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The Timing of Orthodontic Treatment

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By

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Certification of the supervisor

I certify that this project **"The Timing of Orthodontic Treatment"** was prepared by the fifth-year student **Zahraa Waleed Muhsin** under my supervision at the College of Dentistry/University of Baghdad in partial fulfilment of the graduation requirement for the bachelor degree in dentistry.

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Dedication

I would like to dedicate this work to my beloved family, the reason of my success who supported and encourage me throughout my life.

Acknowledgement

First and foremost, praises and thanks to **Allah** Almighty for helping me fulfill my dream, for his blessings throughout my work to complete it successfully.

I would like to extend my deepest respect and gratitude to the Dean of College of Dentistry, University of Baghdad, **Prof. Dr. Raghad Al-Hashimi.**

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Introduction

The appropriate timing of orthodontic intervention has been an intriguing debate among specialists due to lack of solid scientific evidence. The effectiveness of the intervention depends largely on the type of malocclusion. Most often, the main issue is the benefit obtained by treating developing malocclusions in the early mixed dentition stage when compared with treatment started in the late mixed dentition or in the permanent dentition, when said malocclusion has already been established. One reason for the controversy is that the implied toll of an early treatment time is a two-phase protocol. Phase 1 usually takes 6 up to 12 months of active treatment with the intent to augment dento skeletal relationships. Phase 2 is "finishing" step after the eruption of the permanent teeth (Batista *et al*., 2018).

In this situation we must carefully analize the risk/benefit of an early intervention so as to justify the potential added cost of two-phase treatment? Preventive orthodontics are procedures aimed at promoting the development of a normal occlusion and the prevention of malocclusion from developing whereas interceptive orthodontics encourages the restoration of a normal occlusion once a malocclusion has started to develop. Genetic and environmental factors can contribute to the development of such a pathology and can span several years, thus making it difficult to determine specific causative factors. Malocclusions are not life threatening, but are important public health issues as most can be prevented or intercepted (Fleming, 2017).

Addressing of early treatment in the mixed dentition provides several benefits. First, if explained properly, children at this age are more conscientious and cooperative than adolescents. Second, early treatment of detrimental habits, such as digit sucking and tongue thrusting, is advocated after 8 years of age as it can improve

speech difficulties due to open bite, which often occurs as a result of oral habits. Also, at 8 years, the first permanent molars are fully erupted, facilitating removable appliance therapy, which is also better tolerated at this age (DiBiase and Sandler, 2017).

Aim of the study

This project aims to have a brief review about appropriate time for orthodontic intervention of malocclusion.

Chapter one: Review of literature

The appropriate timing of orthodontic intervention has been an intriguing debate among specialists, the effectiveness of the intervention depends largely on the type of malocclusion**.**

1.1 Benefits in early intervention

including:

1. A dental health benefit due to addressing crowding early and improving access for dental hygiene thus providing a suitable environment for the righteous development of the periodontium (Bollen *et al*., 2008).

2. Psychosocial benefit - there is a proven association between the number and severity of dental anomalies including increased overjet and overbite, anterior spacing and open bites with teasing and bullying. Persistent teasing is known to negatively impact on self-confidence and so a malocclusion may have a negative socio-psychological impact. Early treatment to resolve occlusal issues in those affected has been recommended (Seehra *et al*., 2011).

3. The plasticity of the skeleton both in the short- and medium- term has been the subject of lengthy, often vociferous debate. Early research involving cephalometry alluded to the 'immutability' of the facial skeleton contrary to what had previously been propounded by orthodontic pioneers. most notably randomised studies carried out in the U.S. and the U.K. with prolonged follow-up periods of up to 10 years, have confirmed that overjet reduction, for example, during functional appliance therapy is attributable both to skeletal (30%) and dento-alveolar changes (70%) in the short-term. However, in the longer term these skeletal changes appear to

dissipate with little difference in mandibular length or position relative to untreated groups (O'Brien *et al*., 2003).

Nevertheless, there remains a school of thought that more sustained intervention might translate into more meaningful levels of skeletal change. There is currently, no prospective evidence to support this theory and a growing acceptance that early intervention in Class II malocclusion cases is no more effective, but less efficient, than later treatment (Proffit, 2006).

4. Subsequent orthodontic treatment (if needed) is more straightforward and expeditive.

5. The need for extractions of permanent teeth and surgical orthodontics is reduced

6. Reduced risk of dental trauma (Suresh *et al.,* 2015).

1.2 Early management of malocclusions

To better understand the effectiveness of early orthodontic treatment, it is important to review on the management and timing of intervention for various types of malocclusion, include:

1.2.1 Early management of posterior cross bite

Cross bite is a type of malocclusion due to negative transverse discrepancy between maxilla and mandible when the two arches occlude.

In the primary dentition, unilateral posterior cross bite commonly arises as a result of a narrow maxilla (figure1.1), which forces the mandible to displace laterally into an abnormal position due to the presence of tooth interferences (Malandris and Mahoney, 2004; Primozic *et al.,* 2009).

Figure 1.1: Posterior cross bite due narrowing maxilla (Biederman, *1968).*

The reported prevalence of posterior cross-bite in the primary dentition varies from 1% to 16%, depending upon the population sampled, with Caucasian populations generally exhibiting a higher prevalence than African and Asian populations (Farsi and Salama, 1996).

It is thought that this difference between racial groups may be, in part, caused by cultural variation in the prevalence of sucking habits among these populations (Modeer *et al.*, 1982).

The proportion of posterior cross-bites of the primary dentition which persist into the permanent dentition varies, with longitudinal studies reporting between 55% and 92% of these malocclusions failing to self-correct beyond the primary dentition stage (Kurol and Berglund, 1992).

Functional asymmetry in unilateral posterior cross bite can contribute to mandibular skeletal asymmetry as during the growth period continuous condylar displacement in the glenoid fossa induces differential growth of the condyles (Inui *et al.*, 1999; Kilic *et al.*, 2008).

