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CASE REPORT

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Correction of posterior crossbite in deciduous dentition with clear aligners: the "Baby First Expansion" Protocol

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Abstract

Background: Transverse crossbite is one of the most frequent malocclusions in orthodontics and requires early intervention. Rapid maxillary expansion (RME) is a well-established and effective technique for the correction of maxillary transverse deficiency; however, several studies have also investigated maxillary expansion performed with orthodontic aligners in the deciduous dentition. This study aimed to propose a new, clear aligner-based clinical protocol, applicable to very young children with complete deciduous dentition, to enable early correction of posterior crossbite. This protocol has been termed the Baby First Expansion Protocol. **Cases**: This case series describes three pediatric patients with deciduous dentition and maxillary contraction treated with orthodontic aligners following the Baby First Expansion Protocol. The first case involved a 5-year-old girl with deciduous dentition and functional unilateral posterior crossbite associated with a Class II malocclusion. The second case involved a 5-year-old girl with deciduous dentition and a Class I malocclusion associated with a rightward functional mandibular shift due to unilateral posterior crossbite. The third case involved a 5-year-and-2-month-old boy with deciduous dentition, a Class III malocclusion, a functional unilateral posterior crossbite, and a leftward mandibular shift. In all cases, pre- and post-treatment intraoral scans were acquired using the iTero Lumina scanner, and stereolithography (STL) files were uploaded to OrthoCAD software (version 5.9.1.50) to analyse changes in the maxillary arch following expansion. **Conclusions**: This case series highlights the importance of early diagnosis and interceptive treatment of functional unilateral posterior crossbite in pediatric patients with deciduous dentition. The Baby First Expansion Protocol appears to be an effective and well-accepted treatment option for the correction of functional unilateral posterior crossbite in very young children, although it remains a compliance-dependent approach. Further prospective studies with long-term follow-up are required to confirm the stability of the results and to better define the clinical indications of this protocol.

Keywords

Maxillary contraction; Deciduous dentition; Crossbite; Pediatric dentistry; Case series

1. Introduction

Transverse maxillary deficiency is one of the most common malocclusions in orthodontics [1] and continues to be the subject of extensive research. It results from a transverse deficiency of the maxillary bone and is often associated with unfavorable oral habits, such as mouth breathing, atypical swallowing, pacifier use, or thumb sucking. This condition is frequently accompanied by unilateral or bilateral posterior crossbite, with a possible functional mandibular shift towards the crossbite side [2]. Early correction is therefore recommended to prevent initially functional asymmetries from progressing into true skeletal asymmetries during craniofacial growth.

Numerous studies have demonstrated that rapid maxillary expansion (RME) is a well-established and effective technique for the correction of maxillary transverse deficiency [3–5]. In growing patients, slow maxillary expansion (SME) may also represent a valid therapeutic alternative [6].

Clear aligner therapy has emerged as an innovative, aesthetic, and comfortable option for the management of selected orthodontic problems when compared with conventional fixed appliances [7]. However, the predictability of dentoalveolar expansion achieved with orthodontic aligners remains an area of ongoing investigation [8, 9].

Maxillary transverse deficiency may also be detected in the deciduous dentition, and several studies have already explored the use of orthodontic aligners for maxillary expansion in young patients [10–12].

The aim of the present study was to propose a novel clinical

protocol applicable to very young children with complete deciduous dentition to allow early correction of posterior crossbite. This protocol has been termed the Baby First Expansion Protocol.

To this end, three clinical cases of children presenting with deciduous dentition and maxillary constriction were treated using orthodontic aligners (Invisalign®, Align Technology, Santa Clara, CA, USA) according to the proposed expansion protocol. In each case, pre- and post-treatment intraoral scans were obtained using the iTero Lumina scanner (intraoral scanner, Align Technology, Inc., Tempe, AZ, USA), and the resulting STL files were uploaded to OrthoCAD software (version 5.9.1.50, Align Technology, Inc., Tempe, Arizona, USA) to analyse changes in the maxillary arch following expansion achieved with the Baby First Expansion Protocol.

The protocol consists of the following steps:

The patients selected for this protocol were children in the deciduous dentition presenting with functional unilateral posterior crossbite, a transverse discrepancy of less than 6 mm, and a clinically evident centric relation–centric occlusion (CR–CO) discrepancy associated with a functional mandibular shift. Assessment of posterior transverse discrepancy: calculated as the difference between the intermolar width measured between the palatal cusps of the maxillary first deciduous molars and the intermolar width measured between the central fossae of the mandibular first deciduous molars ($\leq$6 mm).

- Test aligners: three trial aligners (touch-up aligners) used to assess patient compliance, changed on a weekly basis. "Touch-up" aligners are a system of passive aligners, devoid of any programmed tooth movement or embedded movement information, and are used exclusively to assess patient compliance at the initial stage of treatment. This phase includes a minimum of three and a maximum of fourteen trial aligners.
- Simultaneous or sequential expansion: expansion limited to a maximum of 4 mm per ClinCheck® treatment plan to enhance predictability; additional expansion, if required, is achieved through subsequent aligner series.
- Posterior attachments for retention: attachments placed on the maxillary and mandibular first and second deciduous molars and canines, when possible, solely to increase posterior anchorage.
- Creation of anterior diastemata: planned between maxillary and mandibular canines to replicate the physiological spacing characteristic of the deciduous dentition.
- Aligner wear protocol: each aligner is worn for 7 days.
- Night-time retention: additional active retention aligners are worn at night and replaced monthly for approximately 6–12 months; retention is discontinued earlier upon eruption of the first permanent molars.

The cases analyzed in the present study were characterized by functional unilateral posterior crossbites, a condition for which early orthodontic intervention is widely recommended. In such cases, the transverse maxillary deficiency leads to occlusal interferences that induce a functional mandibular shift, resulting in an apparent asymmetry that is initially positional rather than skeletal. If left untreated during growth, these functional deviations may progressively stabilize and evolve into true skeletal asymmetries, with potential long-term consequences on craniofacial development. Early correction of functional crossbites aims to eliminate occlusal interferences, restore symmetrical mandibular positioning, and create a more favorable environment for physiological maxillary and mandibular growth [2–4].

Interceptive treatment during the deciduous dentition takes advantage of the high skeletal adaptability and neuromuscular plasticity typical of this developmental stage, allowing for more efficient and stable outcomes while potentially reducing the need for more invasive orthodontic or orthopedic interventions later in life [2–4].

2. Case report

2.1 Case 1

A 5-year-old girl presented with deciduous dentition and a unilateral posterior crossbite associated with a functional mandibular shift to the right. Deflective occlusal contacts were detected on teeth 53, 54, and 55. No deleterious oral habits were reported. Facial examination revealed a symmetrical and well-proportioned face, competent lips, and adequate incisal display on smiling. The patient showed a convex facial profile, with a normal nasolabial angle and satisfactory lip projection. No functional or parafunctional disorders were observed.

