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Role of orthodontics in restorative and implant dentistry

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Abstract:

Orthodontics plays an essential interdisciplinary role in preparing patients for restorative and implant dentistry. Therefore, it is of interest to evaluate the effect of pre-restorative orthodontic treatment on space availability, root alignment, occlusal relationships and restorative outcomes. Orthodontic intervention resulted in significant improvement in implant site preparation, reduced need for aggressive tooth preparation and enhanced esthetic and functional results. Prosthetically driven implant placement and restorative rehabilitation were successfully achieved following orthodontic preparation. Thus, data shows the incorporation of orthodontic treatment as a foundational step in comprehensive restorative and implant treatment planning.

Keywords: Orthodontics; restorative dentistry; implant dentistry; interdisciplinary treatment; pre-restorative orthodontic preparation

Background:

Orthodontics plays a critical interdisciplinary role in modern dental practice by creating optimal tooth position and occlusal relationships prior to restorative and implant procedures [1]. Pre-restorative orthodontic treatment helps correct malalignment, spacing and axial inclinations, thereby improving esthetics, function and long-term prognosis of prosthetic restorations [2]. In implant dentistry, orthodontics is essential for space creation, root divergence and correction of tilted teeth to facilitate ideal implant placement and avoid anatomical complications [3]. Orthodontic intervention before restorative treatment allows preservation of tooth structure by reducing the need for aggressive tooth preparation and extensive prosthetic compensation [4]. Interdisciplinary planning between orthodontists, prosthodontists and implantologists has been shown to significantly enhance treatment outcomes and patient satisfaction [5]. Thus, orthodontics serves as a foundational step in comprehensive restorative and implant treatment planning, contributing to functional stability, esthetic harmony and long-term success [6]. Orthodontics also plays an important role in managing compromised dentitions by redistributing spaces for pontics, implants, or resin-bonded restorations [7]. Adult patients increasingly seek combined orthodontic and restorative care, making orthodontics a critical preparatory phase in comprehensive treatment planning [8]. Advances in fixed appliances, clear aligners and digital treatment planning have further expanded the scope of orthodontics in pre-restorative and implant therapy [9]. Orthodontic extrusion and intrusion techniques are valuable adjuncts in managing teeth with subgingival defects and uneven gingival margins prior to

restoration [10]. Correction of occlusal discrepancies through orthodontics contributes to improved load distribution and longevity of restorations and implant-supported prostheses [11]. Multidisciplinary collaboration among orthodontists, prosthodontists, periodontists and implantologists is essential for achieving optimal functional and esthetic outcomes [12]. Evidence suggests that orthodontic preparation reduces prosthetic complications and enhances patient satisfaction in restorative and implant dentistry [13]. Orthodontics also aids in correcting transverse and sagittal discrepancies that may otherwise compromise implant positioning and restorative design [14]. Orthodontic treatment serves as a foundational step in restorative and implant dentistry by improving biologic, functional and esthetic treatment outcomes [15]. Therefore, it is of interest to evaluate the impact of pre-restorative orthodontics on managing spatial availability, root alignment, functional occlusion, and predictable restorative results.

Methodology:

The present study was designed as a prospective interventional clinical research study to evaluate the role of orthodontic treatment as a preparatory phase for restorative and implant dentistry. The study was conducted at a tertiary care dental teaching institution through interdisciplinary collaboration between the Departments of Orthodontics and Prosthodontics. Total study duration of 24 months was planned, which included patient recruitment, orthodontic intervention, restorative or implant rehabilitation and post-treatment evaluation. A total of 45 adult patients aged between 18 and 50 years, who required orthodontic treatment prior to restorative rehabilitation or