This asymmetrical function reflects different development of the elevator muscles on each side of the jaws leading to a thinner masseter muscle on the cross bite side, which is already seen in the early mixed dentition (Kiliaridis *et al.*, 2000).

Several previous studies have discussed possible causes of facial asymmetry. It has been suggested that the normal asymmetry of the human face primarily originates from the innate functional and structural differences between the cerebral hemispheres, suggesting that brain and skull base asymmetry could be the cause of facial asymmetry (Pirttiniemi, 1998).

On the other hand, other studies concluded that environmental influence were the most likely cause. Habitual chewing on one side has been reported to lead to increased skeletal development on the ipsilateral side. Others have also discussed the possibility that facial asymmetry is simply a response of functional adaptation to asymmetrical masticatory activity (Vig and Hewitt, 1975).

Furthermore, the level of maximum bite force in children with unilateral posterior cross bite is smaller compared to children with neutral occlusion. Early corrections of functional problems should prevent adverse dental and facial development (Sonnesen *et al.*, 2001).

Facial asymmetry due to lateral mandibular displacement in unilateral posterior cross bite, if not treated in the primary dentition, may lead to an undesirable growth modification which results in facial asymmetry of skeletal origin (Ninou and Stephens, 1994; Kilic *et al*., 2008).

Though, early orthodontic treatment seems to be profitable and desirable to create conditions for normal dental and skeletal development (Petrén *et al.*, 2003).

Several methods have been suggested for cross bite correction include in the primary dentition period, active maxillary expansion with an expansion plate as in

figure1.2, The use of an expansion plate with a midline screw in the primary dentition period may result in some skeletal changes as there is less interdigitation of the mid palatal suture compared to the use of an expansion plate in the mixed or permanent dentition stages when orthodontic forces are considered only light enough to tip teeth (Ngan and Fields, 1995 ; Baccetti *et al.*, 2001).

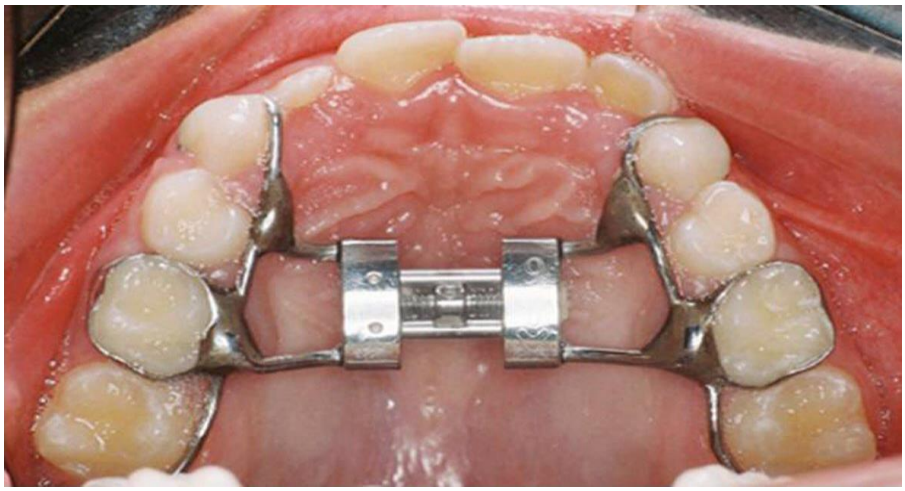

Figure 1.2: Modified hyrax expander (Geran *et al*., 2006).

And in mixed dention quad helix appliance for expansion (figure1.3) (Thilander *et al.*, 1984).

Figure 1.3: Quad helix appliance(Michel, 2019).

1.2.2 Early management of open bite

An open bite is defined as a lack of incisor overlap in centric occlusion (figure1.4). Generally it could have either a dental or skeletal etiology. Successful identification of the etiology improves the chances of treatment success.

A dental open bite generally has an environmental factor, likely a thumb sucking habit or a tongue thrust, which can be corrected by a habit-breaking devise.

Figure 1.4: Asymetrical open bite due thumb sucking(Burford and Noar, 2003).

On the other hand, a skeletal open bite is usually associated with a divergent growth pattern, a steep mandibular plane, a long face and a vertical maxillary excess. The underlying skeletal etiology may be related to excessive vertical growth and is more complicated to manage. In addition, a digit habit that is present for an extended period of time may redirect the development of the mandible and accentuate the vertical aspect of the growth (Moore and McDonald, 1997; Proffit, 2000).

Airway obstruction has also been implicated in the development of an open bite (Nygan and Fields, 1997).

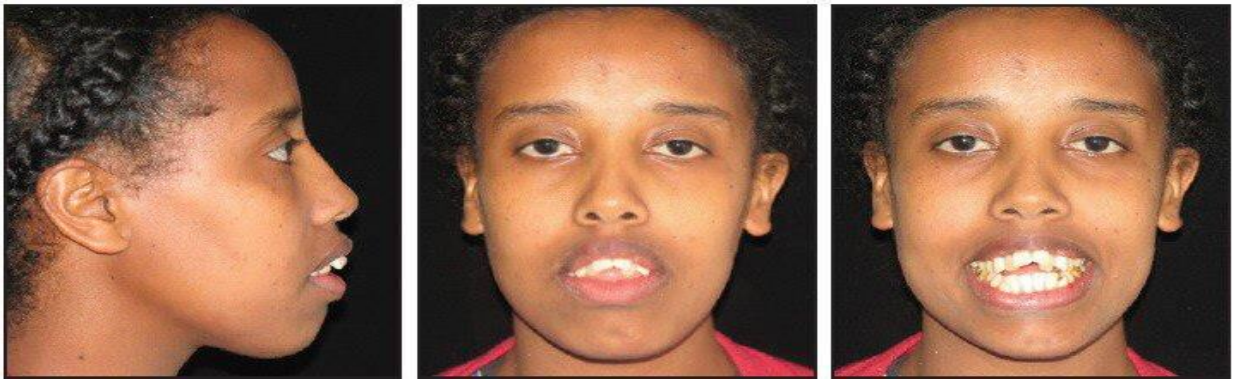

Figure 1.5: 27 years old cl II female patient with severe lower crowding, 10mm anterior open bite (Hiller, 2002).