Intraoral examination revealed a Class II malocclusion with increased overjet (3.9 mm). The maxillary arch was transversely constricted, and the posterior teeth exhibited negative torque. A right unilateral posterior crossbite with an edge-to-edge occlusal relationship and an inclined occlusal plane was observed. The centric occlusion–centric relation (CO–CR) discrepancy measured −5.7 mm at the level of the second deciduous molars.

Panoramic radiographic evaluation confirmed the presence of all deciduous teeth and the developing buds of the corresponding permanent teeth, with no abnormalities in tooth number, morphology, or position (Fig. 1).

2.2 Case 2

A 5-year-old girl presented in the deciduous dentition with a functional unilateral posterior crossbite associated with occlusal interferences on teeth 52, 53, 54, and 55 and a functional mandibular shift to the right. No deleterious oral habits were reported.

Facial examination revealed a slightly asymmetrical face, with deviation of the chin point to the right of the midline. The face was otherwise well-proportioned, the lips were competent, and an appropriate maxillary incisal display was observed. Lateral facial analysis showed a convex profile with an increased nasolabial angle.

Intraoral examination revealed a Class I malocclusion in the deciduous dentition, with normal overjet and overbite. The maxillary arch was transversely constricted, with a −5.1 mm discrepancy compared with the mandibular arch, mainly attributable to negative dental torque in the right posterior segment, resulting in a right unilateral posterior crossbite. The occlusal plane was inclined.

Clinical evaluation revealed no functional or parafunctional disorders; however, functional examination confirmed a right-

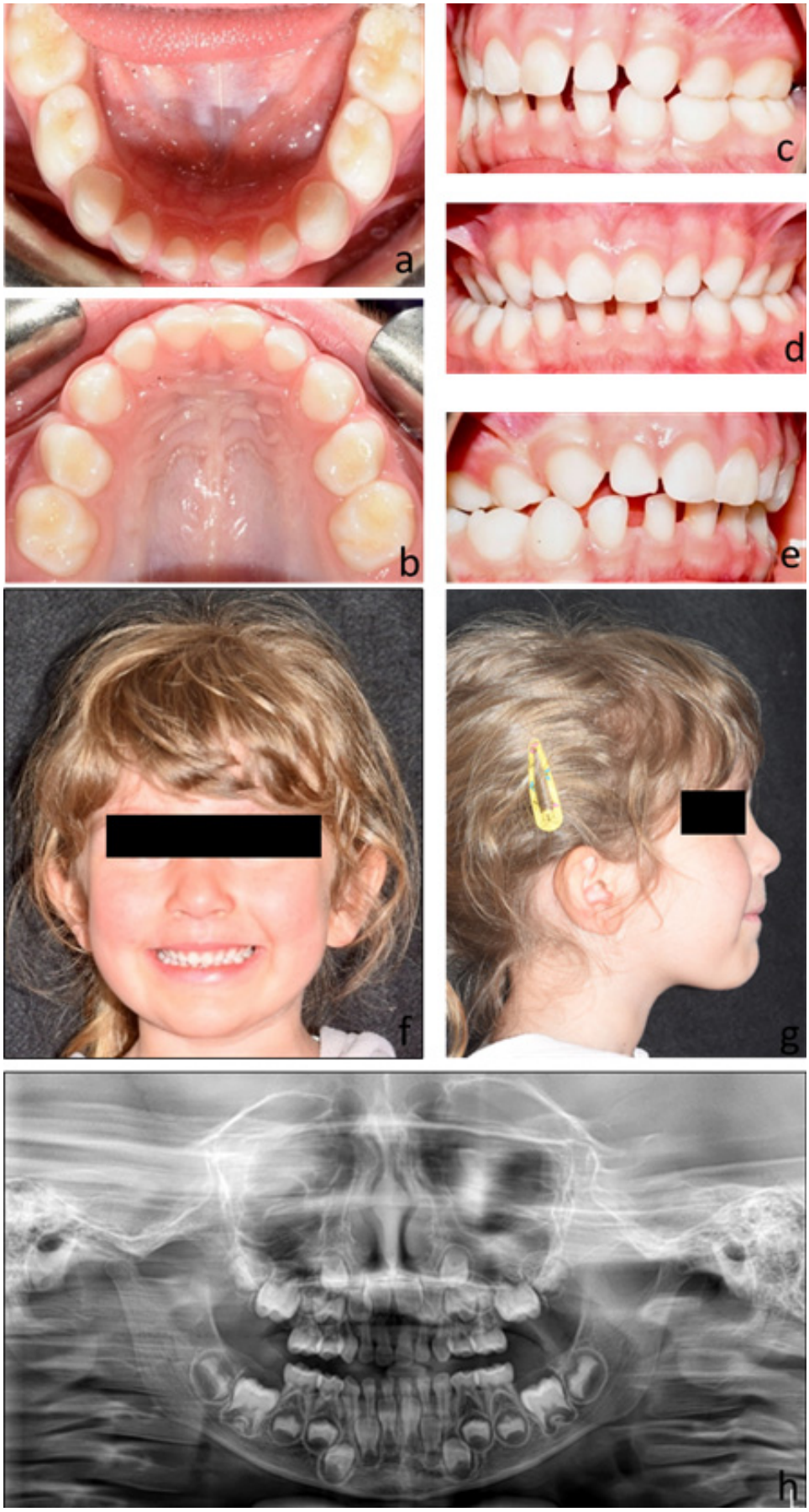


FIGURE 1. Clinical records of Case 1. A 5-year-old patient presenting with a right unilateral posterior crossbite and Class II malocclusion with increased overjet, before treatment. (a–e) intraoral photographs; (f,g) extraoral photographs; (h) orthopantomogram.

ward mandibular shift secondary to the functional unilateral posterior crossbite. Panoramic radiographic evaluation confirmed the presence of all deciduous teeth and the developing buds of the corresponding permanent teeth. No abnormalities in tooth number, morphology, or position were detected, and no condylar asymmetries were observed (Fig. 2).

2.3 Case 3

A 5-year-and-2-month-old patient in the deciduous dentition presented with a functional unilateral posterior crossbite associated with deflective occlusal contacts between teeth 63–73 and 62–72. No deleterious oral habits were reported.

Facial examination revealed an asymmetrical but well-proportioned face, with deviation of the chin point to the left of the midline. The lips were competent, and an appropriate maxillary incisal display was observed during smiling. Lateral facial analysis showed a flat profile, with a nasolabial angle within normal limits.

Intraoral examination revealed a Class III malocclusion in the deciduous dentition, with reduced overjet and overbite. The maxillary arch was transversely constricted, with a left unilateral posterior crossbite extending from tooth 62 to tooth 64. Functional examination demonstrated a leftward functional mandibular shift secondary to the unilateral posterior crossbite.

Panoramic radiographic evaluation confirmed the presence of all deciduous teeth and the developing buds of the corresponding permanent teeth. No abnormalities in tooth number, morphology, or position were detected, and no condylar asymmetries were observed (Fig. 3).

