Bonded mandibular posterior bite plane: Fabrication, insertion and uses

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Abstract
Bite planes are one of the most commonly used auxiliaries during orthodontic treatment. They can be used in different segments of the maxillary and mandibular arch depending upon the type of malocclusion. The present paper describes the requirements of the bonded mandibular posterior bite plane and its fabrication.

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Introduction

The term 'bite plane' is often synonymous with anterior maxillary bite plane although they can be used in the anterior as well as posterior region and in mandibular arch as well. Bite plane has been used in the maxillary arch as early as 1879 to facilitate supraeruption of the mandibular posterior teeth[1]. A bite plane is a shelf of acrylic added to the base plate in the anterior or posterior region to clear the occlusion or to reduce the over bite respectively. They are temporary devices placed in the mouth to disocclude the teeth.

The detailed classification of different types of bite plane is given in fig 1. Bite planes can be fixed[2, 3, 4] or removable[5]. They can be placed in the anterior or posterior segment depending on the individual treatment need.

Anterior bite plane are used when the occlusion interferes with tooth movement, when there is severe deep bite in horizontal pattern of growth and in tempromandibular disturbances resulting from over closure of the mandible. They are usually flat and parallel to the occlusal plane. The maxillary anterior bite plane works on the principle that sufficient disocclusion of the posterior segment will facilitate vertical eruption of the mandibular molars, help achieve adequate vertical height and bite opening without significantly changing the occlusal relationships. Supraeruption of the posterior teeth and growth of the surrounding alveolar bone takes place. The new bone thus formed must be stabilised adequate by gradual withdrawal of the bite plate to prevent relapse.

The mandibular anterior bite plane is used in the correction of maxillary anterior teeth in cross bite. It is otherwise called the 'lower anterior inclined plane' or 'catalan's appliance.'

Maxillary posterior bite planes are indicated in reversed overjet (anterior crossbite) and unilateral or bilateral posterior crossbite. It is a shelf of acrylic added to the baseplate covering the molar and premolar teeth.It breaks the tooth lock in the anterior region by acting as a wedge between the maxillary and mandibular teeth in the posterior region.

The mandibular posterior bite plane in used to disocclude the maxillary and mandibular teeth is case of palatally blocked out maxillary anterior teeth.

Step by step procedure in the fabrication of bonded mandibular bite plane

Armamentarium
Alginate impression material
Proper set of impression trays
Rubber bowl and spatula
Dental stone
19 gauge wire
Heavy wire cutter
Universal plier
Cold mould seal (separating medium)
Self cure clear methyl methacrylate monomer and polymer
Wax knife and carver
Acrylic trimmers
Sand paper
Pumice
Polishing Puff
Type I glass ionomer cement
Mixing pad and spatula

In office procedure and Lab procedure

Day 1

In Office procedure

Impression making and Cast preparation

The orthodontic procedure is explained to the patient. Patient consent is obtained. Accurate alginate impressions are made with a measured quantity of alginate powder and water. The impressions should be poured immediately with dental stone to avoid dimensional change.

Lab procedure

1. Excess stone should be removed from the models for ease of fabrication. Care should be taken to avoid marring the dental surfaces.

2. Cut approximately three inches of 19 gauge wire stainless steel round wire from the spool.

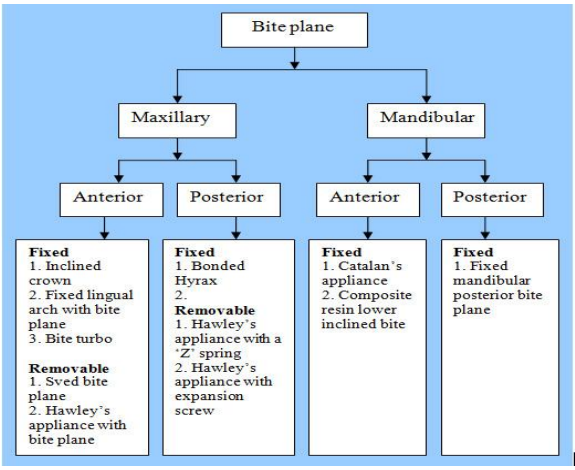

Fig 1- Detailed classification of different types of bite plane

3. Bend the 19 gauge wire along the lingual surface of the lower arch (fig 2).

Fig 2- 19 gauge wire contoured to the lingual arch from

4. The wire should be placed above the cingulum of all the anterior teeth and extended posteriorly to the occlusal surface of the first premolar (fig 3). In cases of crowding in the mandibular anterior teeth the wire should contact the cingulum of the most lingually placed tooth.

5. Separating medium is applied on the model and allowed to dry.

6. The contoured 19 gauge wire is placed back on the model and checked for adaptation. If required the wire can be stabilised on the model with modelling wax placed at the anterior end of the wire. The wire connects the right and left posterior bite blocks such that the bite plane is one single unit instead of two separate pieces of aryclic.