Once growth is complete, the more ideal treatment to correct skeletal open bite requires orthognathic surgery. However, if the underlying skeletal etiology is diagnosed early, successful result will obtained in early treatment so growth modification may be attempted as soon as possible, In a recent study, investigated the effectiveness of applying a vertical chincap in managing the progression of skeletal open bite (*Iscan et al., 2002).*

Thirty-five children, ranging from 8-11 years of age, with Angle Class I or II malocclusions and skeletal and dental open bites were evaluated. They were instructed to wear a vertical chincap, which applies 400 gram on each side from beneath the anterior part of the mandibular corpus in an upward direction, for 16 hours per day over a mean period of 9 months. Favourable skeletal growth and mandibular rotation were obtained compared to the control group. utilized bite plates with either springs or repelling magnets to modify the facial muscle morphology. They achieved 1.3mm improvement in overbite with the spring bite-block therapy and 3mm with the magnetic bite blocks (Kuster and Ingervall, 1992).

Since vertical growth is the last dimension to be completed, some treatment may be prolonged, if begun early. Moreover, long-term studies are needed to determine any tendency for relapse (Kuster and Ingervall, 1992).

1.2.3 Early management of class III malocclusion

Angle's class III malocclusion is one of the malocclusion which shows malrelationship of both the upper and lower jaws in sagittal plane (figure1.6) with either maxilla arrested in its sagittal and vertical plane with mandible being prognathic and showing forward rotation or prognathism (Proffit, 2007).

Figure 1.6: Class III malocclusion (Kapust, 1998).

Treatment timing of class III malocclusion has always been controversial in its early stages in young children. Early intervention is needed in children with moderate to severe anterior crossbite and reverse deepbite as sagittal and vertical deficiency of maxilla could contribute to class III malocclusion (*Guyer et al., 1986).*

Failure of maxilla to grow vertically can result in mandibular overclosure, rotating the mandible upward and forward producing the appearance of mandibular

prognathism which could be because of both position and size of the mandible. In such cases, the children can be benefitted by early treatment, because it reduces the psychological burden of facial and dental disfigurement during the formative period of malocclusion (Campbell, 1983).

The etiology of class III malocclusion is multifactorial because of the involvement of genetics, ethnicity, environmental factors and habitual postures. Early treatment of class III malocclusion offers lot of benefit to the patient as the need of the treatment in the permanent dentition will be reduced as the options would be limited to camoufage or surgery (Battagel, 1993).

With class III malocclusion may have combination of skeletal and dentoalveolar components. Protraction facemask therapy (figure1.7) has been advocated in the treatment of the class III patients with maxillary deficiency. The positive overjet and overbite at the end of the facemask treatment appears to maintain the anterior occlusion (Turley, 1988).

Figure 1.7(A,B): Protraction face mask for growing patient with maxillary deficiency (Turley, 1988).

- **The goals of early class III treatment may include the following:**

a. To prevent progressive irreversible soft tissue or bony changes.

b. To improve skeletal discrepancies and provide more favorable environment for future growth.

c. To improve occlusal function.

d. To provide more pleasing facial esthetics, thus, improving the psychological development of the child.

e. Studies have shown that treatment with facemask and or chin cup improves the lip posture and facial appearance (Kilicoglu and Kirlic, 1998).

Treatment in the deciduous dentition produces greater skeletal changes than those produced in the mixed dentition stage (Kajiyama *et al.*, 2004).

The main objective of early facemask therapy is to enhance forward displacement of the maxilla by sutural growth. It has been shown by Melsen in her histological findings that the midpalatal suture was broad and smooth during the 'infantile' stage (8-10 years of age) and the suture became more squamous and overlapping in the 'juvenile' stage (10-13 years of age) (Melsen and Melsen, 1982).

Moreover, when therapy begins in the early mixed dentition, it seems to induce more favorable changes in the craniofacial skeleton, compared with the same treatment started in the late mixed dentition (Baccetti *et al.*, 2000).

Clinically, studies have shown that maxillary protraction was effective in the primary, mixed as well as the early permanent dentitions. The optimal time to intervene a class III malocclusion is at the initial eruption of the maxillary incisors as the circummaxillary sutures are smooth and broad before age 8 years and become more heavily interdigitated around puberty, as in figure1.8 (Melsen and Melsen, 1982).