3. Results

3.1 Case 1

Treatment objectives were to restore proper maxillary and mandibular arch form and correct the inclination of the maxillary posterior teeth to resolve the functional unilateral posterior crossbite associated with a functional mandibular shift.

The treatment protocol consisted of two sequential phases. The first phase included 13 maxillary and 12 mandibular clear aligners, replaced at 7-day intervals. Attachments were bonded to the deciduous canines and first and second deciduous molars. A simultaneous transverse expansion of the maxillary arch was planned, primarily aimed at correcting negative posterior torque. No transverse expansion was programmed for the mandibular arch; instead, sagittal development was achieved through controlled labial tipping of the lower incisors (Fig. 4).

The second phase comprised 8 maxillary and 14 mandibular aligners, also changed every 7 days. Treatment commenced in July 2024 and was completed in January 2025, with an overall active treatment duration of 6 months. Following the active phase, night-time retention was planned using a series of active retention aligners with progressive expansion, replaced on a monthly basis.

At the end of treatment (Fig. 5), an intercanine expansion of 2.7 mm was achieved, with 4.7 mm of expansion between teeth 54 and 64 and 4.0 mm between teeth 65 and 55. Torque values of 9.3°, 9.0°, and 3.6° were applied to teeth 53, 54, and 55, respectively, while torque values of 3.1°, 3.3°, and 1.5° were applied to teeth 63, 64, and 65, respectively. In all cases presented, transverse expansion was kept minimal, and correction of the functional posterior crossbite was achieved predominantly through controlled modulation of dental torque on the teeth generating occlusal interferences, rather than through extensive transverse displacement. The superimposition of the upper arch T1–T0 is shown in Fig. 6.

Post-treatment intraoral scans were obtained to fabricate retention appliances programmed with minimal hypercorrection to maintain the achieved transverse expansion. Patient compliance throughout treatment was excellent.

3.2 Case 2

Treatment objectives were to restore proper maxillary and mandibular arch form and correct the inclination of the maxillary posterior teeth to resolve the functional posterior crossbite and the interarch discrepancy.

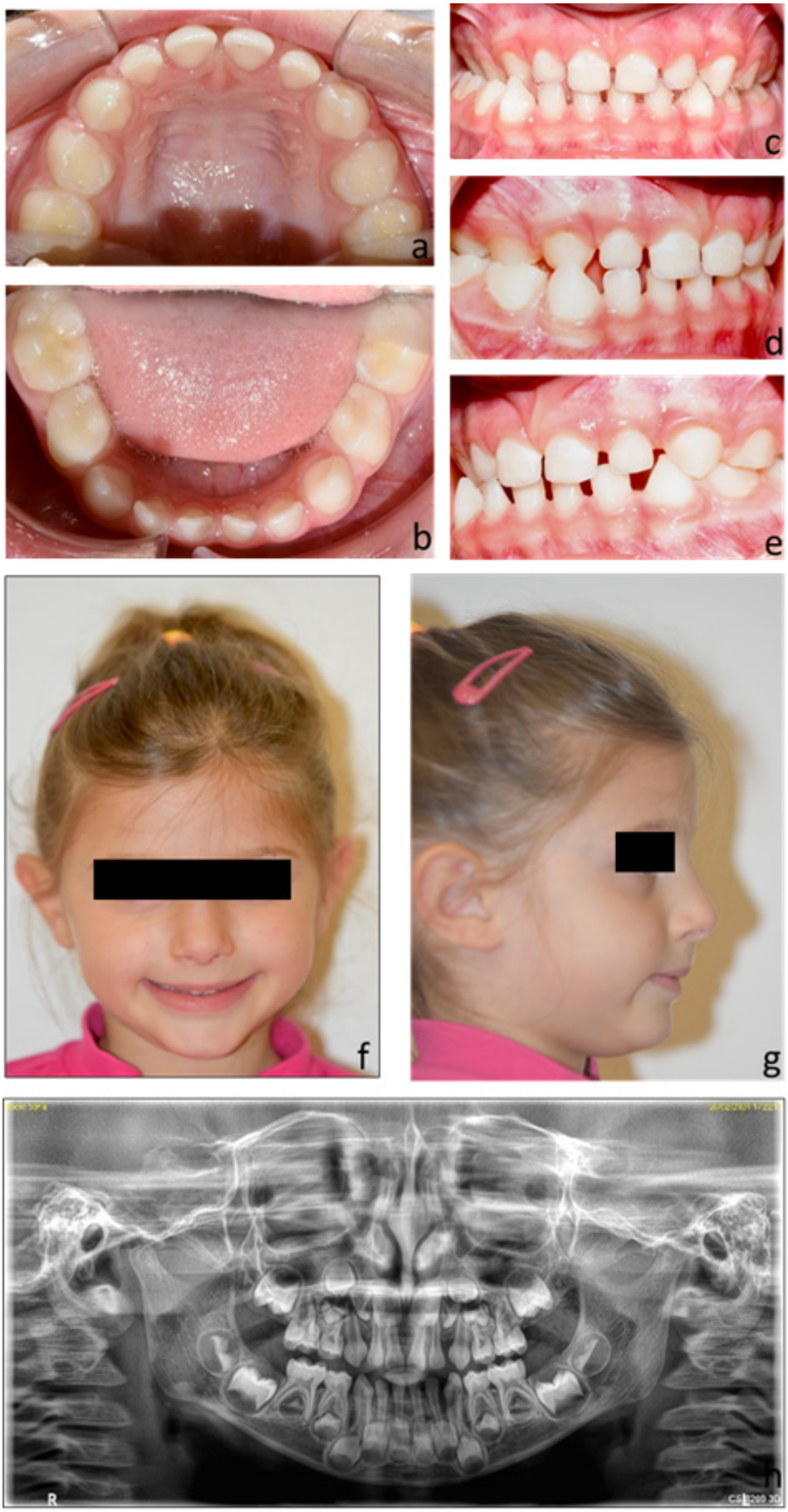
Treatment was carried out using 14 maxillary and 14 mandibular clear aligners with attachments placed on the deciduous canines and first and second deciduous molars, according to the Baby First Expansion Protocol. Aligners were changed every 7 days and worn for approximately 22 hours per day. Treatment started in March 2025 and was completed in June 2025 (Fig. 7).

A simultaneous transverse expansion of the maxillary arch was planned, primarily aimed at correcting negative posterior torque. The mandibular arch was coordinated to the maxillary arch by reducing the buccal inclination of the posterior segments, to correct the right posterior crossbite and eliminate the occlusal interference responsible for the functional mandibular shift.

At the end of treatment (Fig. 8), an intercanine expansion of 4.7 mm was achieved, with 4.4 mm of expansion between teeth 54 and 64 and 5.0 mm between teeth 65 and 55. Torque values of 11.3°, 4.0°, and 6.8° were applied to teeth 53, 54, and 55, respectively, while torque values of 0.9°, 1.6°, and 0.7° were applied to teeth 63, 64, and 65, respectively. Torque was also applied to tooth 52 (9°). Therefore, a second ClinCheck® was performed, incorporating an overcorrection of the maxillary expansion. Overall, the transverse expansion was limited, and correction of the crossbite was achieved primarily through selective torque control of the teeth responsible for occlusal interference. The superimposition of the upper arch T1–T0 is shown in Fig. 9.

