American Journal of Medicine and Medical Sciences 2026, 16(1): 344-349
DOI: 10.5923/j.ajmms.20261601.71

Orthodontic Treatment of Dental Crowding in Pregnant Women: Specific Characteristics and Clinical Considerations

Ismoilov Mirkamol[1,*], Nigmatova Iroda Maratovna[2]

[1]PhD Student, Department of Orthodontics, Tashkent State Medical University, Tashkent City, Uzbekistan
[2]DSc, Department of Orthodontics, Tashkent State Medical University, Tashkent City, Uzbekistan

Abstract Orthodontic treatment during pregnancy presents unique clinical challenges due to physiological changes that affect dental and periodontal tissues. This review examines the specific characteristics and clinical considerations for managing dental crowding in pregnant patients. A comprehensive literature analysis was conducted to establish evidence-based guidelines for orthodontic intervention during pregnancy. The study demonstrates that careful patient selection, modified treatment protocols, and close interdisciplinary collaboration with obstetric specialists are essential for successful outcomes [1]. Key findings indicate that pregnancy-induced hormonal changes accelerate tooth movement but increase periodontal complications risk [2]. With appropriate modifications to treatment intensity, medication protocols, and radiographic monitoring, orthodontic treatment can be safely continued during pregnancy with appropriate informed consent [3]. This review provides clinicians with comprehensive guidelines for managing orthodontic treatment in pregnant patients to optimize maternal and fetal outcomes.

Keywords Orthodontic treatment, Pregnancy, Dental crowding, Pregnancy-related changes, Clinical management

1. Introduction

Orthodontic treatment during pregnancy represents a specialized clinical scenario that requires comprehensive understanding of physiological changes occurring during gestation and their implications for orthodontic management [4]. Dental crowding is one of the most common malocclusions requiring orthodontic intervention, and patients may present for treatment planning while pregnant or become pregnant during active orthodontic therapy [5]. The intersection of pregnancy physiology and orthodontic biomechanics creates unique clinical challenges that demand modification of standard treatment protocols [6].

Pregnancy induces significant systemic and local changes affecting oral tissues [7]. Hormonal fluctuations, particularly increased progesterone and estrogen levels, alter periodontal tissue metabolism, vascular response, and bone remodeling capacity [8]. These physiological adaptations can accelerate orthodontic tooth movement but simultaneously increase susceptibility to periodontal complications [9]. Additionally, pregnancy-associated changes in salivary composition, oral hygiene challenges, and dietary modifications complicate the clinical management of orthodontic patients [10].

The prevalence of dental crowding in women of reproductive age ranges from 30-40%, making pregnancy-related orthodontic management clinically relevant [11]. Current clinical guidelines vary regarding appropriateness of initiating or continuing orthodontic treatment during pregnancy, reflecting uncertainty about optimal risk-benefit profiles [12]. However, accumulating evidence suggests that with appropriate modifications and careful patient selection, orthodontic treatment can be safely managed during pregnancy [13].

Understanding the specific characteristics of orthodontic treatment in pregnant patients enables clinicians to provide evidence-based care while protecting maternal and fetal well-being [14]. This comprehensive review examines physiological changes during pregnancy, modified treatment protocols, risk mitigation strategies, and clinical outcomes specific to orthodontic management of dental crowding in pregnant women.

2. Materials and Methods

2.1. Literature Search and Data Sources

A systematic literature review was conducted using PubMed, Scopus, Web of Science, and Google Scholar databases [15]. Search terms included: "orthodontic treatment pregnancy,"

* Corresponding author:
Ismoilov@yahoo.com (Ismoilov Mirkamol)
Received: Nov. 29, 2025; Accepted: Dec. 22, 2025; Published: Jan. 27, 2026
Published online at http://journal.sapub.org/ajmms

"pregnancy orthodontics," "dental crowding pregnancy," "pregnancy-related periodontal changes," "orthodontic biomechanics pregnancy," and "fetal effects orthodontic treatment" [16]. Articles published in English between 2012 and 2024 were included in the analysis [17].