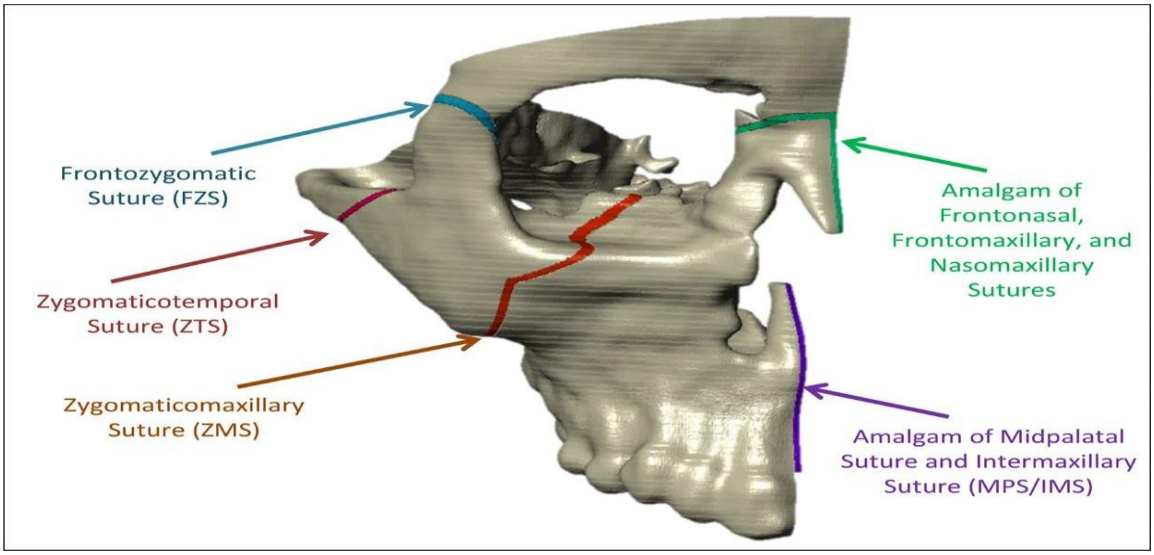

Figure 1.8: Cranial suture and their approximate anatomical location (Romanyk et al., 2013)

Several studies have suggested that a greater degree of anterior maxillary displacement can be found when treatment was initiated in the primary or early mixed dentition. Baccetti *et al* examined the differences in early *vs* late treatment in two groups of children treated with bonded maxillary expanders and facemasks. The younger group showed significantly greater advancement of maxillary structures and significantly more upward and forward direction of condylar growth after treatment (Baccetti *et al*., 1998).

1.2.4 Early management of class II malocclusion

When we face a skeletal class II malocclusion, there is a tendency to believe that the sooner that the treatment gets started the better. This popular belief led to cases in which the patients, who had achieved a stable occlusion before the adolescent growth spurt, suffered a skeletal discrepancy by the time they were fully developing. Here was not taken into account that the growth occurs on different moments for the three planes of space.

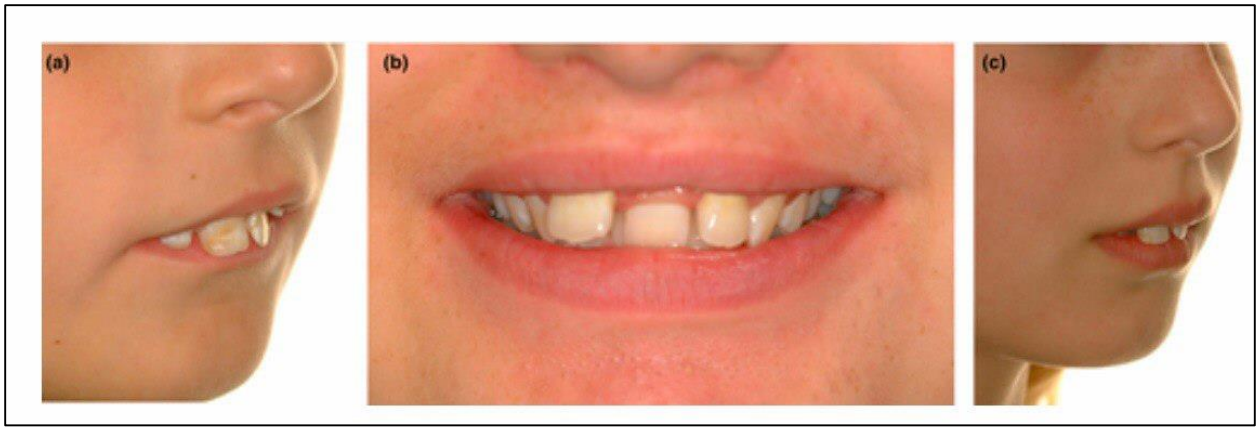

Figure 1.9: Class II malocclusion (Baccetti et al., 2000).

During the primary dentition, the only plane of space in which a growth modification can be truly made is the transversal one. A bit of relapse is to be expected in any case because of the genetically component that makes growth take place in the disproportionate pattern. When the only problem being faced is the sagittal discrepancy, is better to wait until the adolescent growth spurt is getting closer. The final result will be the same as if the treatment had started before. This way we will avoid years of unnecessary treatments that would finally affect our patients motivation and compliance with our orthodontic plan. It might be logic to think that if the necessary treatment for sagittal discrepancy might have to take place near the growth peak, the possibility to wait for treating skeletal class III cases is also there. But let us not forget that in a huge percentage of the Class III cases the problem is the upper jaw and that in these cases there is also a transversal stimulation needed on this bone (Rodriguez, 2019).

So, if there are no advantages in early treatment physiologically, are there any psychological advantages? There is substantial evidence that the dental appearance has an effect on social perceptions and interaction, and can be a target of teasing (Shaw*et al.*, 1980).

The negative impact of malocclusion on self perception appears to increase with age (Helm *et al.*, 1985).

Despite this, early treatment for Class II malocclusion has been reported to have no effect on self-concept, although within this study the children looked at did not present for treatment with low self–concept in the first place. This is supported by other work which found that pre-adolescent children awaiting orthodontic treatment generally have higher than average self-concept (Tung and Kiyak, 1998).

More recent work, however, may show that early treatment increases personal communication .