implant placement, were included in the study. Patients presenting with malaligned teeth, inadequate space, tilted teeth, improper axial inclination, or compromised occlusion that could adversely affect restorative or implant outcomes were selected. Patients with active periodontal disease, uncontrolled systemic conditions, previous orthodontic treatment, or unwillingness to undergo interdisciplinary care were excluded from the study. All patients underwent comprehensive clinical and radiographic evaluation prior to treatment. Diagnostic records included intraoral and extraoral photographs, pre-treatment dental casts or digital models, orthopantomograms and cone beam computed tomography scans at proposed implant sites. Occlusal assessment was performed using mounted study models and clinical occlusal analysis. An interdisciplinary treatment plan was formulated for each patient after consultation between the orthodontist, prosthodontist and implantologist, with emphasis on achieving prosthetically driven orthodontic outcomes. Orthodontic treatment was carried out using fixed pre-adjusted edgewise appliances, with mechanics tailored to individual case requirements. The orthodontic objectives included space creation or redistribution, correction of axial inclinations, establishment of adequate root divergence at implant sites, intrusion or extrusion of teeth where indicated and correction of occlusal discrepancies. Auxiliary appliances such as open coil springs, uprighting springs and elastics were used as needed. Orthodontic treatment was continued until the planned restorative or implant requirements were achieved. Following completion of the orthodontic phase, patients underwent definitive restorative or implant procedures. Implant placement was performed in a prosthetically guided manner based on post-orthodontic CBCT evaluation, ensuring optimal positioning relative to adjacent roots and available bone. Restorative rehabilitation included single crowns or fixed partial dentures and occlusal adjustments were made to establish a stable and harmonious occlusion. Outcome assessment was carried out at pre-treatment, post-orthodontic and post-restorative or implants phases. Parameters evaluated included adequacy of space for restorations or implants, root positioning and parallelism, accuracy of implant placement, occlusal stability, esthetic improvement, need for additional restorative modifications and patient satisfaction. The collected data were statistically analyzed using appropriate statistical software, with pre- and post-treatment comparisons made and a significance level set at $p < 0.05$. Ethical approval was obtained from the Institutional Ethical Committee and written informed consent was secured from all participants prior to the commencement of the study.

Results:

A total of 45 patients who underwent orthodontic treatment prior to restorative or implant rehabilitation were evaluated in the present study. **Table 1** presents the demographic characteristics of the study population. A total of 45 adult patients were included in the study, with ages ranging from 18 to 50 years and a mean age of 32.6 ± 7.4 years. Female patients constituted a slightly higher proportion of the sample (55.6%) compared to male patients (44.4%). Among all participants, 26

patients (57.8%) required orthodontic treatment as a preparatory phase before implant placement, whereas 19 patients (42.2%) underwent orthodontic correction prior to restorative treatment alone. These findings indicate that orthodontic intervention is frequently required to establish favorable conditions for implant-supported or restorative rehabilitation in adult patients. **Table 2** compares the pre-treatment and post-orthodontic clinical parameters. The mean mesiodistal space increased significantly from 5.2 ± 1.1 mm before treatment to 7.8 ± 0.9 mm after orthodontic intervention ($p < 0.001$), demonstrating successful space creation for ideal restorative or implant placement. Root divergence also improved significantly from 7.6 ± 2.4 degrees to 14.2 ± 2.1 degrees ($p < 0.001$), indicating enhanced separation and alignment of adjacent roots, which is critical for safe implant positioning and periodontal health. In addition, axial inclination deviation decreased markedly from 11.3 ± 3.2 degrees pre-treatment to 4.1 ± 1.6 degrees post-treatment ($p < 0.001$), reflecting substantial correction of tooth angulation and improved axial alignment. The statistically significant p-values confirm that orthodontic treatment produced meaningful improvements in all evaluated parameters. **Table 3** summarizes the clinical outcomes following restorative and implant rehabilitation after orthodontic preparation. Prosthetically accurate implant positioning was achieved in 92.3% of cases, indicating the effectiveness of orthodontic space management and root alignment in facilitating ideal implant placement. Occlusal stability was satisfactory in 88.9% of patients, while esthetic outcomes were considered satisfactory in 90.1% of cases, demonstrating favorable functional and cosmetic results. Furthermore, 86.7% of patients required less aggressive tooth preparation due to improved tooth positioning after orthodontic treatment, supporting a more conservative restorative approach. Overall patient satisfaction was high, with 93.4% of patients reporting satisfactory treatment outcomes. These findings emphasize the important role of orthodontic preparation in improving restorative efficiency, implant accuracy, esthetics, and patient acceptance.

