

# Orthodontic treatment and patient satisfaction with Orthoworld Fastbraces® in pediatric population

## Abstract

**Objectives:** To evaluate the outcomes of orthodontic treatment using Orthoworld FASTBRACES® and assess patient satisfaction with various treatment parameters.

A total of 164 eligible pediatric patients out of 20,240 cases treated between 2010 and 2023 were included in this review. Patients were categorized into two groups based on the type of brackets used: 2 patients with ceramic brackets and 162 patients with metal brackets. Following completion of orthodontic treatment, patients were invited to complete a comprehensive questionnaire, which assessed treatment duration, number of visits, brackets and wires used, types of issues encountered, patient understanding of treatment, overall comfort level, compliance, and satisfaction with the speed of treatment.

**Methods:** A retrospective analysis was conducted on 20,240 orthodontic cases treated with Orthoworld FASTBRACES® between 2010 and 2023. From this pool, 559 patients met the inclusion criteria for this study. The pediatric patient group was considered ages 11-17. The pediatric patient cohort was divided into two groups: 2 patients with ceramic brackets and 162 patients with metal brackets. All pediatric patients underwent comprehensive orthodontic treatment using the Orthoworld FASTBRACES® system.

**Results:** Among the pediatric patients included in this review, a detailed analysis of treatment outcomes and pediatric patient satisfaction was performed. The mean treatment duration was calculated for both the ceramic bracket group (n=420 days) and the metal bracket group (n=395 days). The average number of visits required for each group was recorded at 15.5 days for the ceramic bracket group and 14.4 days for the metal bracket group. During treatment, various issues were encountered and categorized as bracket-related, wire-related, tooth-related, patient-related, allergic reactions, soft tissue irritation, bracket placement issues, performance-related issues, and hard tissue complications. Metal group had the highest number of issues with patients complaining of tooth issues and bracket issues. Both groups reported low numbers (n<5) for bracket performance issues, placement issues, soft-tissue issues wires issues, hard tissue issues, ingestion issues, and allergic reactions.

Following the completion of orthodontic treatment, pediatric patients were asked to complete a questionnaire evaluating their understanding of the treatment, overall comfort level, compliance, and satisfaction with the speed of treatment. Patient responses were collected and analyzed to determine the rating of patient understanding, comfort, compliance, and happiness with the treatment duration. The average score for patient responses was greater than 3 (i.e., above average) for treatment evaluation survey for both treatment groups.

**Conclusion:** The analysis of pediatric patients undergoing orthodontic treatment with FASTBRACES® reveals promising results in terms of reduced alignment duration and improved oral hygiene practices. The study emphasizes the importance of precise bracket and wire placement and highlights the expertise of orthodontic practitioners in achieving successful outcomes.

**Keywords:** Orthodontics, bracket, ceramic, metal, braces, pediatrics, Fastbraces

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## Introduction

This paper was prepared to summarize and evaluate Orthoworld FASTBRACES® Orthodontic Brackets in the context of a multi-user experience analysis, based on a review of clinical data.

To consider relevant parameters in the evaluation of a specific orthodontic treatment protocol it is important to consider the broader literature. Multiple studies have discussed and emphasized the importance of evaluating treatment outcomes and patient satisfaction in orthodontic care. Patient-reported outcomes, including factors such as treatment duration, comfort, compliance, and satisfaction, play a significant role in assessing the effectiveness of orthodontic

treatment.<sup>1,2</sup> Patient-centered care and patient satisfaction have been recognized as essential components of successful orthodontic treatment.<sup>3-7</sup>

Furthermore, research has indicated that treatment duration can vary based on the complexity of the case and the orthodontic system used. Studies have reported average treatment durations ranging from 18 to 36 months for orthodontic braces systems. It is important to note that treatment durations may vary depending on individual factors and the specific treatment needs of each patient.<sup>8-11</sup> Patient comfort during orthodontic treatment is another critical aspect, and various techniques and materials have been developed to enhance patient comfort and minimize discomfort.<sup>12-15</sup>

Patient compliance and understanding of the treatment plan are important factors that contribute to treatment success. Effective communication between orthodontic providers and patients is vital in ensuring patient cooperation and achieving desired treatment outcomes.<sup>16,17</sup> Patient satisfaction with the speed of treatment is influenced by several factors, including the alignment of treatment goals with patient expectations, the effectiveness of treatment, and the overall patient experience.<sup>18</sup>

Orthoworld, LLC offers FASTBRACES®, a comprehensive orthodontic treatment system that encompasses a variety of components such as brackets, wires, ligatures, buccal tubes, bands, elastomerics, and other orthodontic appliances as determined necessary by an orthodontist. Commercially available orthodontic accessories including ligatures, buccal tubes, bands, and elastomerics are also part of the FASTBRACES® treatment. The FASTBRACES® brackets and wires consists of both metal and ceramic brackets.

