Scholars Journal of Applied Medical Sciences (SJAMS) **ISSN 2320-6691 (Online)**
Sch. J. App. Med. Sci., 2016; 4(6D):2159-2162 **ISSN 2347-954X (Print)**

(An International Publisher for Academic and Scientific Resources)
www.saspublishers.com DOI: 10.36347/sjams.2016.v04i06.059

Review Article

Missing Spaces – hold them or close them?

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Abstract: Missing permanent teeth are a challenge to orthodontist. To keep the space created by missing teeth open and give a prosthesis or to close the spaces, is big dilemma for the orthodontist. Indications and contraindications for both the treatment options varies according to various factors like amount of space available, profile of patient, type of occlusion etc. Advantages and disadvantages of both treatment options also vary. To ensure successful results with long term stability, careful diagnosis and communication among team members is necessary to satisfy the patient's needs and expectations.
Keywords: Missing spaces, space maintaining, space closure.

INTRODUCTION

Approximately 2% to 10% of the population exhibit missing teeth. Excluding third molars, the most commonly missing teeth are maxillary lateral incisors and second premolars. Patients who exhibit congenital absence of teeth also experience increased ectopic dental eruption and other dental anomalies[1]. Approx. 20% of all congenitally missing teeth are maxillary laterals. It has been found that agenesis of both maxillary lateral incisors is more common than only of one. Sex differences in prevalence have usually been found to be small with slightly more females than males affected. There is an association between hypodontia and malformation of maxillary laterals, which may be reduced in size or simplified in shape, often becoming peg shaped. The demand for orthodontic treatment in patients with congenitally missing upper lateral incisors is high because the condition has an obvious impact on facial esthetics, affecting an individual's self esteem. Heredity is considered a major factor when permanent teeth are congenitally missing.
To determine whether or not teeth are actually missing, x-rays must be taken and carefully evaluated. At times, a tooth may not actually be missing, but hidden underneath the gums and in poor position, preventing normal eruption and requiring orthodontic treatment to bring the tooth into alignment.

Associated problems

Specifically, patients with missing lateral incisors frequently have associated problems like contralateral lateral incisors peg-shaped or smaller than the normal mesial distal width,palatal ectopic eruption of the adjacent maxillary permanent canines; permanent canines adjacent to absent lateral incisors also erupt mesially. In cases of unilateral absence of a maxillary lateral incisor, the midline is often deviated toward that side. Permanent canines adjacent to absent lateral incisors also erupt mesially.

Why treatment is needed?

When permanent teeth are missing, an orthodontic consultation will determine if the space caused by the missing teeth can be closed or remain open, requiring a replacement to fill the space and maintain the bite.

Without orthodontic treatment, the teeth on either side of the missing tooth will move randomly and tip into the open space, causing poor tooth alignment, bite problems and bone loss as we age.

Treatment Options

Careful diagnosis and communication among team members is necessary to formulate a treatment plan that satisfies the patient's needs and expectations. Some of the many factors that the team must consider in their treatment planning include the patient's age, facial type and profile, occlusal scheme, spacing, tooth anatomy and condition (shape, color, and size), alveolar bone quality and quantity, gingival display, and biotype [2-5].Missing maxillary lateral incisors present

challenging treatment planning and mechanotherapy problems for orthodontists, prosthodontist and general practioners.

Indications and Contraindications for Space Closure/opening

Factors that favor space consolidation include a tendency toward maxillary crowding in a patient with a well-balanced profile and normally inclined anterior teeth, cuspids and bicuspids of similar size, dentoalveolar protrusion, Class II malocclusion, marked mandibular crowding or protrusion

Space reopening is usually preferable in a patient with no malocclusion and normal intercuspation of the posterior teeth, pronounced spacing of the maxillary dentition, Class III malocclusion and retro gnathic profile, a large size difference between cuspids and first bicuspids.

ORTHODONTIC SPACE OPENING

When maxillary lateral incisors are missing, orthodontic space opening for future restorations is indicated when enough room is available in the maxillary arch.Patients with accentuated dentoalveolar protrusions and soft tissue convexity are not good candidates for such procedures. However, if upright maxillary lateral incisors need to be protruded, tipped labially, to help correct cross bites, or to gain upper lip support such as in patients with the cleft lip or palate, orthodontic space opening for one or both missing lateral incisors is indicated even if minimal space is available in the maxillary arch.When orthodontic space opening is indicated, orthodontic treatment will maintain or establish a normal buccal occlusion (ANGLE CLASS I), redistribute the available space, close the midline diastema and retract and upright maxillary canines until adequate lateral incisors spaces are created for future prosthetic replacement. Teeth adjacent to the missing lateral incisor space should have parallel roots, especially if implants are considered.