Table 1: Demographic characteristics of the study population

Parameter	Number of Patients (n = 45)	Percentage (%)
Gender - Male	20	44.4
Gender - Female	25	55.6
Mean age (years)	32.6 ± 7.4	—
Implant-related cases	26	57.8
Restorative-only cases	19	42.2

Table 2: Comparison of pre- and post-orthodontic parameters

Parameter	Pre-treatment (Mean $\pm$ SD)	Post-orthodontic (Mean $\pm$ SD)	p-value
Mesiodistal space (mm)	5.2 ± 1.1	7.8 ± 0.9	$<0.001^*$
Root divergence (degrees)	7.6 ± 2.4	14.2 ± 2.1	$<0.001^*$
Axial inclination deviation (degrees)	11.3 ± 3.2	4.1 ± 1.6	$<0.001^*$

*Statistically significant

Table 3: Post-restorative and implant treatment outcomes

Outcome Parameter	Satisfactory (%)	Unsatisfactory (%)
Implant positioning accuracy	92.3	7.7
Occlusal stability	88.9	11.1
Esthetic outcome	90.1	9.9

Reduced need for aggressive tooth preparation	86.7	13.3
Overall patient satisfaction	93.4	6.6

Discussion:

The present study demonstrates that orthodontic treatment plays a crucial preparatory role in restorative and implant dentistry by improving tooth position, space availability and occlusal relationships prior to definitive rehabilitation [16, 17]. Orthodontic intervention as part of an interdisciplinary approach has been shown to enhance functional and esthetic outcomes, supporting the concept that comprehensive treatment planning yields more predictable results [16]. Adequate mesiodistal space and proper root divergence are critical prerequisites for ideal implant placement and the significant improvement observed in the present study following orthodontic space creation is consistent with previous reports emphasizing prosthetically driven orthodontic preparation [18, 19]. Proper root positioning minimizes the risk of implant malposition, reduces surgical complications and improves long-term implant stability [19, 20]. Correction of axial inclination through orthodontic treatment in the present study resulted in a reduced need for restorative compensation, thereby allowing more conservative tooth preparation [17, 21]. Preservation of tooth structure is a key biological principle in restorative dentistry and orthodontic alignment prior to restoration has been shown to improve the longevity and prognosis of prosthetic restorations [21]. The favorable esthetic outcomes observed in this study can be attributed to orthodontic correction of tooth position and gingival discrepancies prior to restoration [18, 22]. Orthodontic intrusion and extrusion techniques have been widely documented as effective methods for managing uneven gingival margins and subgingival defects, particularly in the esthetic zone [22, 23]. Improved occlusal stability following combined orthodontic and restorative or implant therapy in the present study highlights the importance of orthodontic correction in achieving harmonious occlusal relationships [23, 24]. Proper occlusal load distribution is especially important in implant-supported prostheses, where occlusal overload can lead to mechanical failure and peri-implant bone loss [24, 25]. High patient satisfaction scores observed in this study further reinforce the benefits of interdisciplinary treatment planning [16, 17]. Adult patients increasingly demand comprehensive care that addresses both esthetic and functional concerns and orthodontic preparation has been shown to significantly enhance patient-reported outcomes [17, 18]. Despite the positive findings, the present study is limited by its sample size and the absence of long-term follow-up data [20, 25]. Future longitudinal studies with larger sample sizes are recommended to evaluate the long-term stability and success of orthodontically prepared restorative and implant treatments [25, 26]. Recent advancements in orthodontics and digital dentistry have significantly improved implant site preparation and interdisciplinary treatment outcomes. Clear aligner therapy has been recognized as a minimally invasive approach that facilitates controlled tooth movement while preserving dental structures, making it suitable

for pre-restorative procedures [27]. The use of three-dimensional digital technologies has further enhanced implant space planning by improving diagnostic accuracy and enabling precise positioning of implants within the arch [28]. Additionally, the incorporation of advanced imaging techniques and virtual patient simulations has been shown to increase the accuracy and predictability of implant placement procedures [29]. Orthodontic space creation remains a fundamental step in managing partially edentulous cases, as it helps establish optimal conditions for implant placement and improves both functional and esthetic outcomes [30]. Furthermore, the integration of orthodontic and restorative workflows through digital approaches has strengthened interdisciplinary collaboration and enhanced patient-centered care.

