Non-extraction treatment of a Class II case with a missing mandibular central incisor using a CAD/CAM lingual orthodontic system

Author: Khaled Abouseada

A
dult orthodontic pa
tients insist on aesthetic
treatment options that
have the least possible impact
on their work and life. Clear
aligners are an excellent treat-
ment option that is well suited
to many comprehensive or-
thodontic treatment plans.
You may have already fig-
ured out that case selection
is essential, and some movements
are more difficult to perform
well with removable aligners.

Incognito lingual braces (3M
ESPE) are an ideal treatment
option for adult patients who
are best treated with a fixed
system and who are looking
for invisible orthodontics. They
are also perfect for patients who
are not committed to dealing
with removable aligners. Lin-
gual braces are an exciting ad-
vancement in orthodontic care,
and many patients are thrilled.
I would like to present a brief
background on the Incognito
lingual braces system, followed
by a discussion of a case I treat-
ied with lingual braces and why
I chose this system.1

The Incognito appliance is
manufactured using state-of-the-art CAD/CAM technology.
The first step in the fabrication
process is taking accurate poly-
vinyl siloxane impressions and
bite registration using polyvinyl
siloxane, and then creating a
model in plaster and a diagnos-
tic wax-up thereafter (accord-
ing to my direct instructions).
The final model is then sent
to me digitally for feedback, and
I can make a series of changes
until I am satisfied with the final
result. The final model is then
scanned with a 3D scanner and
the brackets are designed on the
computer.

The bracket and archwire
system consists entirely of in-
dividualised components. The
bracket bases and bodies, the
position of the bracket body on
the bases, the bracket-slot ori-
entation (ribbonwise), the di-
rection of the archwire insertion
(vertical or horizontal) and the
archwire geometry are all indi-
vividually adjusted to each tooth,
according to malocclusion and
the orthodontist's instructions.
Rapid prototyping technology is
used for the manufacturing of the
lingual brackets.

The braces are then cast
from gold alloy, mounted in a
flexible indirect bonding tray,
and shipped out ready to be
bonded. Direct bonding is fea-
tible too, owing to the extended
individual bases.

Bending archwires is one
of the most difficult tasks in
orthodontics. In this system,
computer-operated bending
of archwires using robots is
used to manufacture precisely
shaped archwires. Even super-
elastic archwires can be pre-
cisely shaped. This helps solve
three major problems in lingual
orthodontics:

1. Patient discomfort during
the adaptation phase: The appli-
case is designed to be as flat as
possible, not much higher than
a bonded retainer; this signifi-
cantly improves patient comfort.

2. Difficulties in re-bonding:
The customised bracket base
covers the major part of the lin-
gual tooth surface and therefore
allows direct re-bonding with-
out the need for any other posi-
tioning aids.

5. Inaccuracies in finishing:
Inaccuracies of the slots due to
production and resulting vari-
ation in torque play are now part
of the past, owing to In-
cognito. Measuring rates show
divergences of not more than
0.008mm between the slots.
The precisely shaped archwires
also make high-standard finish-
ing easily achievable.2

Figure 1 shows the different steps in
manufacturing braces with the
Incognito system.

This case report describes
the treatment of a patient with
a skeletal Class II malocclusion
due to a retrognathic mandi-
ble and protrusive maxilla. He
also had a congenitally missing
mandibular left central incisor.
The extraction of a single man-
dibular incisor can be employed
as a compromise treatment of
certain malocclusions if the end
result fulfils the requirements
for a healthier dentition that is
dimensionally harmonised in relation to the
surrounding structures.3 In this
case, one of these incisors was
missing so extraction was not
necessary.

The Class II malocclusion
was corrected by non-extract-
tonodontic treatment with a
CAD/CAM fixed lingual ap-
ppliance (Incognito). The Class
III molar relationship had not
changed at the end of treatment,
but a Class I canine relationship
was achieved and the facial pro-
file improved owing to improve-
ment in the position of the man-
dibular incisor in relation to the
mandibular plane, which affects
the position of the lower lip.

Diagnosis and aetiology
The patient was male, aged 25
years and nine months, and had
the chief complaint of crowding
of the maxillary and mandibular
anterior teeth. He had Class III
canine and molar relationships
on both sides, a 2mm overjet, a
4mm overbite, a missing man-
dibular left central incisor, the
maxillary midline was coinci-
dent with the mid sagittal plane,
the mandibular midline was
shifted to the left, the maxil-

ary dental arch had about 7mm
of crowding and lower dental
arch had 8mm of crowding, ex-
cluding the width of the miss-
ing mandibular incisor, and the
maxillary lateral incisors were
in crossbite (Fig 2).

According to cephalomet-
ric analysis, there was a Class
II jaw relationship and normal
vertical facial height. The pa-
tient was in good health and
his medical history showed no
contra-indications to orthodon-
tic therapy (Fig 5).

Treatment objectives
The treatment objectives in-
cluded correction of the maxil-
lar and mandibular crowding,
improvement of the dento-al-
veolar and maxilla-mandibular
relationships, improvement of
facial aesthetics, and establish-
ment of a stable occlusion and
better smile.

Treatment alternatives
Three treatment options were
suggested to the patient. The
first alternative entailed labial
orthodontics, as the aesthetic demand
was very high for the patient
and clear aligners would not have
been able to achieve the needed
results. Both Options one and
two were non-extraction.

The third option was to ex-
tract all four first premolars
but this would have affected
the facial profile negatively. Af-
ter detailed discussion with the
patient, we chose Option two,
non-extraction using a lingual
appliance.

Treatment progress
Treatment began with cus-
tomised, pre-adjusted, CAD/
CAM fixed lingual appliances
(0.550mm slots) placed on
both the maxillary and man-
maxillary and mandibular first premolars. However, this was not a favourable treatment alternative owing to its negative effect on the facial profile.

Performing lingual orthodontic treatment for each patient in the average orthodontic office is now a reality. The treatment results are of a high level, and all our patients may benefit from an invisible appliance. Former problems, such as discomfort, speech alteration, finishing inaccuracies, and particular tooth anatomy, can be overcome in this manner.

The extraction of the mandibular incisors constitutes a therapeutic alternative in treating certain anomalies. It is not a standard approach to symmetrically treating most malocclusions, but the therapeutic aims must be adjusted in certain clinical situations to individual patient needs, even when this means that the final occlusion achieved is not ideal. The deliberate extraction of a mandibular incisor in certain cases allows the orthodontist to improve occlusion and dental aesthetics with minimal orthodontic treatment. In all cases, however, a diagnostic cast is required to predetermine the occlusal possibilities precisely.

Conclusion
The key to success in lingual orthodontics in terms of both professional and patient satisfaction is practice and training. The Incognito system can be used for all types of malocclusions with the same precision as labial braces. The possibility of incisor extraction should be a part of every clinician's portfolio of treatment techniques. If it is planned carefully and executed properly, incisor extraction can be an effective way of satisfying a particular set of treatment objectives.

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Dr Khaled M. Abouseada
Asnani Dental Clinic
P.O. Box 122721
Jeddah 21332
Saudi Arabia
khaled@khaledabouseada.com

Editorial note: A complete list of references is available from the publisher.

Fig. 5a-g Showing upper and lower initial and final comparing them to their corresponding set-up

Fig. 5a
Fig. 5b
Fig. 5c
Fig. 5d
Fig. 5e
Fig. 5f
Fig. 5g

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Author Info
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Saudi Arabia
khaled@khaledabouseada.com

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