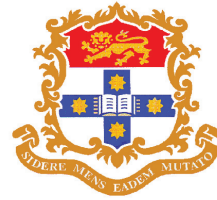


Australian Society  
of Orthodontists



University of Sydney



## Missing and Peg Lateral Incisors

*Creating **Brighter** Futures*

# Missing and Peg Lateral Incisors

Missing and peg lateral incisors pose a distinct challenge for the dental team where the patient can be faced with a potential lifetime aesthetic and/or treatment burden. This article will review the many factors that go into developing an overall treatment plan customised to the individual's needs.

## Incidence

The prevalence of congenitally missing laterals is reported to be between 1 and 2%<sup>(1)</sup>. They are the third most common missing tooth after third molars and mandibular second premolars, accounting for 20% of all congenitally missing teeth<sup>(1)</sup>. The incidence of peg lateral incisors has been reported with a large variation in the literature. Meskin and Gorlin found the incidence to be 0.88 percent in their population group, with females displaying a slightly higher frequency<sup>(2)</sup> whereas Hrdlicka found it to be 8.4% in a population of Chinese males<sup>(3)</sup>.

## Aetiology

The congenital absence of one or more teeth results from a disturbance during the early stages of tooth development<sup>(4)</sup>. Different models have been presented for the inheritance pattern of missing laterals including autosomal dominant, autosomal recessive and incomplete dominance inheritance patterns<sup>(5-8)</sup>.

Alvesalo and Portin looked at a population in Finland and found that nearly half of the people that had a peg shaped lateral, also had a missing lateral. They concluded that a peg shape is the result of a weaker expression of the gene which causes missing laterals. Their study also suggested that missing and peg shaped laterals are different expressions of one dominant autosomal gene<sup>(5)</sup>.

## Management

The management of missing lateral incisors can be broadly divided into two options: space closure involving canine substitution or space opening with prosthetic replacement. The management

of peg lateral incisors can include prosthetic build up to normal lateral incisor proportions or extraction with space closure or prosthetic replacement. In most cases an interdisciplinary treatment plan should be formed between the restorative dentist, the orthodontist and the periodontist.

## Orthodontic Space Closure

This treatment option involves closing the missing lateral space by mesialising the maxillary canines to approximate the maxillary central incisors. There are several advantages of this option as treatment can be completed during adolescence and it does not commit the patient to lifelong maintenance of a prosthetic replacement.

A diagnostic set up for canine substitution, either digitally or on plaster casts, will help identify the amount of orthodontic tooth movement needed, tooth shape problems and including crown recontouring requirements<sup>(9)</sup>. It is also important to assess the relationship between the teeth, gingivae, lips, the smile line and lip support, both in profile and frontally<sup>(9)</sup>.

## Indications for Space Closure

Orthodontic space closure may be the treatment of choice in some patients, however this is very dependent on the original malocclusion<sup>(10)</sup>. Factors that favour space closure include<sup>(9)</sup>:

- Canines and premolars that are similar in size
- Class II malocclusion
- Tendency towards crowding in the upper arch with normal incisor angulation<sup>(11)</sup>
- Well balanced profile
- Moderate to severe lower crowding

The success of canine substitution largely depends on the size difference between the canines and the first premolars<sup>(12)</sup>.

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We would like to congratulate the Alliance for Cavity Free Future Grant recipients in 2016. The winning projects are as follows:

- Improving Oral Health of Aged Care residents at Gundagai Hospital- Dr Kathleen Matthews, Murrumbidgee Local Health District, NSW
- Dietary behaviour change for caries prevention in the dental setting- Dr Melanie Hayes, Melbourne University Dental School, VIC
- A National Survey exploring oral health promotion potential in Australian community pharmacies- Dr Meng Wong Taing and Dr Christopher Freeman, School of Pharmacy and Dr Pauline Ford, School of Dentistry, University of Queensland, QLD
- Assessing the barriers for improvement to oral health for Colac-Otway adolescents- Dr Michael Smith, Barwon Health, Newcomb, VIC
- Oral health knowledge and professional practices of paediatricians – Dr Virginia Dickson-Swift, Professor Mark Gussy, Professor Amanda Kenny & Stacey Bracksley-O'Grady, La Trobe Rural Health School, Bendigo, VIC

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Normally, the canine has a longer clinical crown than a lateral incisor and a first premolar. When the canine is substituted as a lateral, care must be taken to achieve aesthetic gingival margin levels. This can be achieved by extrusion of the canines to lower the gingival margin, and intrusion of the first premolars <sup>(9)</sup>.