Fig 3 - wire adapted to the lingual surface of the lower anterior teeth

7. Self cure clear methyl methacrylate monomer and polymer are alternately placed on the mandibular posterior teeth from the first premolar to the second molar on both sides by sprinkle method to make the posterior bite plane.

8. Care should be taken to avoid extension of the acrylic to the gingival margins of the teeth.

9. The acrylic should cover half of the buccal and lingual surface of the posterior teeth on both sides (fig 4).

Fig 4 - Acrylization done bilaterally

In situations with short clinical crown height of the posterior teeth the acrylic should be away from the gingival margin by 2mm so that it does not act as a plaque retaining area.

10. The mandibular bite plane is removed from the model. The acrylic is trimmed. The interoccusal clearance is less in the second molar region compared to the premolars. Hence acrylic is removed more on the second molars and gradually reduced towards the premolars. This prevents excessive bite opening between the maxillary and mandibular incisors. When the maxillary model is occluded with the bite plane placed on the mandibular model there should be uniform contact between the cusps of all the maxillary posterior teeth on the occlusal surface of the bite plane.

Fig 5 - acrylic placed 2mm away from the gingival margin

11. The bite plane is polished (fig 5). The bite plane is placed on the model after polishing to check the adaptation of the bite plane on the model (fig 6).

Day 2
<u>In Office procedure</u>

Insertion
The bite plane is removed from the model. The bite plane is placed on the mandibular teeth and the fit of the bite plane is checked intraorally for proper adaptation onto the teeth. The gingival extension is checked such that there is a minimum clearance of 2mm between the acrylic and the gingiva. The patient is asked to bite on the bite plane. The upper and lower anterior teeth should be in an edge to edge relation between the upper and lower anterior teeth. There should not be any space between the upper posterior teeth and the mandibular bite plane. Once the occlusion and fit is appropriate the bite plane is cemented with Type I glass ionomer cement. Once the cement has set the excess cement is removed from around the bite plane. Figure 7a -7e shows an example of a bonded mandibular bite plane placed in a patient with posterior crossbite wherein a quadhelix has been fabricated in the upper arch for posterior expansion. As treatment progresses the same bite plane can be used in bringing the lingually blocked 22 into alignment. Note that there is crowding of the lower anterior teeth. The bonded mandibular bite plane is fabricated such that the 19gauge wire contacts the cingulum of the most lingually placed tooth. The maxillary and mandibular anterior teeth are in an edge to edge relation after cementation of the bite plane.

Fig 6 – bonded mandibular bite plane trimmed and polished prior to insertion

Post insertion instructions
The patient is instructed to maintain good oral hygiene to prevent plaque accumulation around the bite plane. The bite plane cannot be removed by the patient.

Hence the patient is advised not to meddle with the appliance with the tongue or hand. The patient might encounter problems with speech due to encroachment of tongue space. This will settle down in about approximately one week. Eating may be difficult for a few days after cementation as the upper teeth occludes on the acrylic platform of the mandibular bite plane. The patient will get accustomed to it with time. Periodic recall visits are scheduled once a month.

Follow up visits

On the following periodic visits the bite plane is checked for any loosening of the fit. If so the bite plane is re-cemented. The bite plane is check for occlusal wear or breakage due to masticatory forces. The clearance between the maxillary and mandibular anterior teeth is checked in cases where anterior cross bite has to be corrected so that sufficient space is available for the tooth in cross bite to jump the bite.

Fig 7a

Fig 7b

Fig 7c

Fig 7a- 7c – intraoral photographs of a mandibular bonded bite plane cemented to the lower arch

Once the desired treatment plan is achieved the bonded mandibular bite plane is removed. A crown remover can be used to remove the bite plane if there is a very good bond between the bite plane and the mandibular posterior teeth. The cement left on the tooth is removed with a finishing bur.

Indications of bonded mandibular bite plane

In unilateral or bilateral posterior crossbites to disocclude the teeth to facilitate expansion of the maxillary arch

1. In cases with palatally blocked maxillary anterior teeth locked behind the mandibular anterior teeth. To facilitate alignment of the tooth into the maxillary arch.

Contraindications of bonded mandibular bite plane

Mixed dentition with exfoliating deciduous teeth and the permanent teeth in various stages of eruption especially the mandibular arch is a contraindication to bonded mandibular bite plane.

1. If malocclusion has to be corrected in the mandibular arch, a bonded bite plane cannot be placed as the occlusal coverage would prevent tooth movement.
2. Patients with poor oral hygiene are a relative contraindication for bonded mandibular bite plane.
3. Patients with a very short clinical crown height are a relative contraindication as there will be frequent dislodgement of the bonded mandibular bite plane.

Conclusion

This present paper illustrates the step by step procedure in the fabrication and insertion of a bonded mandibular posterior bite plane along with its indications and contraindications.

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