A total of 14 aligners were used, with a 7-day change interval, resulting in an active treatment duration of approximately 3 months. Post-treatment intraoral scans were obtained for the fabrication of additional aligners to be used as retainers. Patient compliance was excellent.

Following the active phase, a series of 12 aligners was prescribed as active night-time retention, with monthly changes. A slight transverse expansion was planned during this phase to accommodate physiological growth. Attachments were partially maintained to enhance aligner retention.



F I G U R E 2. Clinical records of Case 2. A 5-year-old patient presenting with Class I malocclusion and right unilateral posterior crossbite, before treatment. (a–e) intraoral photographs; (f,g) extraoral photographs; (h) orthopantomogram.

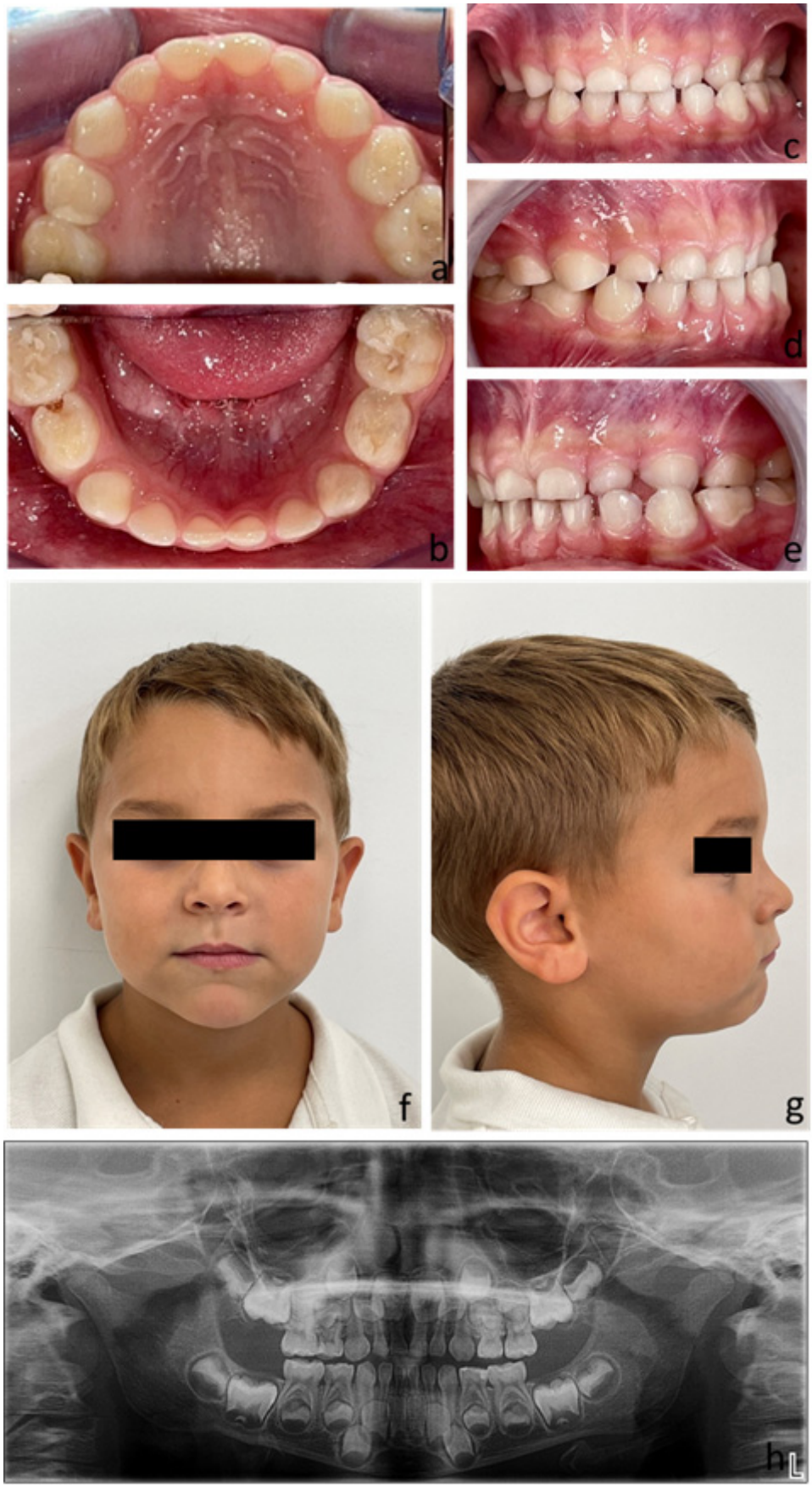


FIGURE 3. Clinical records of Case 3. A 5.2-year-old patient presenting with Class III malocclusion and left unilateral posterior crossbite, before treatment. (a–e) intraoral photographs; (f,g) extraoral photographs; (h) orthopantomogram.

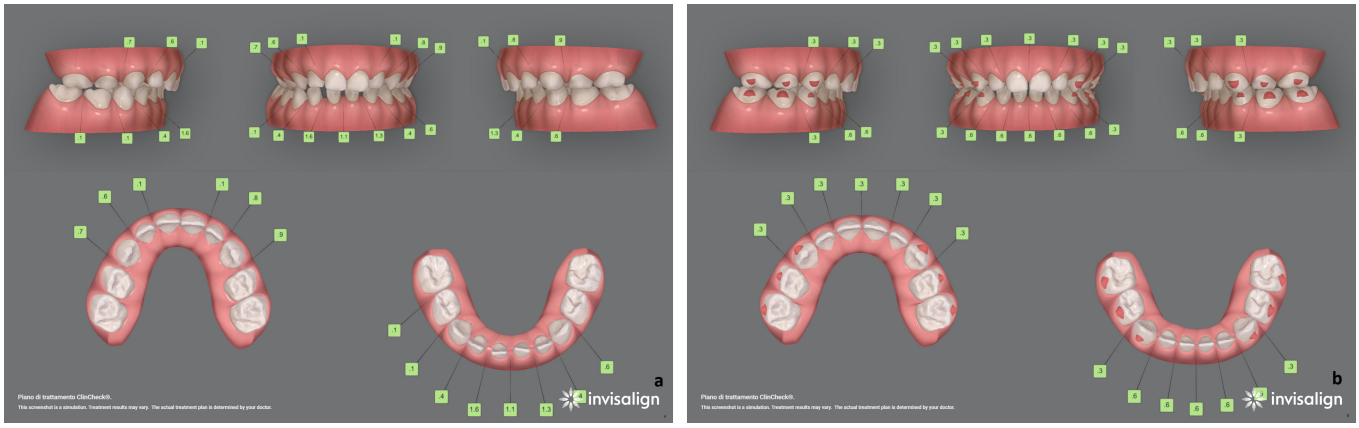


FIGURE 4. ClinCheck® of Case 1. Initial (a) and final (b) ClinCheck® showing the application of the Baby First Expansion Protocol; numbers in green boxes indicate interproximal spaces planned to accommodate wider permanent teeth.

