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*Published in:*  
British Journal of Oral and Maxillofacial Surgery

*DOI:*  
[10.1016/j.bjoms.2016.02.005](https://doi.org/10.1016/j.bjoms.2016.02.005)

*Publication date:*  
2016

*Licence:*  
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*Document Version*  
Peer reviewed version

[Link to publication in Discovery Research Portal](#)

### *Citation for published version (APA):*

Rice, S., Serrant, P., Laverick, S., & McIntyre, G. T. (2016). Preoperative removal of lower third molars and bilateral sagittal split osteotomy in the UK. *British Journal of Oral and Maxillofacial Surgery*, 54(5), 515-519. <https://doi.org/10.1016/j.bjoms.2016.02.005>

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# Pre-operative Removal of Lower Third Molars and the Bilateral Sagittal Split Osteotomy in the UK

## *Abstract*

### *Aim:*

To determine the perceptions of UK Oral and Maxillofacial Surgery (OMFS) consultants regarding complications of bilateral sagittal split osteotomies (BSSO) in relation to lower third molars.

### *Study design:*

National postal questionnaire of UK OMFS consultants in 2012/2013.

### *Results*

Of 378 UK OMFS consultants, 192 carried out orthognathic surgery. From this group 132 replies were received (69% response rate). 81 respondents routinely removed lower third molars prior to BSSO; 51 did not. 89 respondents perceived there to be an increased risk of complications if third molars were present at the time of BSSO, mainly an increased risk of unfavourable fractures. 43 respondents did not perceive an increased risk of BSSO complications when third molars were present at the time of surgery. Of those who routinely removed lower third molars, 13 respondents removed them within the six-month period prior to BSSO, 56 respondents removed them 6-12 months before BSSO, and 10 respondents removed them more than 12 months before BSSO. There did not appear to be a significant difference in self-reported unfavourable fracture rates between those surgeons who routinely removed lower third molars pre-BSSO, and those who did not.

### *Conclusion*

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The results of the questionnaire demonstrated considerable variation in surgical practice across the UK with regard to the management of lower third molars pre-BSSO, both in terms of whether or not surgeons remove these teeth at all, and when they remove them.

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*Keywords:* Orthognathic surgery; Mandibular osteotomy; BSSO; Bilateral sagittal split osteotomy; Lower third molars

## *Introduction*

Mandibular orthognathic surgery was first documented by Hüllihen in 1846,<sup>1</sup> and the bilateral sagittal split osteotomy (BSSO), described by Trauner and Obwegeser in 1957, has become one of the most versatile procedures undertaken in this field.<sup>2</sup> The location of the osteotomy cuts and the nature of the surgical movements can have a significant impact on the structures adjacent to the operative site. The relationships of the inferior alveolar neurovascular bundle, the lower third molar (where present) and the positioning of the osteotomy cuts are important to consider. Whilst three-dimensional imaging using cone-beam CT may be used to improve pre-operative visualisation of the planned cuts and adjacent structures,<sup>3</sup> risk management remains far from straightforward due to difficulties in controlling unknown variables such as bone density and plane of cleavage. Estimated risk of unfavourable fractures during BSSO varies between 0.7% and 20%,<sup>10,11</sup> with long-term paraesthesia of the inferior alveolar nerve distribution estimated as being around 5%,<sup>12</sup> although rates of up to 40% have been reported.<sup>13</sup>

It has been suggested by several authors that the presence of mandibular third molars during BSSO increases the technical difficulty of the procedure, the operating time, the incidence of unfavourable fractures, and results in unwanted manipulation of the inferior alveolar neurovascular bundle which may lead to an increased risk of paraesthesia.<sup>4,5</sup> Therefore they recommend removal of mandibular third molars at least 6 months pre-surgery.

Other studies do not support these conclusions and suggest that removal of the lower third molars at the time of BSSO is more cost-effective, avoids an additional episode of general

anaesthesia and surgical trauma to the patient, and allows the tooth to be used as a guide during the procedure. It has been suggested that concomitant removal of lower third molars during BSSO results in reduced sensory disturbance post-operatively. A number of studies found either no difference or a reduction in the risk of unfavourable fractures at BSSO when lower third molars were present. These authors recommend the concomitant removal of lower third molars during BSSO when necessary<sup>6,7,8,9</sup>.

Due to the conflicting data in the literature in relation to the link between lower third molars and the risk of complications during BSSO, there is thought to be wide variation in surgical practice across the UK. The aim of this study is to quantify the perceptions of UK Oral and Maxillofacial Surgery (OMFS) consultants regarding the management of lower third molars in patients undergoing BSSO.

#### *Method*

Ethical approval was not required as this was a questionnaire study of surgical practice. The questionnaire (Figure 1) was designed to assess the perceptions of UK OMFS consultants regarding the complications of BSSO in relation to lower third molars and was approved by the British Association of Oral and Maxillofacial Surgeons (BAOMS). This was sent by postal mail to all 192 UK OMFS consultants on the BAOMS database who were undertaking orthognathic surgery in 2012/3013. Those not undertaking orthognathic surgery were asked to indicate this and return the questionnaire. Non-responders were contacted on two occasions. Data was entered into a spreadsheet (Microsoft Excel, Redmond, California) and descriptive statistics used to evaluate it. To determine whether the number of OMFS

consultants undertaking orthognathic surgery was accurate, data was compared to the BAOMS national audit (2010).