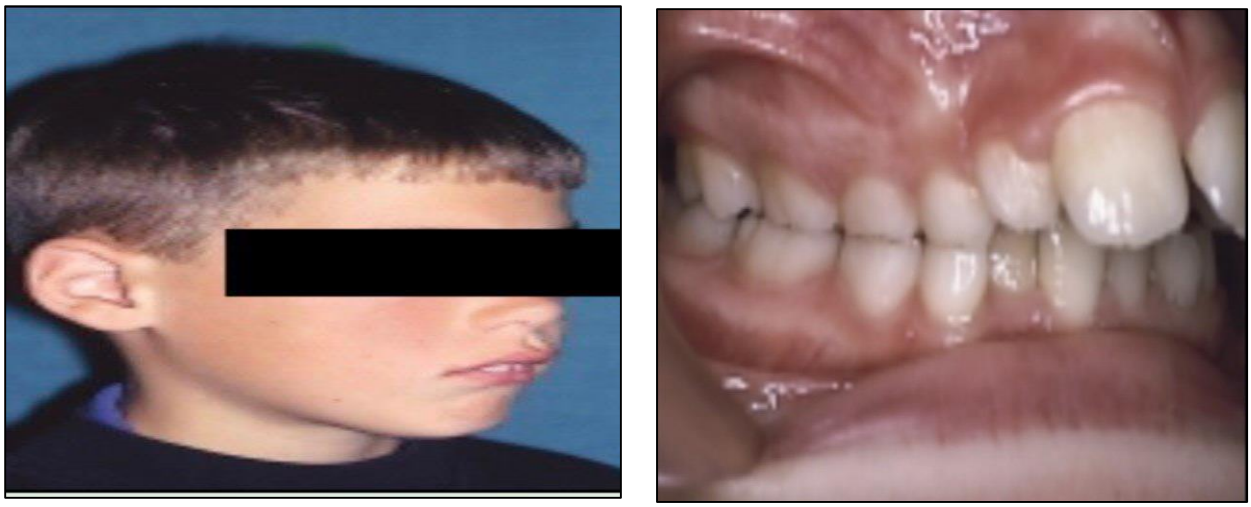

Figure 1.10: A,B Cl II div 1 with lip incompetence and increase incisor show at rest (Jarvinen, 1979).

In (Figure1.10) Case of patient in the mixed dention who request treatment due teasing at school.

One consistent finding is the increased incidence of trauma to the upper labial segment in pre-adolescent children with increased overjets (Jarvinen, 1979).

Increased overjet appears to be a greater contributor to traumatic injury in girls than boys, even though traumatic injury frequency is greater in boys. A high percentage of these injuries occur before the age of 10 years, especially in boys (probably due to the rougher nature of boys' activities and their more active participation in sports) (Hunter *et al.*, 1990).

An advantage of starting functional appliance therapy in the late mixed or permanent dentition is that the functional phase of treatment can be followed almost immediately by the fixed appliances, which can incorporate mechanics designed to stabilize the newly established occlusion.

By starting treatment in the mixed dentition, there will inevitably be a period when the clinician is awaiting further dental development before further treatment decisions can be made. This will mean either that treatment will have to be discontinued during this period or that some form of retention regime will have to be implemented. This may consist of wearing the appliances just at night, the use of headgear or the use of simple removable retainers (figure1.11).

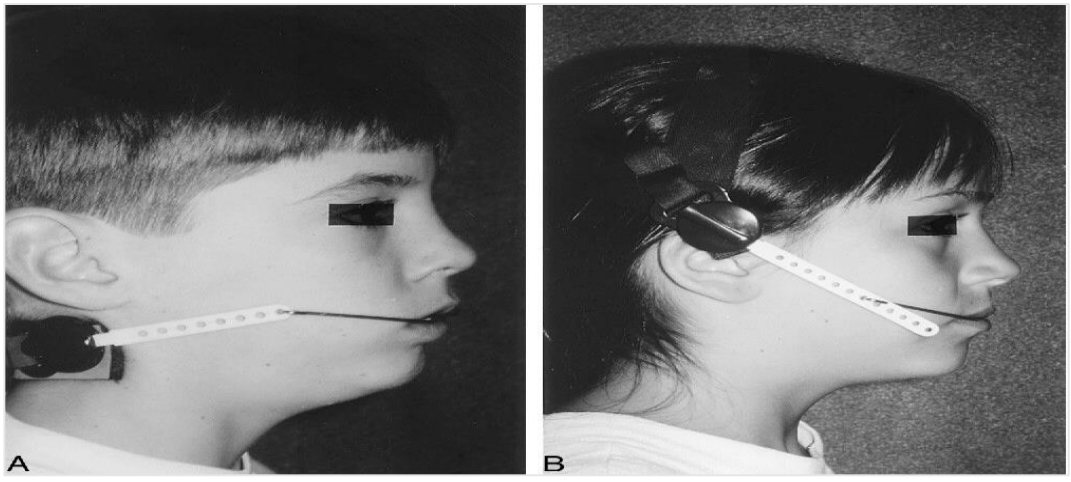

Figure 1.11:A, cervical and B, high-pull headgear used as retainers (Johnston, 1986).

If the last policy is pursued, incorporation of an inclined anterior bite plane (figure1.12) on an upper removable appliance will help to maintain the sagittal correction and allow the lateral open bites to improve as the dentition develops (Sandler and Dibiase, 1996).