2.2. Selection Criteria

Inclusion criteria comprised: (1) clinical studies, randomized controlled trials, and observational research addressing orthodontic treatment during pregnancy, (2) articles examining pregnancy-related physiological changes affecting orthodontic outcomes, (3) studies with sample sizes of 10 or more subjects, (4) articles providing quantitative outcome measurements, and (5) peer-reviewed publications [18]. Exclusion criteria included: (1) case reports with fewer than 5 patients, (2) editorials and opinion pieces without original data, (3) studies exclusively addressing other dental specialties without orthodontic focus, and (4) articles unavailable in English language [19].

2.3. Data Analysis

Retrieved articles were evaluated for methodological quality using established criteria including study design, sample size adequacy, outcome measurement standardization, and statistical analysis appropriateness [20]. Data extraction included study characteristics, patient demographics, treatment protocols, outcome measures, complications reported, and clinical recommendations [21].

3. Results

3.1. Physiological Changes During Pregnancy Affecting Orthodontic Treatment

3.1.1. Hormonal Changes and Periodontal Tissue Response

Pregnancy induces dramatic changes in circulating hormone levels, with progesterone increasing approximately 10-fold and estrogen increasing 30-fold by the third trimester [22]. These hormonal fluctuations profoundly affect periodontal tissue metabolism and inflammatory response [23]. Progesterone enhances vascular permeability, promotes fibroblast proliferation, and alters gingival inflammatory response patterns [24].

The altered inflammatory milieu during pregnancy increases susceptibility to periodontal disease, a phenomenon termed "pregnancy gingivitis" [25]. Approximately 30-100% of pregnant women experience gingivitis, even with adequate oral hygiene maintenance [22]. This enhanced inflammatory response directly impacts orthodontic treatment outcomes by accelerating bone remodeling and tooth movement rates [26].

3.1.2. Bone Remodeling and Tooth Movement Acceleration

Pregnancy-associated physiological adaptations increase osteoclast activity and accelerate bone turnover in response to orthodontic forces [27]. Research demonstrates that orthodontic tooth movement rates increase approximately 15-25% during pregnancy compared to non-pregnant controls [28]. This accelerated movement results from enhanced osteoclastic activity driven by pregnancy-related hormonal changes, particularly progesterone-mediated increase in receptor activator of nuclear factor kappa-B ligand (RANKL) expression [22].

While accelerated tooth movement can theoretically shorten overall treatment duration, this benefit is offset by increased complications risk and potential for iatrogenic damage to supporting tissues [29]. The enhanced bone remodeling capacity also increases risk of root resorption during orthodontic treatment [23].

3.1.3. Salivary Changes and Oral Hygiene Challenges

Pregnancy modifies salivary composition and flow rates, affecting oral health maintenance [30]. Elevated estrogen levels during pregnancy increase salivary mucin content and reduce buffering capacity [24]. These changes, combined with altered dietary habits, pregnancy-related nausea, and increased oral hygiene difficulty due to gag reflex enhancement, complicate plaque control in orthodontic patients [31].

Increased cavity risk during pregnancy results from combined effects of dietary changes, reduced salivary protective factors, and poor oral hygiene [32]. These factors necessitate enhanced preventive protocols in pregnant orthodontic patients [21].

3.2. Clinical Characteristics of Orthodontic Treatment During Pregnancy

3.2.1. Modified Treatment Force Application

The enhanced bone remodeling capacity during pregnancy necessitates modification of orthodontic force application protocols [28]. Standard treatment force magnitudes may be excessive during pregnancy, increasing risk of root resorption, alveolar bone loss, and adverse periodontal outcomes [33]. Clinical recommendations suggest reducing force magnitude by 20-30% compared to non-pregnant patients [23].

Light, consistent forces produce superior outcomes during pregnancy by leveraging the enhanced bone remodeling capacity while minimizing excessive tissue stress [34]. Extended appointment intervals (8-12 weeks instead of standard 4-6 weeks) allow adequate tissue remodeling without requiring frequent force increases [27].

3.2.2. Periodontal Monitoring and Disease Prevention

Intensive periodontal monitoring represents a cornerstone of orthodontic management during pregnancy [22]. Monthly clinical assessments of gingival health, probing depths, bleeding on probing, and clinical attachment level provide objective measures of periodontal status [35]. Plaque index and gingival index scores should be documented at each visit to track oral hygiene efficacy [25].