Amount of space needed for orthodontic space opening

The required amount of space needed for replacing missing lateral incisors is determined by two factors-

1. Esthetics of mesiodistal width between the anterior teeth. The width relationship between lateral and central incisor should the golden proportion: one lateral incisor is equal to two-third of central incisor.
2. Occlusion is second factor that affects the amount of space that needs to be created. Achieving good buccal intercuspation with a normal canine relationship coinciding midlines an optimal overbite and over jet relationship should provide adequate space for a prosthetic lateral incisor that is esthetically pleasing.

When implants are part of the treatment plan, their size dictates the amount of space that needs to be opened. In opening space, the main concern is alveolar ridge width in the area of the missing lateral incisor. Alveolar ridge width may be influenced in the mixed dentition during the eruption of the permanent canine. The ideal situation is to encourage the canine to erupt adjacent to the permanent central incisor. After the canine has erupted, it can be moved distally into its normal position. By moving the tooth distally, bone is laid down, forming an alveolar ridge with adequate buccolingual width to facilitate proper implant placement. Occasionally, the canine does not erupt adjacent to the central incisor. When this occurs, a future bone graft might be necessary to establish the appropriate width in the edentulous area to place an implant.

Advantages and disadvantages of orthodontic space opening

- **Advantage** - Good both functionally and occlusally, as it favours an ideal intercuspation of canines through first molars. In addition, minimal equilibration and reshaping are required on sound teeth.
- **Disadvantage** - It commits the patient to a permanent prosthesis in an area of the mouth in which tooth shade, gingival contour and margins are critical and not always easy to control.

Prosthetic options with orthodontic space opening:

The four prosthodontic options currently available for replacing missing teeth are traditional fixed partial dentures, resin bonded fixed partial denture, removable partial dentures, and Osseo integrated implants. Implant substitution is considered an optimal solution considering the possibility of obtaining an ideal occlusion and the indisputable advantage of avoiding any damage to the adjacent teeth [9-10].

ORTHODONTIC SPACE CLOSURE

Closing spaces and replacing missing maxillary lateral incisors by using canines is indicated in full lip profiles when anterior teeth are severely protruded or tipped labially. In such cases, opening spaces for the missing lateral incisors will make anterior teeth protrude even more, thus worsening the patient's profile and compromising the long term stability of the end result. Whenever teeth in the mandibular arch need to be extracted for orthodontic reasons- such as severe crowding or protrusion – orthodontic space closure by using canines to replace missing lateral incisors is indicated in the maxillary arch. Orthodontic space closure, by mesial movement of the adjacent teeth, also provides satisfactory esthetic and functional long-term results [6-8].

Trial Diagnostic Set Up

Treatment planning for maxillary lateral incisors, orthodontic space closure should include a trial diagnostic set up which consists of cutting teeth on the

plaster model without altering their mesiodistal width and then repositioning them with sticky wax in their desired position. This trial diagnostic set up helps identify any tooth- mass problems and the amount of tooth reshaping and interproximal reduction needed for a functional and esthetic result.

Advantages and disadvantages of orthodontic space closure

- Advantage – No need of prosthesis in the anterior region of mouth.
- Disadvantage - The tendency for the space to reopen is the major disadvantage.

Clinical Problems Associated with Space Closure

Due to the size differencebetween cuspids and first bicuspids, variations in crown length and width can create a poor esthetic balance between the hard and soft tissues. In general, the cuspids have longer clinical crowns than the lateral incisors, and the first bicuspids are shorter than the cuspids. There is a color differencebetween cuspids and incisors, the cuspids being usually darker and/or more *yellowish* than the incisors, accentuating the contrast between the maxillary central incisors and the "new" lateral incisors. There is also a crown torque differencebetween cuspids and lateral incisors.

Considerable improvement that can be achieved today with the space-closure alternative by combining techniques from esthetic dentistry and carefully detailed orthodontic treatment. Such treatment may include esthetic recontouring of a mesially relocated cuspid to a more ideal lateral incisor shape and size by using a combination of grinding and composite resin build-ups or porcelain laminate veneers, intentional whitening by vital bleaching of a yellowish cuspid that has been moved mesially into the lateral incisor position and careful correction of the crown torque of a mesially relocated cuspid to mirror the optimal lateral incisor crown torque, along with the provision of optimal torque for the mesially moved maxillary first and second bicuspids. Individualized extrusion and intrusion during the mesial movement of the cuspids and first bicuspids, respectively, to obtain an optimum level for the marginal gingival contours of the anterior teeth. Increasing the width and length of mesially moved and intruded first bicuspids with composite resin build-ups and/or porcelain laminate veneers. Simple minor surgical procedures for localized clinical crown lengthening.

These techniques, when used in combination, can provide the needed improvements to approach the looks of a natural intact dentition, and can thus make orthodontic space closure a more attractive treatment alternative than ever before for patients with missing lateral incisors.