Data collected from commercial use of the product, between 2010 through present, was compiled for the purpose of a comprehensive retrospective review focused on evaluating a multi-user experience with FASTBRACES®. A Treatment Evaluation Survey was deployed for 559 cases between 2016-2023 to assess orthodontic treatment performance. The pediatric population of 164 cases are discussed in this review. Specific aspects such as treatment duration, overall comfort, patient compliance, satisfaction with treatment speed and patient understanding of treatment were evaluated by the orthodontic providers per use case.

## Material and methods

### Trial design

A retrospective observational clinical study was conducted to assess the effectiveness of Orthoworld FASTBRACES®. The methodology involved collecting data from 164 out of 559 pediatric cases between 2016 and 2023 and sending a Treatment Evaluation Form to the participating doctors about their and their patients' experiences with the product. In addition to the user cases with associated Treatment Evaluation Forms, data from 20,240 cases with ceramic brackets was collected from cases between 2010 and 2023, containing information about doctor name (when available), treatment start and finish date and patient age.

### Participants, eligibility criteria, and settings

The Treatment Evaluation Form completed by participating providers for each of the 164 cases included questions pertaining to type of FASTBRACES® bracket, treatment start and end date, number of visits during treatment, number of brackets used, number of wires used, types of issues (types: bracket, wire, tooth, patient, allergic, ingestion soft tissues, placement, performance, hard tissue), rating of patient understanding of treatment, patient overall comfort level, patient compliance, patient happiness with speed of treatment.

This data was compiled and analyzed using pivot tables in Microsoft Excel to assess trends in overall efficacy and safety of FASTBRACES® as well as to gain more nuanced insights on user experience.

## Results

### Patient details

Among the 20,240 orthodontic cases treated between 2010 and 2023, a total of 164 pediatric patients met the inclusion criteria

for this comprehensive evaluation of Orthodontic Treatment with Orthoworld FASTBRACES®. The patient cohort was divided into two distinct groups: 2 patients with ceramic brackets and 162 patients with metal brackets. These groups were analyzed to assess treatment outcomes and patient satisfaction. Following the completion of their orthodontic treatment, patients participated in a detailed questionnaire encompassing various aspects of their treatment experience. Unfortunately, there is limited to no data available for follow-up after completion of orthodontic treatment (Table 1).

### Orthodontic treatment experience analysis data

The average pediatric patient age was 15.46 years (ceramics brackets: 15.5 years  $\pm$ 0.71 and metal brackets: 15.45  $\pm$ 1.2) with a range of 11 to 17. The treatment experience analysis of the patients in the treatment groups are reported in Table 2. No statistically significant difference between the two groups was found in the treatment evaluation.

### Duration

The mean treatment duration for 164 pediatric patients with ceramic brackets was found to be 420 days, while patients with metal brackets had a mean treatment duration of 394.98 days. These findings indicate that the overall treatment duration was within the expected range for both groups. The average number of visits required for successful treatment completion was 15.5 days for the ceramic bracket group and 14.41 days for the metal bracket group. These results suggest that patients in both groups received similar levels of monitoring and care throughout their orthodontic treatment. However, the treatment duration for both the ceramic and metal bracket groups varied significantly, indicating individual variations in the response to treatment.

### Brackets and wires

In terms of the materials used during the orthodontic treatment, the number of brackets and wires utilized was recorded. The ceramic bracket group required an average of 25 brackets per patient, while the metal bracket group utilized an average of 22.17 brackets per patient. Additionally, the average number of wires used was 3 for the ceramic bracket group and 3.08 for the metal bracket group. Despite the slightly longer treatment duration in the ceramic bracket group, both groups required a comparable number of brackets and wires, indicating similar treatment complexity and requirements.

### Treatment evaluation survey

The user survey aimed at gathering patient feedback on various aspects of their treatment experience, including understanding of the treatment process, comfort level, compliance with treatment protocols, and satisfaction with the speed of treatment delivery. The table below summarizes the key findings of the user survey in pediatric cases (Table 3).

The user survey provides insights into patient feedback on their orthodontic treatment experience with ceramic and metal brackets. The findings indicate that patients in both groups had a good understanding of the treatment process, experienced satisfactory levels of comfort, demonstrated good compliance with treatment protocols, and expressed overall satisfaction with the speed of treatment delivery. These results contribute to the existing knowledge in orthodontics and can assist orthodontic professionals in treatment planning and decision-making.

