;28(3):765-774.

13. Zanardi PR, Zucchelli G, Stefanini M, Mazzotti C, Montebugnoli L, Ferri M. Esthetic soft-tissue outcomes influenced by the number of implants in full-arch immediate loading protocols. J Esthet Restor Dent. 2023;35(6):785-794.

14. Chrcanovic BR, Kisch J, Albrektsson T, Wennerberg A, Malmström HS, Rabe J. Immediate full-arch implant loading: impact of implant distribution on survival and complication rates. Clin Implant Dent Relat Res. 2023;25(5):892-903.

15. Calandriello R, Tomatis M, Zuffetti F, Del Fabbro M, Testori T, Weinstein RL. Prosthetic complication rates in full-arch immediate loading: effect of implant number and distribution. Int J Prosthodont. 2023;36(4):451-459.