Figure 1. Post treatment gingival margin heights in a canine substitution case <sup>(9)</sup>

The mesiodistal width and the incisal edge of the canine should be adjusted in order to look more like a lateral incisor. In addition, the distal angle is slightly rounded, the canine eminence on the labial surface is reduced and the lingual surface at the incisal area is reduced to establish an adequate overbite and overjet relationship <sup>(13)</sup>.

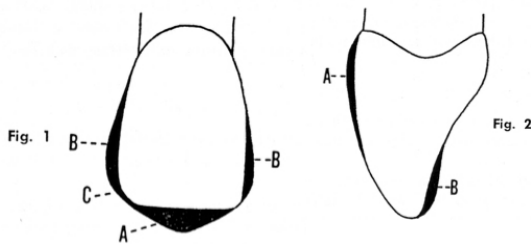


Figure 2. Reshaping of canine to resemble a lateral incisor <sup>(13)</sup>

Canines are usually darker and more yellow in colour when compared to lateral incisors. When they are repositioned adjacent to the central incisors this colour difference can be accentuated, hence, the canines may require individual bleaching or, in some cases, veneering <sup>(9)</sup>.

A canine substitution treatment plan with no lower extractions will result in a therapeutic Class II posterior occlusion with lateral group function <sup>(9)</sup>. If the contact between the lower lateral incisors and the upper canines is too severe, then excessive wear may be noted on the lower incisors. To prevent this occurring the functional forces need to be directed on the upper first premolars which should be rotated mesially <sup>(14)</sup>. Some clinicians may be concerned that moving the first premolar into the canine position might place an excessive functional demand on the premolar. Long term studies of periodontal condition and occlusal function have shown no such effect <sup>(9, 15)</sup>.

The first premolar should have more buccal root torque as this will lift the palatal cusp up and away from functional interferences as well as provide a "canine like" buccal bulge. The substituted canine however requires palatal root torque to enhance aesthetics and may also help to reduce apical migration of the gingival margin <sup>(4)</sup>.

## Orthodontic Space Opening and Prosthetic Replacement

Space closure and canine substitution is not appropriate for all situations and therefore the lateral incisor space may need to be opened and restored. Factors that favour space opening include <sup>(9)</sup>:

- No malocclusion and normal intercuspation of the posterior teeth
- Spacing of the maxillary dentition
- Class III malocclusion
- Retrusive upper lip
- A large size discrepancy between the canines and first premolars
- Canine size, shape and colour that makes canine substitution of the lateral incisor unaesthetic

## Space Requirements

The amount of space for lateral incisor replacement is determined by two factors: aesthetics and occlusion <sup>(16)</sup>. An aesthetic relationship exists between the central and lateral incisor called the "golden proportion" where the lateral incisors should be about two thirds the width of the central incisor <sup>(16, 17)</sup>. In some situations the space for the lateral replacement may be insufficient due to occlusal considerations. The orthodontist should then assess the posterior intercuspation, the amount of overjet and overbite <sup>(16)</sup>. If the correct occlusion has been achieved then the orthodontist may perform some interproximal reduction of the central incisors and the canine to create space for the lateral incisor crown <sup>(16)</sup>.

## Implant Supported Restoration

Restoring a congenitally missing lateral incisor space with an implant is a viable treatment option, as it does not affect the adjacent teeth. However sufficient bone in all three dimensions is required to ensure placement in an optimal position <sup>(16, 18, 19)</sup>. When calculating the mesio-distal space required for implant placement, the clinician should take into account that 1mm of bone needs to exist between the implant and the adjacent tooth for development of a papilla <sup>(16)</sup>. The more common width of the implant in the maxillary lateral incisor region is 3.75mm and the platform on the implant is 4mm <sup>(16)</sup>.