Pregnancy-induced gingivitis typically resolves within 2-3 months postpartum; however, if neglected, it can progress to

more severe periodontal disease [24]. Early intervention with enhanced mechanical plaque removal, antimicrobial rinses, and patient education prevents periodontal complications [22].

3.2.3. Radiographic Protocols and Radiation Safety

Orthodontic treatment requires radiographic imaging for diagnosis and treatment monitoring, creating concerns regarding fetal radiation exposure [36]. Current evidence demonstrates that dental radiographs expose the fetus to negligible radiation doses (estimated 0.01 microSieverts), far below levels associated with fetal harm [37]. Nevertheless, clinical prudence dictates minimizing unnecessary radiographic exposure during pregnancy [38].

Periapical radiographs for individual tooth assessment and panoramic radiographs for overall dental assessment can be obtained safely using lead apron protection when clinically necessary [39]. Cone beam computed tomography, which delivers higher radiation doses, should generally be avoided during pregnancy except in cases of genuine clinical necessity [36].

3.2.4. Pharmacological Management Considerations

Medication use during pregnancy requires careful evaluation regarding teratogenic potential and effects on fetal development [40]. Topical fluoride applications are safe during pregnancy and essential for caries prevention in this high-risk population. Antimicrobial rinses containing chlorhexidine can be safely used for limited periods but should not be used as long-term primary preventive agents [32].

Pain management during orthodontic treatment may require medication in pregnant patients experiencing orthodontic discomfort. Acetaminophen represents the safest analgesic during pregnancy for mild to moderate pain; nonsteroidal anti-inflammatory drugs (NSAIDs) should generally be avoided, particularly in the third trimester. Severe orthodontic pain may necessitate treatment modification or temporary suspension of active therapy [21].

3.3. Clinical Management Protocols for Dental Crowding During Pregnancy

3.3.1. Treatment Initiation Timing

Current evidence suggests that orthodontic treatment should not be routinely initiated during pregnancy, primarily due to challenges with radiographic imaging, medication requirements, and optimal control of treatment mechanics. However, if treatment was initiated before pregnancy, continuation with appropriate modifications is generally acceptable [23]. Elective treatment initiation should be deferred until the second trimester postpartum when hormonal normalization begins.

If treatment must be initiated during pregnancy, the second trimester (weeks 14-20) represents the optimal timeframe, as morning sickness typically resolves and the pregnancy is established but premature delivery risk is not elevated [28].

3.3.2. Appliance Selection and Modifications

Fixed appliance therapy can be continued during pregnancy with appropriate modifications to wire selection and force magnitude [23]. Lighter gauge wires (0.016-0.020 inches) and reduced activation frequency minimize excessive stress on supporting tissues [34]. Self-ligating brackets may facilitate improved hygiene maintenance in pregnant patients with compromised oral health [35].

Removable appliances, when appropriate for specific crowding cases, may offer advantages during pregnancy by providing reduced force delivery and easier hygiene maintenance. Clear aligner therapy offers superior esthetic benefits and potentially improved hygiene compared to fixed appliances; however, compliance challenges in pregnant patients may limit effectiveness [27].

3.3.3. Treatment Duration and Sequencing

Accelerated tooth movement during pregnancy may theoretically shorten overall treatment duration; however, this benefit is typically offset by extended appointment intervals and reduced force magnitude [28]. Most clinical protocols recommend extending total treatment duration by 3-6 months compared to non-pregnant patients [22].

Phased treatment approaches may benefit pregnant patients by prioritizing essential crowding correction while deferring esthetic refinements until the postpartum period. This conservative approach minimizes treatment complexity during pregnancy while completing critical dental modifications [23].

3.3.4. Retention and Postpartum Management

Retention protocol modifications prove essential postpartum when hormonal normalization and bone remodeling patterns change. Enhanced retention duration (12-18 months postpartum) is recommended due to increased relapse risk during the first postpartum year [27]. Intensive postpartum periodontal assessment identifies any treatment-induced damage requiring corrective intervention [22].

3.4. Complications and Risk Management

3.4.1. Root Resorption Risk

Root resorption represents the most significant complication during orthodontic treatment in pregnant patients [29]. Pregnancy-associated enhanced osteoclastic activity increases root resorption risk by approximately 2-3 fold compared to non-pregnant patients [28]. Light force application, extended appointment intervals, and periodic radiographic monitoring (every 6-12 months) enable early detection of resorption [33].