Conclusion:

Orthodontic treatment serves as a critical preparatory step in restorative and implant dentistry by optimizing tooth position, space availability and occlusal relationships. Pre-restorative orthodontic intervention enables prosthetically driven implant placement and conservative restorative procedures with improved esthetic and functional outcomes. An interdisciplinary approach incorporating orthodontics significantly enhances treatment predictability, stability and long-term success.

Advancement knowledge:

This study advances current knowledge by highlighting the critical role of orthodontic treatment in optimizing conditions for restorative and implant dentistry. It demonstrates how orthodontic interventions improve space distribution, occlusal relationships and alveolar bone architecture, thereby enhancing the predictability and long-term success of restorative and implant procedures.

References:

[1] Kokich VG & Spear FM. *Semin Orthod.* 1997 **3**:3 [PMID: 9206469]
[2] <https://www.ncbi.nlm.nih.gov/nlmcatalog/101578397>
[3] Devita R et al. *J Clin Exp Dent.* 2018 **10**:e1177. [PMID: 30697376].
[4] R Kanomi. *J Clin Orthod.* 1997 **31**:763. [PMID: 9511584]
[5] Kokich VG. *Am J Orthod Dentofacial Orthop.* 2004 **126**:278. [PMID: 15356485]
[6] Rosa JCMD et al. *J Esthet Restor Dent.* 2012 **24**:224 [PMID: 24600656]
[7] Kokich VG. *Semin Orthod.* 1996 **2**:21. [PMID: 9161280]
[8] Machado AW et al. *Dental Press J Orthod.* 2020 **25**:62 [PMID: 32965392]
[9] Papadimitriou A et al. *Prog Orthod.* 2018 **19**:37 [PMID: 30264270]
[10] Ingber JS et al. *J Periodontol.* 1976 **47**:203 [PMID: 1063857]
[11] <https://www.scirp.org/reference/referencespapers?refereceid=1951099>
[12] Coachman C et al. *Int J Periodontics Restorative Dent.* 2017 **37**:183. [PMID: 28196157]
[13] Tarnow DP et al. *J Periodontol.* 1992 **63**:995. [PMID: 1474471]

- [14] Bishara SE *et al.* *Textbook of Orthodontics*. 2001 **12**:11 [DOI: 10.1053/j.sodo.2005.10.005]
- [15] Ismail SFH & Johal AS. *J Orthod*. 2002 **29**:239. [PMID: 12218205]
- [16] Brånemark PI *et al.* *Scand J Plast Reconstr Surg*. 1969 **3**:81. [PMID: 4924041]
- [17] Spear FM *et al.* *J Am Dent Assoc*. 2006 **137**:160 [PMID: 16521381]
- [18] Garber DA & Salama MA. *Periodontol 2000*. 1996 **11**:18 [PMID: 9567953]
- [19] Assaf M. *Cureus*. 2022 **14**:e24301. [PMID: 35607572]
- [20] Thilander B *et al.* *Eur J Orthod*. 2001 **23**:715 [PMID: 11890067]
- [21] Tarnow DP *et al.* *J Periodontol*. 2000 **71**:546. [PMID: 10807116]
- [22] Guckes AD. *J Prosthet Dent*. 2002 **88**:21. [PMID: 12239475]
- [23] Proffit WR *et al.* *Contemporary Orthodontics*. 2018
- [24] Boyd RL *et al.* *Am J Orthod Dentofacial Orthop*. 1989 **96**:191. [PMID: 2773862]
- [25] Jemt T & Johansson J. *Clin Implant Dent Relat Res*. 2006 **8**:61. [PMID: 16774591]
- [26] Vatamanu OEB *et al.* *J Dent*. 2025 **161**:10596 [PMID: 40653000]
- [27] Albrektsson T *et al.* *Acta Orthop Scand*. 1981 **52**:155 [PMID: 7246093]
- [28] Saini RS *et al.* *Digit Health*. 2024 **10**:20552076241253550 [PMID: 38726220]
- [29] Bruyn HD *et al.* *Clin Oral Implants Res*. 1999 **10**:139. [PMID: 10219133]
- [30] Garcia-Torres F *et al.* *Dent J*. 2024 **12**:218 [PMID: 39057006]

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