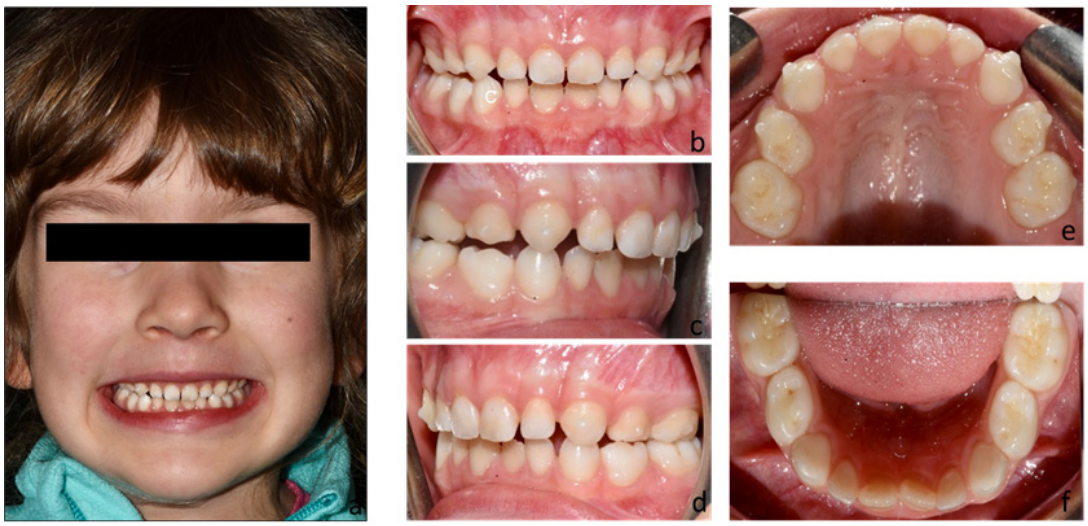


FIGURE 5. Case 1 at the end of treatment. (a) Patient's smile after treatment; (b–f) intraoral records after application of the Baby First Expansion Protocol.

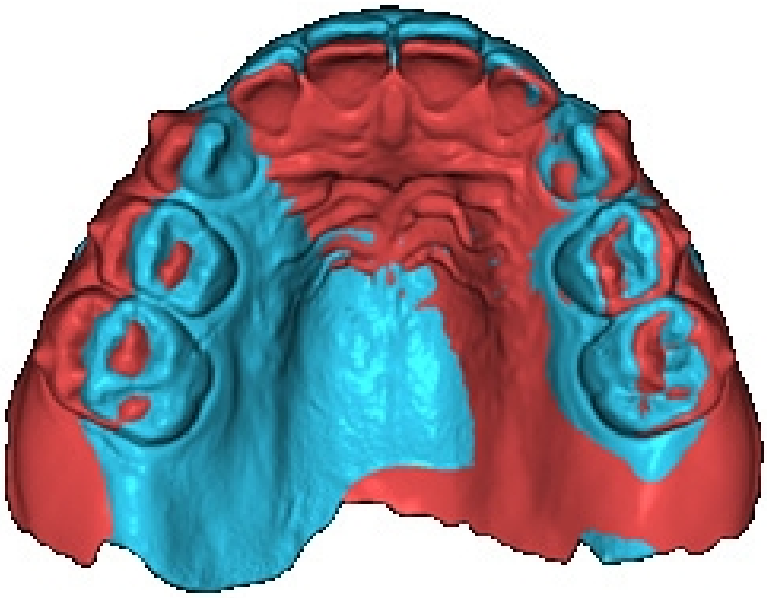


FIGURE 6. Case 1 superimposition. Superimposition of the upper arch T1–T0.

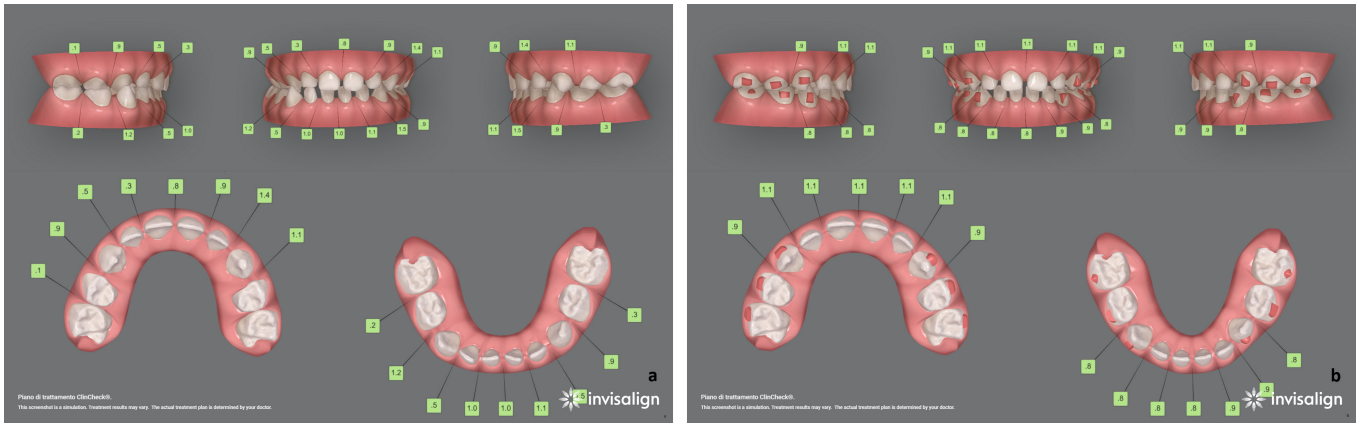


FIGURE 7. ClinCheck® of Case 2. Initial (a) and final (b) ClinCheck® after application of the Baby First Expansion Protocol; numbers in green boxes indicate interproximal spaces planned to accommodate wider permanent teeth.