Absence of the lateral incisor commonly results in insufficient bucco-lingual bone for implant placement so that bone augmentation procedures may be required <sup>(4)</sup>. After extraction, the alveolar ridge narrows by 23% in the first 6 months <sup>(20)</sup>. While orthodontic movement of the canine through the edentulous ridge and back again has been suggested as a way of developing the ridge without resorting to grafting procedures <sup>(19, 21)</sup> a more recent study has shown that there is still significant net bone loss so that bone grafting may still be required <sup>(22)</sup>.

## Timing of Treatment

The appropriate time to place an implant is based on cessation of patient's facial growth. As the face grows, the teeth continue to erupt to maintain occlusal contact, however, implants cannot erupt. If an implant is placed too early then significant periodontal, occlusal and aesthetic problems can be created <sup>(23, 24)</sup>. The most predictable way to monitor facial growth is to take serial cephalometric radiographs 6 months to 1 year apart <sup>(25)</sup>.

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Any changes indicate that growth is occurring. In general, the earliest possible timing for implant placement for girls is 16 to 17 years and for boys is 20 to 21 years<sup>(26)</sup>, although waiting longer is safer.

Therefore if orthodontic treatment is completed during early adolescence a long period of space maintenance is required until the patient can receive an implant. Not only does this result in bone loss in the edentulous site, but also requires teenage patients to have a removable denture or a Maryland bridge for many years.

Over time, there is a tendency for the roots of the central and canine to converge into the lateral space after orthodontic treatment. Often a second shorter phase of orthodontics is needed just prior to the implant placement to upright these roots.

## Tooth Supported Restoration

A resin-bonded cantilever bridge is the most conservative tooth supported restoration as it leaves the adjacent teeth relatively untouched. The ideal anterior occlusal relationship for these restorations is a shallow overbite<sup>(26)</sup>. This allows for maximum surface area for bonding and decreases the amount of lateral force<sup>(26)</sup>.

## Restoration of Peg Lateral Incisors

The first decision to be made is whether to retain or extract the peg lateral incisors. Extractions may be advisable due to unfavourable anatomic features, including a very thin or short roots and very short or malformed clinical crowns<sup>(27)</sup>. If being retained the peg lateral incisor may need to be moved orthodontically to develop optimal space distribution for the placement of restorations and ensure correct gingival margin height<sup>(27)</sup>.

The restorative material chosen largely depends on the amount of mesio-distal spacing as well as the amount of tooth structure available. If small spaces are present, direct bonding may provide a conservative and cost effective option, particularly if the patient is still growing<sup>(27)</sup>. Best results are achieved when the natural morphology of the tooth is maintained and the restoration is not over contoured<sup>(28)</sup>.

As much sound enamel as possible should be preserved when preparing the teeth for a crown or veneer. Usually a feather edge is the only appropriate margin design because of the tooth or pulpal morphology<sup>(27)</sup>. This margin is the least appropriate for ceramic margins, especially in porcelain laminate veneers<sup>(29)</sup>. A metal margin may be acceptable however the restorative dentist must take care if the periodontal tissues are thin and friable as it will result in an unaesthetic restoration<sup>(27)</sup>. A slightly subgingival interproximal and labial margin will allow the technician to create a contact point with a steep emergence profile to better support the papilla and provide a more natural appearance<sup>(30)</sup>.



Restoration of peg lateral incisors with PFM crowns (27)



Restoration of a peg lateral incisor on the left side with a porcelain veneer and canine substitution on the right side (9)

## Conclusion

The incidence of missing lateral incisors is relatively common and therefore poses a frequent management problem for the treating clinician. Appropriate treatment must involve an interdisciplinary approach. When deciding whether to close or open space, the clinician must take into account the existing malocclusion, the size and shape of the teeth as well as the age and soft tissue profile of the patient.

## References available upon request



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