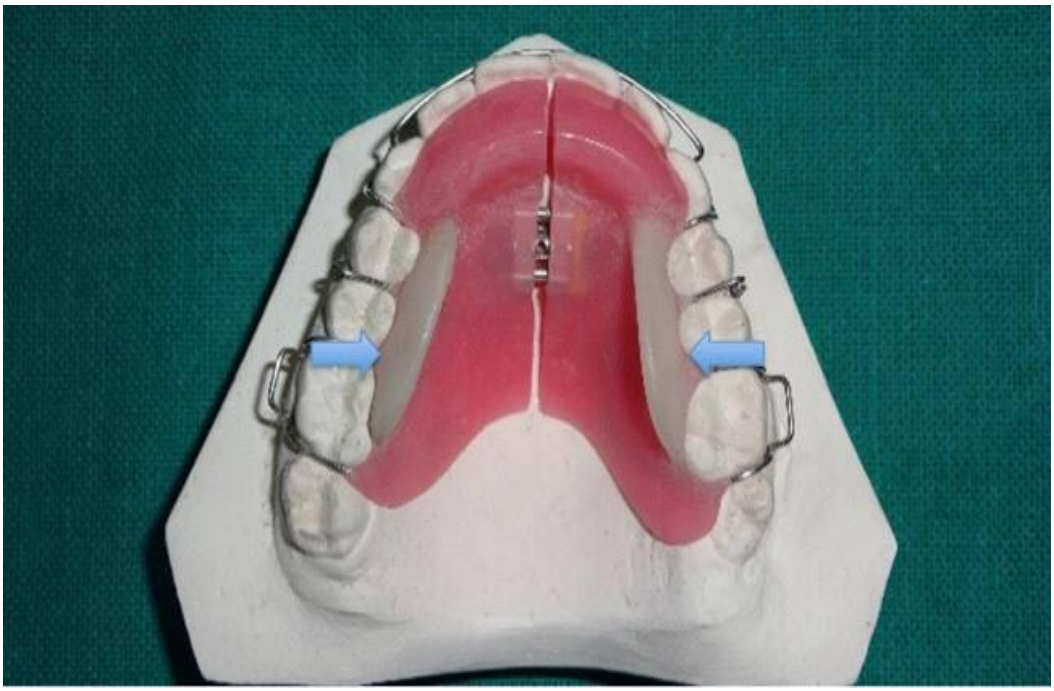

Figure 1.12: Incline anterior bite plane (Clark, 1997)

1.2.5 Early management of arch-length discrepancy

To determine the need for and appropriate timing of treatment for arch-length discrepancies, clinicians must be knowledgeable about normal arch development. During the period of transition from the primary to permanent dentition, minor incisor crowding is often present in the normally developing dentition (that is, the dentition that will ultimately have enough room for all of the permanent teeth without orthodontic intervention). Such crowding (figure1.13) is often seen after the eruption of the succedaneous mandibular incisors. With the eruption of the permanent mandibular lateral incisors, mild incisor crowding represents a normal stage of development. Continued growth and development relieve the crowding to

the extent that there is enough space available for the permanent mandibular canines to erupt (Proffit and Fields, 2000).

Figure 1.13: crowding after the eruption of permanent mandibular incisors (Dugoni *et al*., 1995).

there are three reasons for this space gain:

-With normal growth, a slight increase in arch width occurs across the canines. This amounts to about 2 millimeters of space gain and is due, in part, to a labially inclined path of canine eruption. More width is gained in the maxilla than in the mandible, and, on average, it occurs to a greater extent in boys than in girls.

-As the succedaneous incisors replace their primary counterparts, they flare forward, gaining 1 to 2 mm of arch length.

-In the mandibular arch, the primate space is located posterior to the primary canines. Consequently, the permanent canine erupt in a more posterior position than their primary counterparts, leaving the gained space of about 1 mm on each side available for the alignment of the incisors.

In contrast to the transitional crowding seen in the mandibular arch, a transitional diastema often exists between the permanent maxillary central incisors.

At this stage, a diastema often causes concern for parents because the teeth appear to be erupting into unfavorable positions. However, for most children, this is a natural transitory state that is self-correcting. With the subsequent eruption of the maxillary lateral incisors and canines, a central diastema of 2 mm or less typically closes naturally.

Larger diastemata as in (figure1.14) likely will require orthodontic intervention to achieve complete closure. However, if the occlusion is developing normally otherwise and the child is not overly concerned about the space, we recommend that canine eruption be given a chance to reduce the space.

Figure 1.14: large diastema before canine eruption (Field, 2007).

Clinicians also can alleviate crowding of the anterior dentition by using potential posterior space. Unlike the situation for the anterior teeth, the permanent canines and premolars have a combined mesiodistal width that is smaller than the width of the primary teeth they replace. The combined difference is on average, 2.5

mm for each side in the mandible and 1.5 mm in the maxilla (figure1.15). The extra space that this represents is referred to as the leeway space,

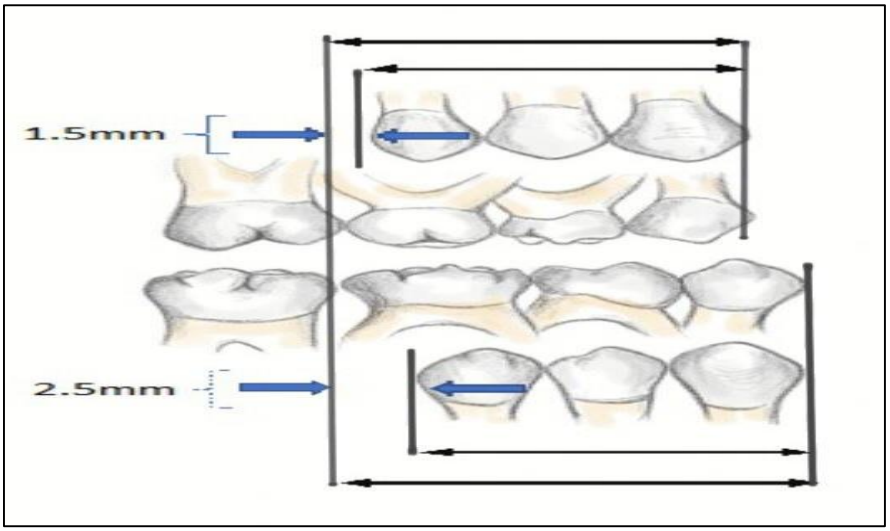

Figure 1.15:leeway space (Rjmedink, 2019).

If left to nature, this space will be taken up by mesial drifting of the permanent first molars.

Orthodontic management of this space, however, can preserve it to relieve crowding of anterior teeth. Such space preservation can be achieved by placing a lingual holding arch as in (figure1.16) or a lip bumper on the lower arch and a transpalatal appliance or headgear on the maxilla.

Figure 1.16: Lingual holding arch to preserve leeway space (Ringenberg, 1967).

In his experience, Gianelly has found that management of the leeway space alone can resolve the crowding problems in more than 80 percent of orthodontic patients. Optimal timing for this treatment should coincide with exfoliation of the primary second molars, typically in the late-transitional dentition (*Gianelly, 1995)*.