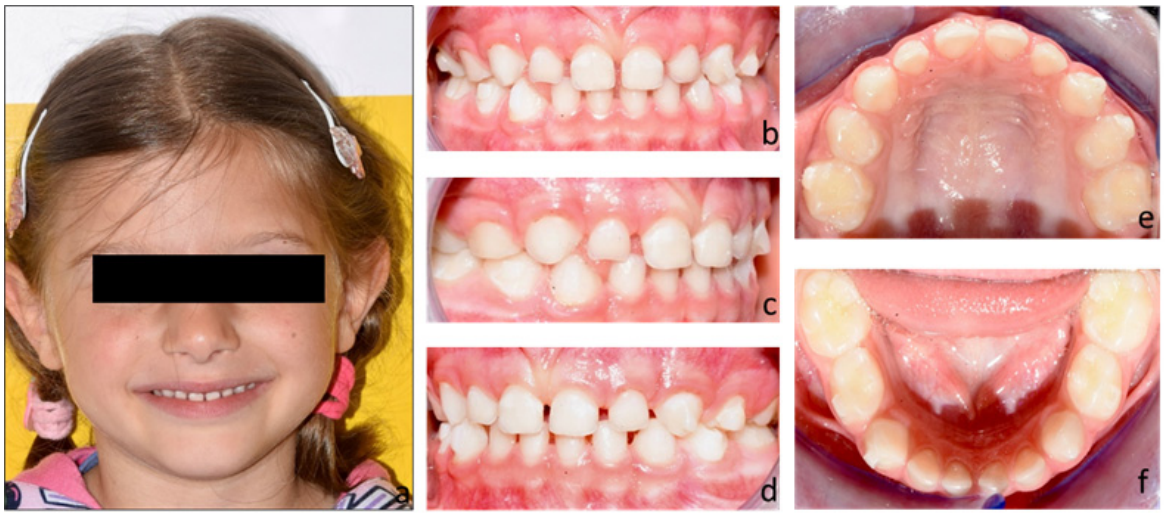


FIGURE 8. Case 2 at the end of treatment. (a) Patient's smile after treatment; (b–f) intraoral records after application of the Baby First Expansion Protocol.

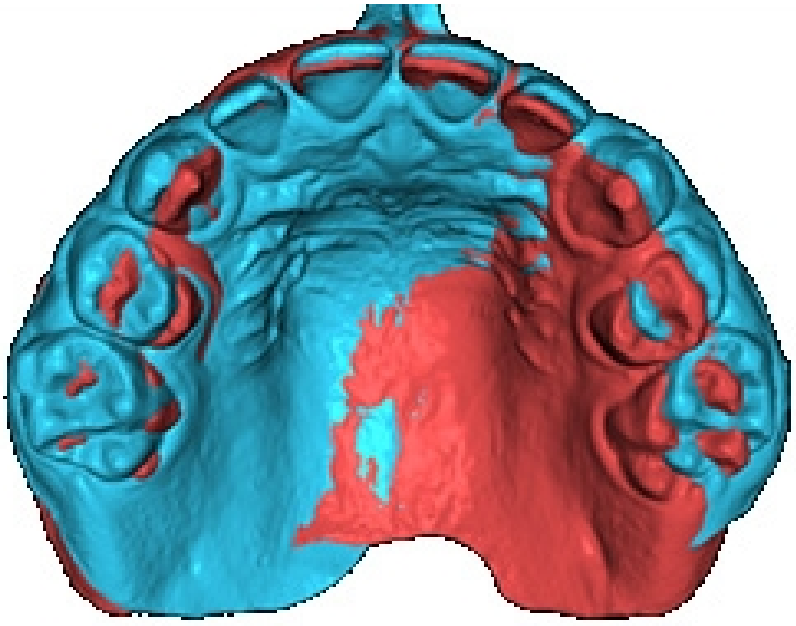


FIGURE 9. Case 2 superimposition. Superimposition of the upper arch T1–T0.

3.3 Case 3

Treatment objectives were to restore proper maxillary and mandibular arch form and correct the inclination of the maxillary posterior teeth to resolve the functional unilateral posterior crossbite and the interarch discrepancy.

Treatment followed the Baby First Expansion Protocol and was carried out using 13 maxillary and 13 mandibular clear aligners, changed at 7-day intervals, and worn for approximately 22 hours per day. The active treatment phase began in October 2024 and was completed in February 2025 (Fig. 10).

A simultaneous transverse expansion of the maxillary arch was planned, primarily aimed at correcting negative posterior torque. The mandibular arch was coordinated to the maxillary arch by reducing the buccal inclination of the teeth in the third quadrant, to correct the crossbite and eliminate the occlusal precontacts responsible for the functional mandibular shift.

Posterior attachments were placed on teeth 54, 55, and 65 to improve aligner retention, as well as on tooth 62 due to the extension of the crossbite from teeth 62 to 64. Interproximal space creation was programmed mesial and distal to teeth 53 and 63. In the mandibular arch, reduction of buccal inclination was planned, particularly at the level of the canines. Attachments were placed on teeth 83, 84, 85, 72, 73, 74, and 75, and power ridges were applied to teeth 71 and 81 for improved root control. At the end of the active phase, an intercanine expansion of 2.7 mm was achieved, with 1.4 mm of expansion between teeth 54 and 64. Torque values of 3.8°, 0.8°, and 8.2° were applied to teeth 53, 54, and 55, respectively, while torque values of 8.7°, 1.9°, and 8.5° were applied to teeth 63, 64, and 65, respectively.

Following completion of the active phase, a second series of aligners was prescribed as active night-time retention, consisting of 12 maxillary and 8 mandibular aligners with monthly changes and a slight programmed expansion to accommodate physiological growth. During this phase, attachments were only partially maintained to enhance aligner retention. Final clinical photographs were taken without retainers in place.

The overall active treatment duration was 3 months and 1 week (Fig. 11). The superimposition of the upper arch T1–T0 is shown in Fig. 12. Patient compliance throughout treatment was excellent, and clinical results remained stable even after a retention-free follow-up period (Fig. 13).

4. Discussion

The treatment of posterior crossbite should be considered a priority in orthodontic care and intercepted as early as possible to prevent initially functional mandibular shifts from developing into skeletal asymmetries [2]. Several studies have analyzed the shape and length of the mandibular condyles on panoramic radiographs. Although orthopantomography is not the imaging modality of choice for detailed anatomical evaluation of the condyles, an association between condylar asymmetry and unilateral posterior crossbite has been reported, further emphasizing the importance of early intervention to prevent skeletal asymmetries [13]. This concept is also supported by the American Academy of Pediatric Dentistry, which provides clinical guidelines recommending early treatment in children [14].

Systematic reviews have suggested initiating the treatment of posterior crossbites in the deciduous dentition with selective grinding. If this approach proves ineffective, orthodontic intervention—preferably with fixed appliances—should be undertaken during the early mixed dentition. Selective grinding, therefore, remains a valid interceptive option; however, in cases characterized by excessive crown inclination and marked cusp overlap, it is often insufficient as a standalone treatment and must be followed by transverse expansion of the maxillary arch [4, 15, 16].

