



ORTHODONTIC EXTRACTION OF IMPACTED MANDIBULAR THIRD MOLARS WITH A MINIMALLY-INVASIVE BRACKET (MIB) SYSTEM

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INTRODUCTION: Surgical removal of impacted third molars is a very common surgical procedure before or during orthodontic treatment and often causes significant patient anxiety.¹ Moreover, risks and complications involved in this procedure cannot be completely avoided. Previous studies have introduced methods to avoid risks and complications.²⁻⁴ In this study, the use of a minimally invasive technique for orthodontic extraction aided by an innovative device named “minimally invasive brace” (MIB) might reduce risks, complications, and patient anxiety.

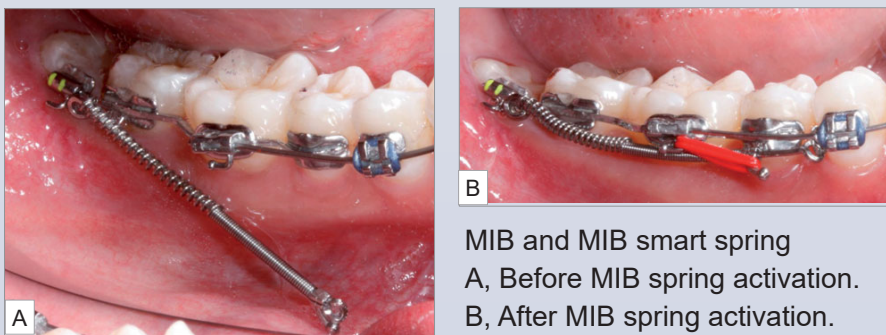
AIMS: To introduce an innovative dental anchorage device named “minimally-invasive brace” (MIB) that can efficiently upright mesially impacted mandibular third molars by **transforming** the procedure from surgical removal to simple extraction.

MATERIALS AND METHODS: Twenty-four partially-erupted mandibular third molars with mesioangular impaction and requiring removal were included in this prospective clinical study. The patients were randomly divided into two groups: MIB (n= 16) and control (n= 8) groups. In the MIB group, an MIB and MIB smart spring were applied to the second premolars and the first and second molars as the anchorage to upright the third molars to allow simple extraction. In the control group, no treatment was provided before the third molar removal. Patient comfort and duration of the 3rd molar removal between groups were evaluated using the independent T-test.

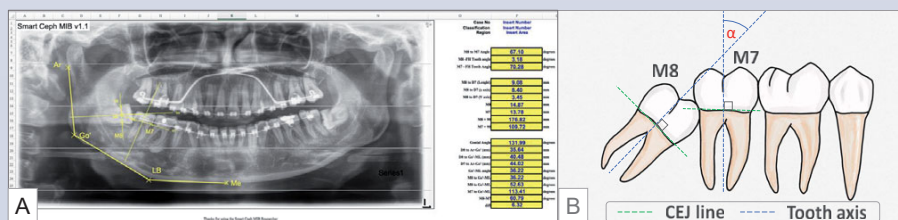
MEASUREMENTS	ASSESSMENTS
1) The rate and amount of 3 rd molar movement *	Pre- and post-operative panoramic radiographs (Smart Ceph v1.1)
2) The stability of the anchorage provided by the MIB*	Superimposition of pre- and post-operative intraoral scanner images ⁵
3) Facial swelling**	Superimposition of pre- and post-operative 3-D facial scanner images ⁶
4) Patient comfort during the 3 rd molar removal**	Visual analog scale (VAS) scores
5) Duration of the 3 rd molar removal**	Extraction procedure except injection

*Measured only in the MIB group, **Compared between the control and MIB groups

MIB system

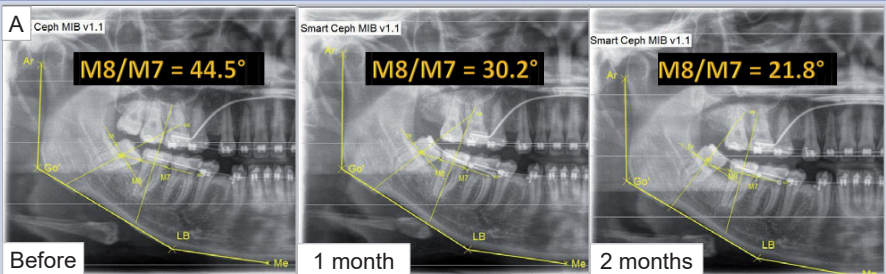


Measurement of pre- and post-operative panoramic radiographs



RESULTS: The MIB system uprighted mesially-impacted mandibular third molars before extraction with minimal movement of the anchorage. Duration of the tooth removal, patient discomfort, and facial swelling were significantly less in the MIB group than in the control group.