Relapse after retention

There is usually a marked tendency for spaces to reopen in the maxillary anterior region after closure and conventional retention with plates or splints. For this reason, the retention of space-closure cases must not be taken lightly. Long term or permanent retention with lingually bonded multistranded wire retainers over the six anterior teeth combined with removable plate to be used continuously for the first six months and then at night. No apparent side effects were noticed with this regimen in the 10year follow-up study cited above. The bonded retainer wire should include the first bicuspid, but after several years, it can usually be cut distal to the cuspids, so that only the cuspids and central incisors are included. Should spaces still open up distal to the cuspids; these can be filled with composite resin build-ups. An interesting alternative to reopening space for missing lateral incisors is to open up space in the posterior region. This technique has the same biological advantages in the anterior portion of the maxilla as normal space closure. It may promote better long-term stability, particularly if there is a jaw-size or tooth-size discrepancy. The spaces opened up behind the second bicuspids can be filled with single-tooth implants or by cantilever bridges from the first molars. Restorations on single-tooth implants behind the second bicuspids do not need to meet the same strict esthetic requirements as in the anterior region, and such implants will also receive a more favorable axial loading.

The Extraction/Non-Extraction Dilemma for Missing Premolars

Despite rhetoric to the contrary, scientific evidence suggests that appropriate extraction followed by space closure affects the facial profile negligibly. Early extraction of second primary molars in instances of congenital absence of underlying second premolars can often result in mesial drifting of the posterior dentition, affording the opportunity to close spaces. Therefore, aggressive early modified serial extraction can eliminate the need for major restorative dentistry. When crowding is severe, space maintenance is needed to conserve anchorage while canines and first premolars drift distally, or extractions can be delayed until the permanent dentition. In Class II cases, anchorage requirements dictate extraction timing and mechanical space closure management. By contrast, later extraction of premolars can have a more negative effect on incisor position and therefore can result in flattening of the facial profile if there is excessive incisor retraction. For these reasons, it is imperative that patients be assessed orthodontically as early as possible so that all treatment options are available.

During treatment planning, the factors that increase the likelihood of extraction are a large degree of crowding, midline discrepancy, anteroposterior molar discrepancy between right and left sides, procumbency of the incisors on the underlying alveolar structures (double-dental protrusion), full facial profile requiring reduction in lip support, increased vertical

dimension of the lower facial height, a shallow overbite or anterior open bite.

CONCLUSION

A little bit of prevention is worth a pound of cure. A consultation with an orthodontist for the child at a young age to determine the best course of treatment if baby teeth are being lost prematurely or there is a history of missing teeth in your family. Missing lateral incisors are usually discovered by age 9 when general orthodontic treatment needs are becoming apparent. Whether to close, open or maintain a space for a missing lateral incisor is an orthodontic decision that needs to fit within a total plan of dental management? Factors to consider include Skeletal base relationship, severity of crowding, over jet, overbite, position into which the canine erupts, crown sizes, crown shapes, crown colours, gingival contours, gingival display on smiling, patient and parent attitude toward options, availability of appropriate prosthetic services, time delay before effecting "final" prosthetic treatment, space and bone required for implant fixtures and financial and biological costs.

REFERENCES:

1. Baccetti T; A controlled study of associated dental anomalies. Angle Orthod 1998; 68:267-74.
2. Sabri R; Management of missing maxillary lateral incisors.JAmDentAssoc.1999; 130(1):80-84.
3. Spear FM, Mathews DM, Kokich VG; Interdisciplinary management of single tooth implants. SeminOrthod.1997; 3(1):45-72.
4. Kokich VO Jr; Early management of congenitally missing teeth. Semin Orthod. 2005; 11(3):146-151.
5. Kinzer GA, Kokich VO Jr; Managing congenitally missing lateral incisors. Part II: tooth- supported restorations. J Esthet Restor Dent. 2005; 17(2):76-84.
6. Zachrisson BU, Rosa M, Toreskog S; Congenitally missing maxillary lateral incisors: canine substitution. Point. Am J Orthod Dentofacial Orthop. 2011; 139(4):434, 436, 438.
7. Nordquist GG, McNeill RW; Orthodontic vs. restorative treatment of the congenitally absent lateral incisor–long term periodontal and occlusal evaluation. J Periodontol. 1975; 46(3):139–43.
8. Robertsson S, Mohlin B; The congenitally missing upper lateral incisor. A retrospective study of orthodontic space closure versus restorative treatment. Eur J Orthod. 2000; 22(6):697–710.
9. Rupp RP, Dillehay JK, Squire CF; Orthodontics, prosthodontics, and periodontics: a multidisciplinary approach. Gen Dent. 1997; 45(3):286–9.
10. Zachrisson BU; Planning esthetic treatment after avulsion of maxillary incisors. J Am Dent Assoc. 2008; 139(11):1484–90.