In recent years, clear aligner therapy has undergone substantial development. The Invisalign® system employs a sequence of removable thermoplastic aligners designed to progressively reposition teeth. Custom aligners are fabricated using stereolithographic technology based on conventional impressions or intraoral digital scans and are produced from polyurethane material with an approximate thickness of 0.75 mm. Each aligner is digitally programmed to achieve controlled tooth movements of approximately 0.15–0.25 mm. Patients are instructed to wear each aligner for approximately 22 hours per day for 1–2 weeks before progressing to the subsequent aligner [8]. Adherence to the prescribed wear protocol is a critical determinant of treatment success [17]. Clear aligners are generally indicated for the correction of mild to moder-

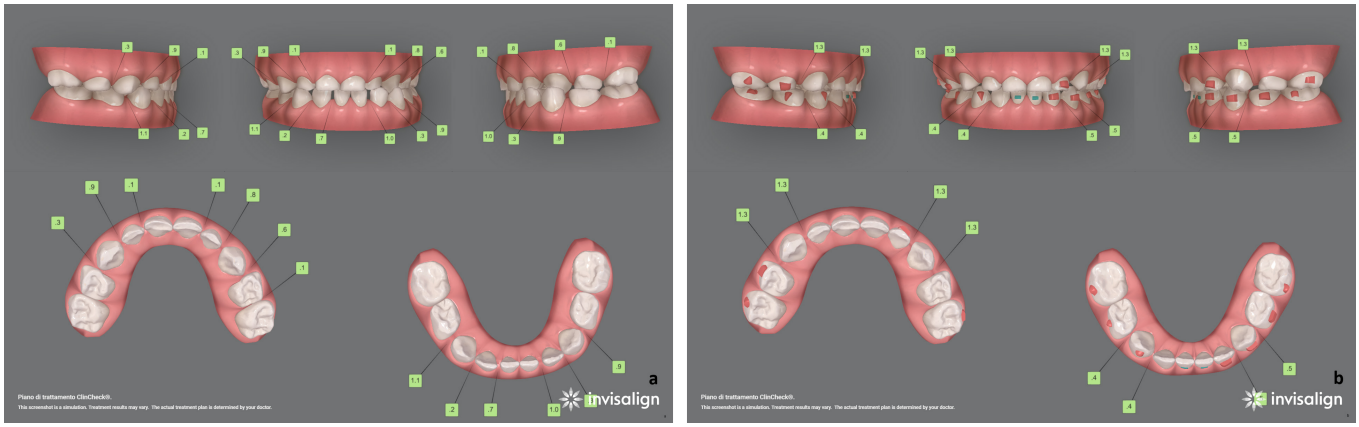


FIGURE 10. ClinCheck® of Case 3. Initial (a) and final (b) ClinCheck® after application of the Baby First Expansion Protocol; numbers in green boxes indicate interproximal spaces planned to accommodate wider permanent teeth.

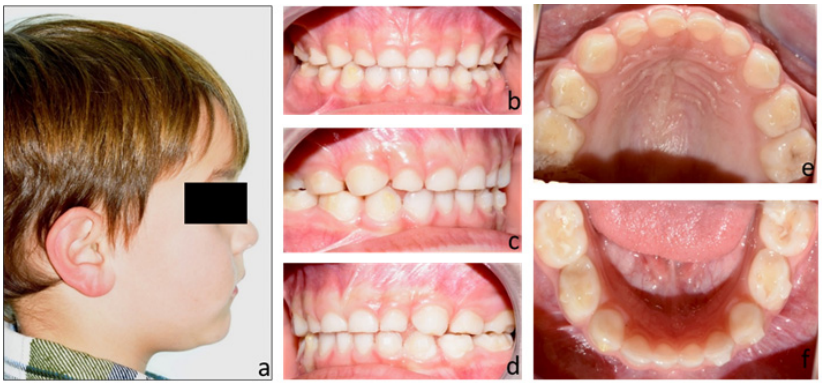


FIGURE 11. Case 3 at the end of treatment. (a) extraoral photograph after treatment; (b–f) intraoral records after application of the Baby First Expansion Protocol.

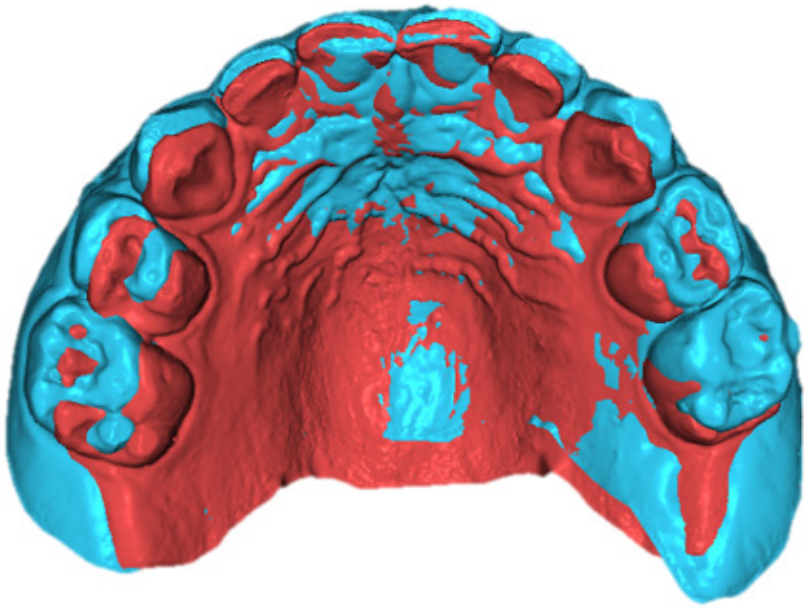


FIGURE 12. Case 3 superimposition. Superimposition of the upper arch T1–T0.

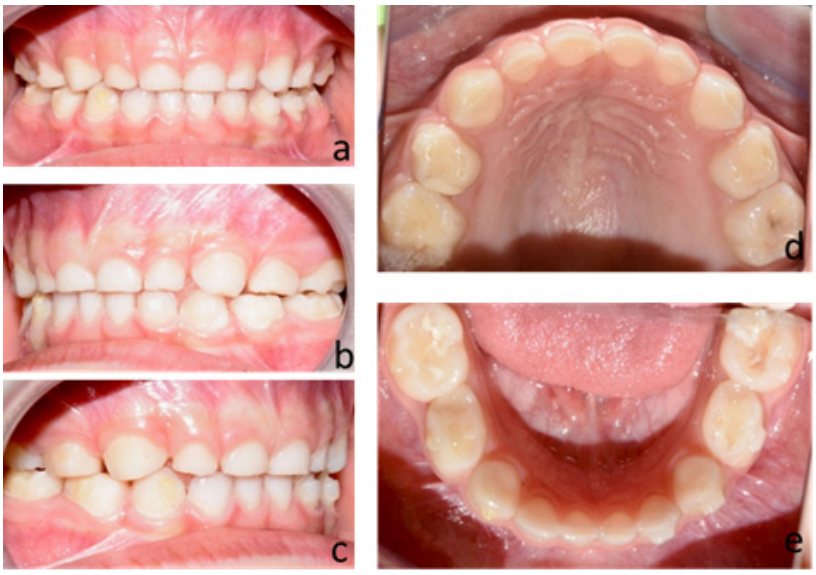


FIGURE 13. Case 3 follow-up. Patient 8 months after completion of treatment, without retention. (a–e) intraoral photographs.

ate malocclusions [7, 18]; however, only a limited number of studies have compared predicted outcomes generated by ClinCheck® with actual clinical results, particularly with regard to transverse expansion [8].