RESULTS 1. Rate and amount of 3rd molar movement

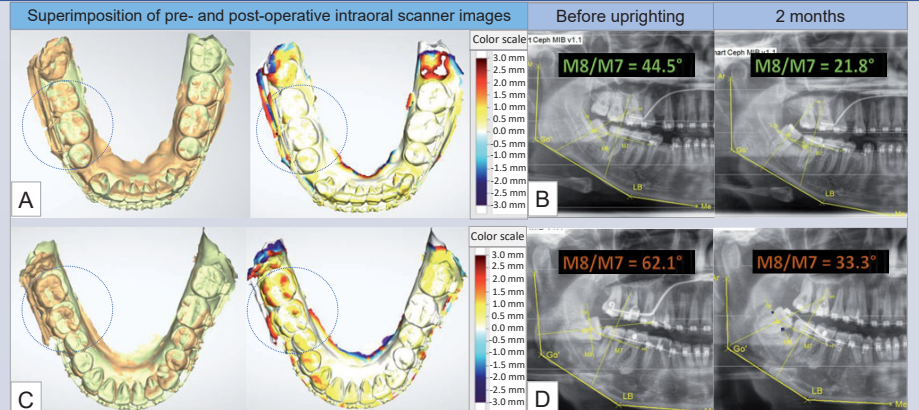


Result 1. A, Panoramic images show the MIB system efficiently uprighted the mesially-impacted mandibular third molar.

	N	MIN	MAX	MEAN	S.D.
Age	16	20.0	27.0	22.3	2.1
Uprighting time (months)	16	1.0	5.0	2.1	0.9
Rate of 3 rd molar movement (degrees/month)	16	9.9	17.6	14.2	2.4
Amount of 3 rd molar movement (degrees)	16	15.5	57.8	29.2	9.8

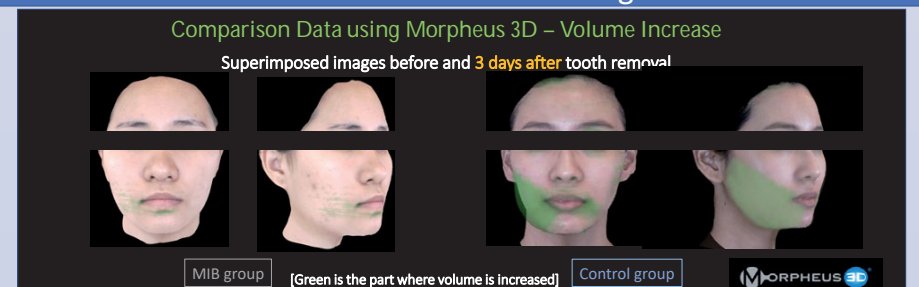
B, Descriptive Statistics in the MIB group (N= 16, Female= 9, Male= 7).

RESULTS 2. Stability of the anchorage provided by the MIB



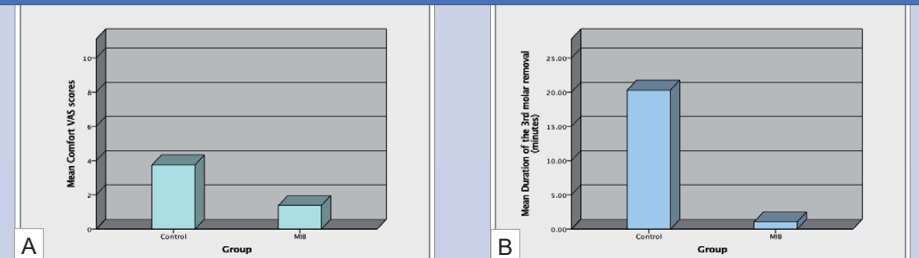
Results 2. The stability of the anchorage (the 2nd premolars and the 1st and 2nd molars) provided by the MIB was evaluated by superimposition of pre- and post-operative intraoral scanner images. The colour scale shows that minimal movement of the anchorage (less than 0.5 mm) occurred at a small angle of impaction (A,B). At a greater angle of impaction (C,D), there was more movement of the anchorage (0.5-2.0 mm).

RESULTS 3. Facial swelling



Results 3. Facial swelling was evaluated by superimposition of pre- and post-operative 3D facial scanner images. The results show facial swelling was significantly less in the MIB group than in the control group.

RESULTS 4. Patient comfort and 5. Duration of the 3rd molar removal



Results 4 and 5. Independent T-test

A, Mean of patient comfort VAS scores in control and MIB groups. The mean difference is significant between groups (P<0.01).
B, Mean of duration of the tooth removal in control and MIB groups. The mean difference is significant between groups (P<0.01).

CONCLUSIONS: The MIB system, using posterior teeth as an anchorage unit and an MIB smart spring, offers a minimally-invasive option for uprighting mandibular third molars before extraction with minimal movement of the anchorage. The system reduces the duration of tooth removal, patient discomfort, and facial swelling.

References
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