Arch width expansion in the absence of a transverse discrepancy is sometimes indicated to increase the arch perimeter, thereby relieving arch-length discrepancies (figure1.17).

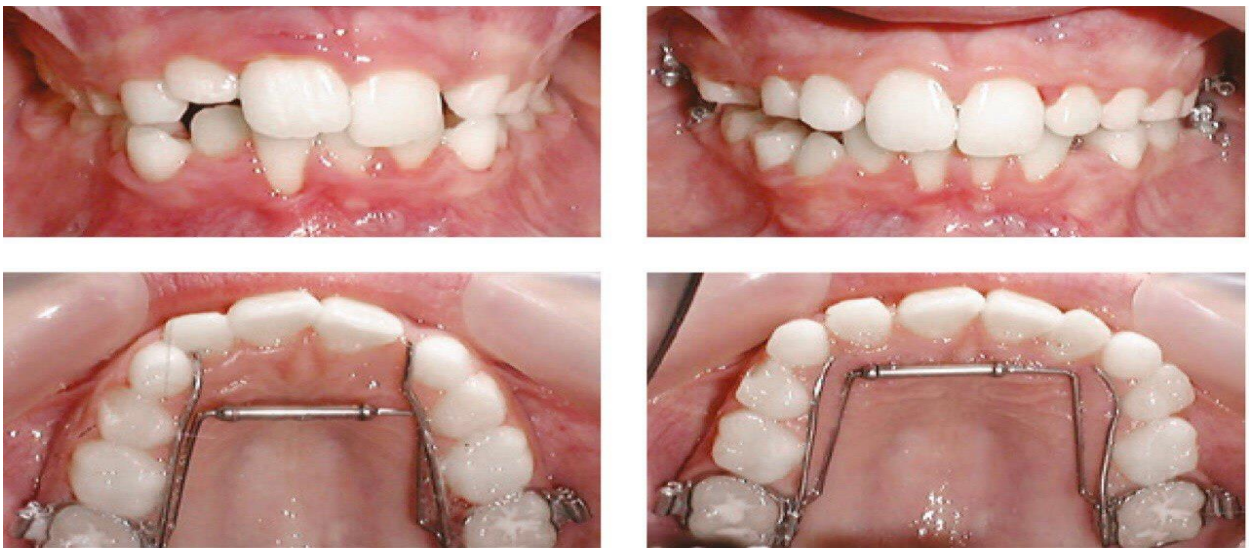

Figure 1.17: Transverse arch development(Clark,2022).

In general, beginning the expansion in the late transitional dentition is ideal because it can be followed immediately with placement of fixed appliances to direct the permanent teeth into the newly created space. However, earlier intervention sometimes is indicated. When crowding is severe enough to prevent the natural eruption of certain teeth—for example, the permanent maxillary lateral incisors—then expansion would be indicated at the age of 6 or 7 years. In addition, eruption of teeth into a crowded arch may have occurred, but their malpositioning leads to unfavorable wear patterns. This also would be an indication for early expansion

followed by active alignment, rather than for delaying treatment until more of the permanent teeth erupt, which may cause continued harmful wear of the enamel. In most cases, if expansion is chosen to relieve crowding, it can be delayed until the late-transitional dentition. Common exceptions to this have been described above. In these cases, timing will center on the eruption of the affected teeth.

There is no scientific evidence to support the idea that expansion in the primary dentition is more stable than that in the early-to-late transitional dentition.

In cases of severe crowding, extraction of permanent teeth may be desirable. In these cases, a serial extraction plan may be indicated. This protocol calls for the sequenced extraction of specific primary teeth to facilitate the early eruption of the permanent teeth identified for extraction. These are usually the first premolars. In cases of severe crowding, such a plan allows for the second premolars and canines to erupt well within the alveolus rather than ectopically. Once the remaining permanent teeth have erupted, fixed appliances are placed to provide ideal alignment within an arch in which the space discrepancy has been eliminated. Ideally, serial extractions begin in the early-transitional dentition, while the placement of fixed appliances is delayed until the early-permanent dentition (Gianelly, 1995).

1.2.6 Early management of congenitally missing lateral incisor

Maxillary lateral incisors are one of the most common congenitally absent permanent teeth. Clinical managements usually involve either implant replacement, a prosthetic bridge or canine substitution (figure1.18). The latter is generally

considered the more ideal option given its better longevity and more tooth conservation.

Figure 1.18: Substitution of maxillary canine for maxillary lateral incisor(https://orthopracticeus.com/ce-articles/tooth-substitutions-orthodontic-treatment/).

If the congenitally missing lateral incisors were diagnosed in the mixed dentition and the patient and parents elect future implant restorations to replace the missing teeth, every effort should be made to establish sufficient faciolingual thickness of the alveolus at the future implant sites. One option is to encourage canine eruption next to the central incisors by the extraction of the primary lateral incisor (Biggerstaff, 1992).

The eruption of the permanent canines adjacent to the central incisors can develop a large faciolingual width of the alveolar ridge in the edentulous area. The canines can be subsequently distalized orthodontically to their ideal sites, leaving an ideal width of alveolar ridge for future implants and the distalization for space opening should not be started before the age of 13 years so as to prevent the relapse and progression of bone atrophy. The time of implantation should be close to the end of orthodontic treatment. As opposed to starting orthodontic space closure early, orthodontic space opening before implantation should be started late (Kinzer & Kokich, 2005).

1.2.7 Early management of congenitally missing mandibular second premolar

The mandibular second premolar is another common congenitally missing permanent tooth. Frequently, if the patient has no arch length to tooth size discrepancy, the primary second molars should be retained for as long as possible, in order to maintain the alveolar bone both vertically and buccolingually. Moreover, in order to achieve a more ideal posterior occlusion, an appropriate amount of reduction of the mesiodistal width of the primary molars may be performed, after evaluating root convergence and crown width on a periapical radiograph. Often, an occlusal composite build-up or placement of a stainless steel crown may be necessary to establish an adequate crown height and to avoid submergence of the deciduous tooth and tipping of the adjacent teeth (Becker, 2007).