### Patient harms

Throughout the treatment period, various issues were encountered by the pediatric patients. These issues were categorized into different types, including bracket-related, wire-related, tooth-related, patient-related, allergic reactions, ingestion of soft tissues, bracket placement,

performance-related issues, and hard tissue complications. The incidence and distribution of these issues were examined within both the ceramic and metal bracket groups. Notably, the most commonly reported issues were bracket-related and wire-related, indicating the significance of proper bracket and wire placement and adjustment (Table 4).

**Table 1** Patient demographics and treatment duration for pediatric population cases (164 patients)

	No. of cases	Patient age (years)	Avg. duration of treatment (days)	Duration of treatment range (days)
Ceramic	5106	15.03 ± 1.37	402.72 ± 220.76	6-1823
Metal	161	15.45 ± 1.16	396.99 ± 271.15	8-1439

**Table 2** Orthodontic treatment experience analysis for pediatric population (<18 years)

Parameter assessed	Bracket type	
	Ceramic	Metal
Number of Cases	2	162
Patient Age (Average, standard deviation)	15.5 ± 0.71	15.42 ± 1.2
Patient Age Range (Min, Max)	15-16	11-17
Duration of Treatment (Average, days ± std dev)	420.0 ± 35.36	394.98 ± 271.52
Number of Adjustment Visits (Average)	15.5	14.41
Number of Brackets Used (Average)	25	22.17
Number of Wires Used (Average)	3	3.08
<b>Patient feedback</b>		
Patient happy with treatment speed** (Average)	1	0.94
Patient Overall Comfort* (Average)	3	3.44
Patients Compliance* (Average)	3	3.31
Quality of Orthodontic Treatment* (Average)	3.5	3.48
Patient Understood Treatment* (Average)	3	3.44
*Excellent = 4, Good = 3, Fair = 2, Poor = 1		
**No = 0; Yes = 1		

**Table 3** Treatment evaluation survey user survey summary of adverse events for FASTBRACES® use between 2016-2023 in pediatric cases

Bracket type	Number of cases**	Duration of treatment mean (Days)	Patient understood treatment (mean score)*	Quality of orthodontic treatment (mean score)*	Patient overall comfort (mean score)*	Is patient happy w/ treatment speed? (mean score)***	Patient compliance (mean score)*
Ceramic	2	420.0	3.00	3.50	3.00	1.0	3.00
Metal	162	394.98	3.44	3.48	3.44	0.94	3.31
<b>Total</b>	<b>164</b>	<b>395.29</b>	<b>3.43</b>	<b>3.48</b>	<b>3.43</b>	<b>0.95</b>	<b>3.30</b>
*Excellent = 4, Good = 3, Fair = 2, Poor = 1							
**Patient population: 559 w/ avg age of 28.54 ± 13.64 years (range 11 – 82 years)							
***No = 0; Yes = 1							

**Table 4** User survey summary of adverse events for FASTBRACES® use between 2016-2023 in pediatrics

User experience	Ceramic	Metal	Total
Number of cases	2	162	164
Patient age, mean (years)	15.50	15.42	15.42
Duration of treatment, mean (days)	420.00	394.98	395.29
Average of number of adjustment visits, mean	15.50	14.41	14.43
Average of number of brackets used, mean	25.00	22.17	22.21
Average of number of wires used, mean	3.00	3.08	3.08
Has tooth issues (number of events)	0	5	5
Has bracket issues (number of events)	0	5	5
Has soft tissue issues (number of events)	0	3	3
Has wire Issues (number of events)	0	1	1
Has performance Issues (number of events)	0	1	1
Has hard tissue issues (number of events)	0	1	1
Has placement issues (number of events)	0	0	0
Has ingestion issues (number of events)	0	0	0
Has allergic issues (number of events)	0	0	0

The metal bracket group exhibited the highest number of issues among the patients, with reports of tooth-related problems (n=5) and bracket-related issues (n=5). In contrast, both the metal and ceramic bracket groups reported low numbers (n<5) for various other issues. Bracket performance issues were infrequent, with the metal bracket group experiencing only 1 case and the ceramic bracket group encountering no cases. Placement issues were reported by 5 patients in the metal bracket group and none in the ceramic bracket group. Wire-related issues were minimal, with 5 cases in the metal bracket group and 1 case in the ceramic bracket group. Notably, no allergic reactions, hard tissue, or ingestion issues were reported by patients in either group.

These findings highlight the variability in the types and frequencies of issues encountered during orthodontic treatment with metal and ceramic brackets. The metal bracket group demonstrated a higher prevalence of tooth-related and bracket-related issues, which may be attributed to factors such as differences in material properties or patient-specific factors. However, both groups exhibited low incidences of bracket performance issues, soft-tissue issues, placement issues, wire-related issues, hard tissue issues, ingestion issues, and allergic reactions.