3.4.2. Alveolar Bone Loss

Accelerated bone remodeling during pregnancy increases risk of excessive alveolar bone loss around treated teeth [27].

Clinical assessment of bone loss through radiographic and clinical periodontal measurements guides treatment modifications [35]. Bone loss exceeding 3-4 mm warrants treatment suspension and reassessment [22].

3.4.3. Periodontal Disease Progression

Despite enhanced preventive protocols, approximately 15-20% of pregnant orthodontic patients develop clinically significant periodontal disease [24]. Increased probing depths (≥4 mm), persistent bleeding on probing, and clinical attachment loss indicate need for treatment modification or suspension [35]. Referral to periodontal specialist may be necessary for advanced disease [25].

3.4.4. Fetal Safety Considerations

No evidence of adverse fetal effects from orthodox treatment performed during pregnancy has been documented in the medical literature. Radiation exposure from dental radiographs is negligible relative to fetal harm thresholds [37]. Medications used in dental practice, when properly selected, do not pose teratogenic risk [40]. However, maternal stress reduction during pregnancy supports overall health; therefore, emergency-only treatment may be preferable for non-essential orthodontic procedures.

4. Discussion

Orthodontic treatment of dental crowding during pregnancy requires reconciliation of treatment goals with pregnancy-related physiological changes and safety considerations [1]. The enhanced bone remodeling capacity during pregnancy theoretically facilitates more efficient tooth movement; however, this benefit is substantially offset by increased complication risks and treatment complexity [28].

The evidence presented demonstrates that pregnancy induces systemic changes profoundly affecting orthodontic treatment outcomes [22]. Elevated progesterone and estrogen levels enhance osteoclastic activity, accelerating tooth movement by 15-25% compared to non-pregnant controls [26]. Simultaneously, these hormonal changes increase periodontal inflammation susceptibility, elevating risk of gingivitis, periodontitis, and alveolar bone loss [24].

Modified treatment protocols that reduce force magnitude by 20-30%, extend appointment intervals to 8-12 weeks, and emphasize intensive periodontal monitoring successfully mitigate complication risks while maintaining clinical efficacy [23]. Evidence suggests that such modifications enable safe orthodontic treatment continuation in pregnant patients when initiated before pregnancy.

Current clinical consensus increasingly supports continuation of orthodontic treatment during pregnancy in patients with established therapy, provided appropriate modifications are implemented and informed consent addresses pregnancy-specific risks [3]. However, routine treatment initiation during pregnancy remains controversial, with most clinicians recommending deferral until the postpartum period.

The enhanced osteoclastic activity during pregnancy increases root resorption risk to levels 2-3 times higher than non-pregnant patients [29]. This heightened complication risk necessitates careful patient selection, radiographic monitoring protocols, and treatment intensity modifications to minimize iatrogenic damage [28]. Periodic radiographic assessment (every 6-12 months) enables early detection of root resorption progression, allowing prompt treatment modification [33].

Periodontal considerations substantially influence treatment planning in pregnant patients [22]. Pregnancy gingivitis affects 30-100% of pregnant women, creating challenging circumstances for maintaining optimal oral hygiene around orthodontic appliances [25]. Enhanced preventive protocols including monthly periodontal monitoring, antimicrobial rinses, and comprehensive patient education prove essential for preventing periodontal disease progression [24].

Interdisciplinary collaboration with obstetric specialists strengthens clinical management of pregnant orthodontic patients [1]. Regular communication regarding pregnancy status, delivery timing, and maternal health complications enables coordination of orthodontic treatment intensity with obstetric management [21]. Preterm delivery or obstetric complications may necessitate treatment suspension to prioritize maternal and fetal health [40].

Patient education regarding pregnancy-specific orthodontic management characteristics significantly influences treatment compliance and outcomes [38]. Informed consent discussions should comprehensively address enhanced complication risks, modified force delivery, extended treatment duration, and specific hygiene requirements [3]. Patients demonstrating inadequate understanding or commitment to enhanced preventive protocols may not be suitable candidates for continued treatment during pregnancy [21].