Primary tooth ankylosis may occasionally occur. As the adjacent teeth and alveolar bone continue to erupt and develop, the ankylosed primary molar appears to submerge below the occlusal table. The best way to detect ankylosis is to compare the bone level on a bitewing radiograph. One adverse effect of primary tooth ankylosis is the development of a vertical bone defect. The remaining growth potential and tooth position may determine the management of an ankylosed primary second molar (Kokich, 2005).

Because a 14-year-old male may still have significant growth remaining, early extraction of the ankylosed primary molar may be indicated in order to allow the alveolar ridge to develop occlusally as the adjacent teeth continue to erupt. However, the management may be different for a 14-year-old female with little growth remaining (Ostler & Kokich, 1994).

1.2.8 Early treatment and patient compliance

Another factor that has been used to favor early treatment is the greater compliance obtained from preadolescent patients. This has certainly been reported for adherence to instructions given for removable appliances and for headgear wear, although some studies have found no correlation between patient's age and level of co-operation (Albino *et al.*, 1991).

Younger children are usually influenced by their parents and other adults but adolescents are more susceptible to peer pressure, especially in terms of self-image. Of course this can act in either direction when trying to encourage compliance to orthodontic treatment, if an adolescent has significant concerns about the appearance of his or her teeth and has friends who are undergoing orthodontics, the treatment will have peer acceptance and compliance may be forthcoming; however, if no peers are undergoing treatment, orthodontic treatment may not be accepted. Pre-adolescent children seem less concerned about peer approval (Tung and Kiyak, 1998).

There is therefore no indication that pre-adolescent children are not psychologically ready for treatment. One of the disadvantages of early treatment, however, is often the requirement for a second phase of treatment in the early permanent dentition. Whether the compliance during this second stage of treatment is affected by starting treatment in the mixed dentition is unknown (Helm *et al*., 1985).

Chapter Two: Discussion

The passage from primary to early mixed dentition is often susceptible to changes which can be caused by a variety of factors and may interfere with a normal occlusion.

A correct timing when to start an orthodontic therapy is essential for the treatment to be most effective in the shortest time and with the lowest cost possible. Longitudinal studies indicate that a malocclusion observed in primary dentition can fairly predict the malocclusion developing in mixed and/or permanent dentition (Nisula *et al*., 2006).

Some of the occlusal characteristics on primary dentition persist in mixed dentition like children with a malocclusion in primary dentition (posterior crossbite, increased overjet, cl lll) present higher risks of having a malocclusion in early mixed dentition. However, an anterior open bite may spontaneously improve (Góis, 2012)

Some authors suggest that an early treatment may reduce the severity of the malocclusion at a later stage (Bhayya, 2011). Preventive and early treatments in orthodontics are still object of debate on cost-effectiveness (Tschill *et al*., 1997; Kurol and Proffit, 2006).

Some authors that considered the ideal time for a treatment is in late-mixed dentition stage (Viazi, 1995; Kurol et al, 2006). while other authors concluded that early orthodontic treatments would be beneficial and desirable especially to enhance skeletal and dental discrepancies and correct habits, dysfunction and malocclusion in their early stages, and especially transverse discrepancies which may cause temporo-mandibular joint problems or facial asymmetry (Thilander *et al*, 1984; Far

nik *et al.*, 1988; Korpar *et al.*, 1994; Trottman and Elsbach, 1996; Tschill *et al*., 1997; Thilander *et al.*, 2001; Ovsenik *et al.*, 2004).

An early treatment is psychologically beneficial for those patients whose self-esteem is reduced by the teasing of their peers (Jacobson, 1979), supports the theory that an early treatment is easier and guides the physiological dental exfoliation, early treatment can reduce the need for extractions of permanent teeth and corrects bad habits, helping the normal development of mixed and permanent dentitions.

Early orthodontic therapies also help to prevent traumatic dental injuries of maxillary incisors when they are protruding and can reduce the severity of a skeletal malocclusion and therefore the need of orthognatic surgery in adult age (Ricketts, 1979).

Chapter three: Conclusion and suggestion

3.1 Conclusion

The best timing for orthodontic treatment continues to be a controversial subject. early orthodontic treatment is effective and desirable in specific situations. Evidence is equally compelling, however, that such an approach is not indicated in some cases, and delaying treatment until later in dental development may be advised.

- In the treatment of patients with Class II malocclusion, correction at an early or late stage is equally beneficial but there were large individual variations within the treatment groups. The immediate effect that early treatment may have on a patient's self-esteem and susceptibility to dental trauma is not well-understood and is likely to vary from patient to patient. Begining treatment Class II discrepancies at an early age has potential to extend the overall treatment time.
- Patients with Class III malocclusion stand to benefit significantly from appropriate timing of orthopedic treatment. If parents delay treatment until complete development of mandible orthognathic surgery inevitable.
- A functional shift resulting from a crossbite is optimally corrected before complete growth so that asymmetrical growth of the mandible can be reduced or even prevented.
- Treatment of arch-length discrepancies depends on the nature of the crowding. Natural arch development has the potential to correct early mild incisor crowding. Management of the leeway space will resolve a majority of cases of crowding. This approach is best accomplished in the transitional to late-transitional dentition. Severe crowding may warrant the extraction of permanent teeth. A serial extraction protocol may be desirable and the

extraction sequence for such an approach begins in the early transitional dentition, while the appliance phase occurs in the early-permanent dentition.

3.2 Suggestion

So we must focus on appropriate timing for each malocclusion and distribute it in general dentists and people, by:

- Go to schools and perform education lectures to children and encourage them about regular visits to dentist for early detection any problem.
- Placing clear and understandable posters for people in dental centers because mostly parents have concern of children.
- Perform lectures by orthodontic specialist to general dentists about appropriate timing of orthodontic intervention.

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