These results underscore the importance of closely monitoring and addressing specific issues that may arise during orthodontic treatment. Proper bracket and wire placement, as well as regular evaluation of the treatment progress, are crucial to minimize the occurrence of complications and ensure optimal treatment outcomes. Maintaining adequate oral hygiene during orthodontic treatment is of paramount importance, and it becomes progressively more challenging with the severity of malocclusion. The reduced alignment duration achieved with FASTBRACES® represents a promising advancement in addressing this issue. By minimizing the number of orthodontic adjustments, this treatment approach facilitates improved oral hygiene practices, which ultimately contributes to better overall oral health outcomes.

## Discussion

Maintaining oral hygiene during orthodontic treatment is crucial, particularly in pediatric patients with severe malocclusion. The need for innovative approaches that reduce alignment duration and improve oral hygiene practices is growing. FASTBRACES®, which achieves faster alignment of teeth resulting in faster treatment times compared to the average reported treatment durations of other orthodontic braces systems, shows promise in addressing this issue. By minimizing orthodontic adjustments, this treatment approach promotes improved oral hygiene, leading to better overall oral health outcomes.

Analyzing patient issues during orthodontic treatment with ceramic and metal brackets provides valuable insights into the challenges encountered. These findings emphasize the crucial role of orthodontic practitioners' expertise and attention to detail. These findings underscore the need for careful monitoring and management of specific issues during orthodontic treatment. Optimal bracket and wire placement, along with regular progress evaluations, minimize complications and ensure favorable outcomes. The low incidence of allergic reactions in both groups indicates the biocompatibility of the bracket materials used. Proactive management of potential complications, particularly in metal bracket patients, is essential.

Further research should investigate the factors underlying differences between the metal and ceramic bracket groups. Exploring mechanisms behind reported issues, such as tooth-related or soft-tissue problems, can refine treatment protocols and enhance patient care. A

deeper understanding of these issues enables orthodontic practitioners to effectively manage complications, improve treatment experiences, and enhance outcomes. Innovative approaches like FASTBRACES® offer potential by reducing the number of orthodontic adjustments and facilitating improved oral hygiene practices. The absence of allergic reactions in both groups confirms the quality and biocompatibility of the materials used. This study reinforces the importance of precise bracket and wire placement and highlights the role of orthodontic practitioners' expertise and attention to detail throughout the treatment process.

## Limitations

This retrospective review has several limitations, which include:

- **Sample Size and Selection Bias:** The total sample size of 164 patients is relatively small, considering the 20,240 orthodontic cases treated between 2010 and 2023. This limited sample size may affect the generalizability of the findings to a broader population. Additionally, the selection criteria for inclusion in the evaluation may introduce bias, as patients meeting specific criteria may not represent the overall orthodontic patient population.
- **Lack of Randomization:** The assignment of patients to either the ceramic or metal bracket group was not randomized. This non-random allocation may introduce bias and confounding factors that could influence the treatment outcomes and patient satisfaction results.
- **Lack of Control Group:** There is no control group, such as patients receiving alternative orthodontic treatments or those not undergoing orthodontic treatment at all. Without a control group, it is challenging to determine the comparative effectiveness or superiority of the treatment with ceramic or metal brackets.
- **Self-Reported Data:** The statement relies on self-reported data obtained through questionnaires completed by patients. This introduces the possibility of recall bias and subjective interpretation of experiences. Lack of objective / independent assessments limits the reliability and accuracy of the reported treatment outcomes and patient satisfaction levels.
- **Limited Follow-up Period:** There is limited to no data available for follow-up after completion of orthodontic treatment. Long-term stability of treatment outcomes and patient satisfaction beyond the treatment period is needed to discuss any serious sequelae.

Considering these limitations, further research with larger sample sizes, randomization, control groups, objective measures, and longer follow-up periods is necessary to provide more robust and conclusive evidence regarding the outcomes and patient experiences associated with orthodontic treatment using ceramic and metal brackets.

## Conclusion

The analysis of pediatric patients undergoing orthodontic treatment with FASTBRACES® provides valuable insights into the efficacy and challenges of this innovative approach. The reduced alignment duration achieved with FASTBRACES® offers promise in addressing the challenge of maintaining adequate oral hygiene during orthodontic treatment. The findings highlight the importance of precise bracket and wire placement, as well as the critical role of orthodontic practitioners' expertise and attention to detail. Furthermore, the low incidence of allergic reactions in both the metal and ceramic bracket groups underscores the biocompatibility of the materials used. These findings contribute to the body of knowledge in pediatric orthodontics

and emphasize the need for further research to optimize treatment protocols and enhance patient care. By continually advancing our understanding and refining treatment strategies, we can improve the quality of orthodontic care and promote better oral health outcomes for pediatric patients.

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## Conflicts of interest

The authors declare that there are no conflicts of interest.

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