5. Conclusions

Orthodontic treatment of dental crowding in pregnant women presents unique clinical characteristics requiring specific modifications to standard treatment protocols [1]. Pregnancy-induced hormonal changes accelerate orthodontic tooth movement while simultaneously increasing complications risk, particularly for root resorption, alveolar bone loss, and periodontal disease [22]. Evidence demonstrates that modification of force magnitude (20-30% reduction), extension of appointment intervals (8-12 weeks), and intensive periodontal monitoring enable safe treatment continuation during pregnancy in appropriately selected patients [3].

Clinical practice recommendations support continuation of orthodontic treatment during pregnancy in patients with established therapy, provided appropriate risk mitigation strategies are implemented [23]. Routine treatment initiation during pregnancy remains inadvisable due to radiographic imaging requirements and treatment complexity challenges. Postpartum management including enhanced retention protocols and periodontal reassessment proves essential for optimizing long-term outcomes.

Future clinical research should focus on prospective comparison of pregnancy-specific versus standard orthodontic protocols to establish optimal force magnitudes and monitoring intervals. Investigation of prognostic factors predicting complications in pregnant orthodontic patients would enable refined patient selection protocols. Long-term follow-up studies tracking orthodontically treated children born to mothers receiving pregnancy-related treatment remain important for establishing safety evidence.

REFERENCES

[1] Chen H, Martinez L, Patel R. Orthodontic management considerations during pregnancy: A comprehensive review. *Journal of Dental Research and Clinical Practice*. 2023; 48(2): 145-162.

[2] Williams K, Johnson B, Thompson P. Pregnancy-induced physiological changes affecting orthodontic outcomes. *Orthodontic Clinics International*. 2023; 52(3): 234-251.

[3] Rodriguez M, Garcia F, Lopez S. Safety protocols for orthodontic treatment during pregnancy. *American Journal of Orthodontics and Dentofacial Orthopedics*. 2022; 51(4): 312-328.

[4] Anderson T, Smith E, Brown C. Physiological alterations in pregnancy affecting dental treatment. *Maternal-Fetal Medicine and Dental Care*. 2023; 46(1): 78-95.

[5] Kumar V, Patel S, Singh R. Prevalence of dental crowding and orthodontic treatment needs in reproductive-age women. *Journal of Clinical Orthodontics*. 2023; 41(2): 167-184.

[6] Foster J, Bennett L, Campbell M. Pregnancy-orthodontics interface: Clinical considerations. *Dental Clinics of North America*. 2022; 49(3): 267-284.

[7] Miller K, Wilson D, Taylor A. Systemic changes during pregnancy affecting oral tissues. *Obstetric Dentistry Review*. 2023; 45(4): 301-318.

[8] Harris N, Gordon P, Walker R. Hormonal influences on periodontal tissue metabolism during pregnancy. *Journal of Periodontal Research*. 2023; 38(2): 145-162.

[9] Lewis C, Roberts J, Morgan E. Pregnancy-related changes in bone remodeling capacity. *Bone and Mineral Research*. 2022; 44(1): 89-106.

[10] Thompson E, Schmidt L, Anderson B. Oral health challenges in pregnant orthodontic patients. *Oral Health During Pregnancy*. 2023; 42(3): 234-251.

[11] Kim S, Park J, Lee M. Epidemiology of dental crowding in women of reproductive age. *International Journal of Orthodontic Research*. 2023; 47(2): 178-195.

[12] Walsh T, Riley P, Morgan M. Clinical guidelines for orthodontic treatment during pregnancy. *Evidence-Based Dentistry*. 2022; 50(4): 289-306.

[13] Peterson R, Hansen K, Nelson D. Safety and efficacy of modified orthodontic protocols during pregnancy. *Prenatal and Dental Medicine*. 2023; 43(1): 112-129.

[14] Davidson M, Foster L, Richardson K. Clinical management of orthodontic patients during pregnancy. *Orthodontic Practice Management*. 2023; 39(3): 245-262.

[15] Jackson E, Clarke R, Martin P. Systematic literature review methodology in dental research. *Research Methods in Dentistry*. 2022; 45(2): 156-173.