In patients with limited transverse discrepancy, especially at a very young age, outcomes achieved with clear aligners in mixed dentition have been reported to be comparable to those obtained with rapid palatal expansion [8, 9]. Vlaskalic *et al.* [19] recommended limiting dental arch expansion to 2–3 mm per quadrant to reduce the risk of relapse and gingival recession, while Malik *et al.* [17] identified dental arch expansion as an appropriate indication for clear aligner therapy in cases of 1–5 mm of crowding. According to a 2015 systematic review, clear aligners are capable of controlling posterior buccolingual inclination, although the strength of the supporting evidence was considered limited [20].

Based on these considerations, the Baby First Expansion Protocol was developed to allow treatment of very young children with transverse discrepancies of dentoalveolar origin rather than true skeletal constriction. This protocol represents an alternative interceptive approach based on a fully digital workflow. Compared with conventional expansion appliances, it offers several advantages, particularly in very young patients. Traditional rapid palatal expanders must be cemented to deciduous teeth, resulting in a fixed appliance that may be uncomfortable and poorly tolerated. In addition, these appliances require daily parental activation and may be associated with emergencies due to appliance debonding.

By contrast, clear aligner therapy applied according to the Baby First Expansion Protocol is less invasive and more comfortable, allowing correction of maxillary contraction, elimination of functional mandibular shift, and promotion of harmonious craniofacial growth. The removable nature of aligners facilitates oral hygiene and reduces the incidence of appliance-related emergencies, as aligners can be removed during meals and sports activities [7, 21].

An unexpected finding of the present case series was the high level of patient compliance. Even very young children adapted well to aligner wear and speech, in agreement with previous reports [22]. In this case series, compliance was consistently excellent, and no specific strategies to enhance cooperation were required. In our clinical experience, children aged 4–7 years generally demonstrate good adherence to clear aligner therapy when appropriately supervised by caregivers. Compliance was initially assessed using passive trial aligners (Touch-up aligners), with aligner adaptation to teeth and attachments serving as the primary clinical indicator. Remote monitoring systems were not used due to the young age of the patients; instead, follow-up visits at 4–6-week intervals allowed verification of aligner fit and treatment progression. When reduced compliance is suspected, a conservative approach involving increased monitoring and slower treatment progression may be the most appropriate strategy. Further studies are needed to better investigate this aspect.

Recent evidence confirms that clear aligners can produce clinically meaningful transverse changes in growing patients; however, the predictability of expansion remains variable and predominantly dentoalveolar rather than skeletal. Transverse expansion achieved with clear aligners in early mixed dentition has been reported to be statistically significant in both arches; however, predictability did not exceed approximately 50% during the first aligner series and required refinement sets to achieve improved outcomes (approximately 70%) [23]. Predictability was consistently higher in the mandibular arch than in the maxillary arch. Similar findings have also been reported, demonstrating that expansion outcomes are influenced by tooth type, arch location, and the amount of programmed movement [24].

From a biomechanical perspective, retention and force delivery represent particular challenges in the deciduous dentition due to short clinical crowns, smoother enamel surfaces, and limited undercuts, which may compromise aligner seating and force expression. The use of attachments has been shown to improve the control of complex movements by increasing surface contact for force application and enhancing mechanical retention. Systematic reviews suggest that attachment geometry and placement may improve movement accuracy [25, 26]; however, current evidence remains heterogeneous, and further interventional studies are required to clarify their precise role [27].

Despite encouraging clinical outcomes, several limitations must be acknowledged. Evidence regarding aligner-based expansion in children aged 4–7 years with complete deciduous dentition is limited, as most available studies focus on mixed dentition. Although clear aligners may effectively increase arch width, observed changes predominantly reflect dentoalveolar adaptation and buccal crown tipping rather than true skeletal expansion. Consequently, aligner-based expansion should be considered an interceptive dentoalveolar strategy rather than an orthopedic approach, with predictable effects limited to moderate transverse discrepancies [28, 29].

Long-term implications of early aligner-based intervention warrant careful consideration. While early correction of functional unilateral posterior crossbite and elimination of functional mandibular shift may positively influence mandibular position and occlusal function, high-quality longitudinal studies evaluating long-term stability, growth modulation, and craniofacial development are still lacking. Finally, the Baby First Expansion Protocol is indicated only for functional unilateral posterior crossbites with limited transverse discrepancy and is not suitable for cases of true skeletal maxillary constriction, which require conventional orthopedic expansion. Aligner therapy remains compliance-dependent and may be less appropriate in children with limited caregiver support or anatomical conditions that compromise attachment retention. These considerations highlight the importance of careful case selection and the need for further research to better define the clinical limits of this approach.

5. Conclusions

This case series suggests that the Baby First Expansion Protocol may represent a feasible and minimally invasive interceptive approach for the treatment of functional unilateral posterior crossbite in very young children with deciduous dentition. In appropriately selected cases, clear aligner therapy enabled correction of occlusal interferences and resolution of functional mandibular shift, with good patient acceptance and

compliance.

However, the effects of this protocol are primarily dentoalveolar, and its indications are limited to functional unilateral posterior crossbites with mild transverse discrepancy; cases with true skeletal maxillary constriction still require conventional orthopedic treatment. In addition, aligner-based therapy in deciduous dentition remains compliance-dependent and may be influenced by biomechanical challenges related to retention and ongoing dental development. Further prospective studies with larger samples, quantitative outcome measures, and long-term follow-up are needed to confirm the stability of the results and to better define the clinical limits of this approach.

AVAILABILITY OF DATA AND MATERIALS

No datasets were generated or analyzed during the current study. The data supporting the findings are based on clinical measurements from individual cases and are available from the corresponding author upon reasonable request.

AUTHOR CONTRIBUTIONS

FP—performed the research. ES and VV—analyzed the data. FSB—wrote the manuscript. AU—designed the research study and revised the original manuscript. VL—designed the research study, supervised, and revised the whole manuscript. All authors contributed to editorial changes in the manuscript. All authors read and approved the final manuscript.

ETHICS APPROVAL AND CONSENT TO PARTICIPATE

The study participants provided written informed consent. As this case report involves three pediatric patients, written informed consent was obtained from their legal guardians in accordance with our standard consent procedures. The patients and their parents provided written consent for the publication of this case report and the accompanying images. All procedures performed were performed in accordance with the ethical standards of the institutional and/or national research committee and with the Declaration of Helsinki, as revised in 2013. According to institutional policies and national regulations, formal approval from the Ethics Committee is not required for single case report or case series of this type; therefore, ethical approval was waived.

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CONFLICT OF INTEREST

The authors declare no conflict of interest. AU is serving as a member of the Editorial Board of this journal. We declare that AU had no involvement in the peer-review of this article and has no access to information regarding its peer review. Full responsibility for the editorial process for this article was delegated to NM.

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