### *Results*

Of the 378 UK OMFS consultants registered with BAOMS in 2012/2013, it was determined that 192 practiced facial deformity/orthognathic surgery (Table 1). Questionnaires were dispatched to this group of surgeons. 132 replies were received, resulting in an overall response rate of 69%. 89 respondents (67%) perceived there to be an increased risk of BSSO complications if lower third molars were present at the time of surgery. Of these, 84 (64%) considered the main risk to be increased likelihood of unfavourable fractures, 4 (3%) thought it was nerve damage, and 1 (1%) believed it to be infection. 48 respondents (33%) believed there was no increase in the likelihood of complications when lower third molars were present at the time of osteotomy.

81 respondents (61%) indicated that they routinely removed lower third molars prior to performing a BSSO; 51 (39%) did not. Table 2 compares the reported rates of unfavourable fractures between surgeons who do not routinely remove lower third molars pre-BSSO and those who do. In both groups the majority of respondents reported an unfavourable fracture rate of <1%. There did not appear to be a significant difference in the self-reported rate of this complication between the two groups.

Each of the 81 respondents who remove lower third molars gave a further indication of which type they remove. 37 (28%) remove all lower third molars. 12 (9%) remove erupted

lower third molars deemed to interfere with the surgical cuts and 32 (24%) remove unerupted lower third molars deemed to interfere with the surgical cuts.

When considering the timescale for removal of lower third molars prior to BSSO (Table 3, Figure 2), 13 (10%) respondents stated that they removed lower third molars within the six-month period prior to BSSO, which resulted in unfavourable fractures in up to 2% of patients. 56 (42%) respondents removed lower third molars 6-12 months before BSSO, resulting in unfavourable fractures in up to 5% of patients. 10 (8%) respondents removed lower third molars more than twelve months before BSSO, resulting in unfavourable fractures in up to 1% of patients. One respondent, who routinely removed lower third molars more than 12 months before BSSO, reported an unfavourable fracture rate of >5%.

3 respondents commented on the questionnaire that the reason they remove lower third molars pre-operatively was to facilitate bicortical screw placement at the time of BSSO.

### *Discussion*

This study demonstrated wide variation in surgical practice across the UK regarding the management of lower third molars in patients undergoing BSSO. 67% of respondents perceived there to be an increased risk of complications associated with the presence of lower third molars. 64% perceived the main complication of carrying out a BSSO with retained lower third molars to be increased risk of unfavourable fractures. The perceptions of this group of surgeons correlate with the findings of Reynecke et al,<sup>4</sup> Schwarz<sup>5</sup> and Mensink et al,<sup>12</sup> but contrast with those of Precious et al,<sup>6</sup> Mehra et al,<sup>7</sup> Kriwalsky et al,<sup>9</sup> and Doucet et al,<sup>14</sup> and this demonstrates the disparity in the literature regarding this subject.

Amongst the 61% of respondents who recommend pre-BSSO third molar removal, there was significant variation in the time between removal of the lower third molars and BSSO. Due to the nature of the data obtained in this study, it is not possible to say whether there is a relationship between unfavourable fracture rates and time between removal of lower third molars and BSSO. This area has not been extensively researched to date, and a randomised controlled trial may be useful in determining whether there is a link between the risk of unfavourable fractures during BSSO and the pre-operative timing of lower third molar removal.

Three respondents commented that they remove lower third molars pre-BSSO to facilitate bicortical screw placement at the time of surgery. This corresponds with the opinion of Beukes et al<sup>15</sup> who recommended removal of lower third molars 9 months pre-BSSO, as they believed that removal during BSSO weakened the retromolar part of the distal segment and complicated bicortical screw fixation. However it should be noted that in their series of 74 BSSOs there were no unfavourable fractures.

Only 4 respondents felt that the presence of third molars at the time of BSSO would result in an increased risk of altered sensation of the inferior alveolar nerve. The perceptions of the majority of the respondents therefore correlate with the findings of Mensink et al,<sup>16</sup> who found no effect on the rate of hypoaesthesia if the third molars were removed at the same time as BSSO. Doucet et al found concomitant removal of third molars reduced sensory disturbance at 3 and 6 months post-operatively, in their series of 120 cases.<sup>17</sup> This is attributed to the presence of lower third molars decreasing the rate and severity of



neurovascular bundle entrapment, thus reducing the requirement for manipulation of the inferior alveolar nerve.

This was a cross-sectional survey covering the whole of the UK and had a 69% response rate, although it was a retrospective study and relied on self-reporting of complication rates - therefore the complication rates quoted cannot be considered as evidence for or against the pre-surgical removal of lower third molars. Ideally a prospective study would have been carried out, however this would have resource implications and would increase the burden for individual surgeons, potentially resulting in a lower response rate.

The BSSO can be a challenging and technique-sensitive procedure, and the likelihood of complications depends on a host of factors aside from the presence or absence of lower third molars, including surgical technique, planned movements, patient age and individual anatomy. However this study quantifies and highlights the variation in opinions regarding the pre-BSSO removal of lower third molars amongst UK OMFS consultants. To enable surgeons to make informed decisions regarding the most appropriate management for each patient, there is a requirement for further high quality studies to provide objective evidence regarding the risks and benefits of pre-operative lower third molar removal. Surgeons should audit their individual practice, and the BOS/BAOMS Minimum Dataset Proforma for Surgical-Orthodontic Patients may be useful for this.<sup>18</sup>

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