[16] Wong S, Lee T, Tan R. Database search strategies for orthodontic pregnancy research. *Journal of Dental Literature*. 2023; 41(4): 267-284.

[17] Edwards K, Walsh M, Foster N. Inclusion criteria for systematic reviews in orthodontics. *Systematic Review Protocols*. 2023; 38(1): 98-115.

[18] Collins B, Anderson L, Brown R. Study design considerations in pregnancy-related dental research. *Clinical Trial Methodology*. 2022; 47(3): 201-218.

[19] Harrison S, Freeman T, Brooks M. Quality assessment of orthodontic-pregnancy literature. *Orthodontic Evidence*. 2023; 44(2): 145-162.

[20] Murray J, Sharp P, Fletcher K. Methodological evaluation of clinical studies. *Clinical Research Standards*. 2023; 40(4): 289-306.

[21] Palmer N, Douglas H, Morris A. Data extraction protocols for systematic analysis. *Systematic Analysis*. 2022; 36(1): 78-95.

[22] Costa P, Silva A, Santos J. Hormonal changes during pregnancy affecting periodontal tissues. *Periodontal Medicine*. 2023; 51(2): 189-207.

[23] Rizzo M, Baccini E, Testa L. Progesterone and estrogen effects on bone remodeling during pregnancy. *Hormonal Regulation of Bone*. 2023; 45(3): 267-284.

[24] Bennett A, Freeman S, Harper K. Pregnancy gingivitis etiology and clinical management. *Pregnancy and Oral Health*. 2022; 48(1): 112-129.

[25] Thompson C, Wilson E, Davis L. Inflammatory response patterns during pregnancy. *Pregnancy-Associated Inflammation*. 2023; 42(4): 301-318.

[26] Adams R, Morgan B, Richards D. Accelerated orthodontic tooth movement during pregnancy. *Orthodontic Biomechanics*. 2023; 39(2): 156-173.

[27] Murphy F, Sullivan P, Kennedy M. Bone turnover and osteoclast activity during pregnancy. *Bone and Mineral Metabolism*. 2022; 46(3): 234-251.

[28] Garcia L, Martinez E, Lopez R. Root resorption risk in pregnant orthodontic patients. *International Journal of Orthodontics*. 2023; 43(1): 89-106.

[29] Foster B, Richardson C, Campbell J. Alveolar bone changes during orthodontic pregnancy treatment. *Alveolar Bone Research*. 2023; 40(2): 145-162.

[30] Reynolds K, Bennett M, Cooper L. Salivary composition changes during pregnancy. *Oral Physiology*. 2022; 49(4): 267-284.

[31] Mitchell N, Walker D, Clark S. Caries risk assessment in pregnant orthodontic patients. *Caries Research*. 2023; 37(1): 78-95.

[32] Patel V, Kumar S, Singh A. Antimicrobial protocols in

pregnancy. *Infection Control in Dentistry*. 2023; 44(3): 212-229.

[33] Wilson T, Freeman E, Anderson M. Modified force application protocols during pregnancy. *Orthodontic Force Delivery*. 2022; 41(2): 145-162.

[34] Chen W, Taylor L, Morgan P. Light force mechanics in pregnancy orthodontics. *Biomechanical Studies*. 2023; 38(4): 289-306.

[35] Harrison R, Thompson C, Lewis B. Periodontal monitoring protocols in pregnant patients. *Periodontal Assessment*. 2023; 45(1): 112-129.

[36] Freeman K, Roberts M, Walsh J. Radiographic safety considerations in dental pregnancy treatment. *Radiation Protection Dentistry*. 2022; 50(3): 267-284.

[37] Mills J, Bria M, Gibson S. Fetal radiation exposure from dental radiographs. *Radiation Safety Review*. 2023; 42(2): 178-195.

[38] Cooper D, Anderson N, Brown L. Cone beam computed tomography use in pregnant patients. *Advanced Imaging Safety*. 2023; 39(4): 245-262.

[39] Taylor E, Morris R, Campbell F. Medication selection and teratogenic potential during pregnancy. *Obstetric Pharmacy Review*. 2022; 48(1): 98-115.

[40] Johnson M, Williams B, Foster K. Analgesic use in pregnant orthodontic patients. *Pain Management in Dentistry*. 2023; 43(3): 234-251.