

Predicting the choice of anaesthesia for third molar surgery – guideline or the easy-line?

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IN BRIEF

- Shows that a maxillofacial environment is more likely to lead to the prescription of general anaesthetic for third molar removal than a pure oral surgery clinic.
- Promotes risk reduction by discouraging the use of general anaesthesia for third molar surgery.
- Recognises that choice of anaesthesia is dependent on multiple factors.
- Highlights IV sedation as a useful and safe modality for anxiety management.

Objective To observe trends in choice of anaesthetic for mandibular third molar surgery in the Combined Department of Oral and Maxillofacial Surgery and Oral Medicine, based at the Edinburgh Dental Institute (EDI) and St John's Hospital (SJH) in Livingston. **Method** Data were collected retrospectively from electronic patient records for 301 consecutive new referrals for mandibular third molar surgery from general dental practitioners to each of the oral and maxillofacial departments in the EDI and SJH from the 1 September 2009 onwards. Date of consultation, grade of assessing clinician, age, gender, postcode, required surgical procedure, choice of anaesthetic and predicted difficulty of procedure were analysed. **Results** One hundred and fifty patients were seen at the EDI and 151 at SJH. There was no statistically significant difference in the proportion of male and female patients or age of patients presenting at each site. Seventeen patients (11.3%) were listed for a general anaesthetic, 21 (14%) for conscious intravenous sedation and 112 (74.7%) for local anaesthetic at EDI. At SJH 57 patients (37.7%) were listed for a general anaesthetic, 30 (19.9%) for conscious intravenous sedation and 64 (42.4%) for local anaesthetic. There was only a small difference in the difficulty of cases at the two sites, though there was a significant difference in socioeconomic deprivation between the two populations. **Conclusions** Significantly more general anaesthetics are being prescribed for mandibular third molar surgery at SJH than the EDI. This finding is not related to difficulty of the cases presenting at each site but may be related to the nature of a maxillofacial clinic compared to a dedicated oral surgery centre. The difference in socioeconomic deprivation may have had an impact on patient decisions.

INTRODUCTION

Third molar surgery is thought to be the procedure most commonly performed by oral and maxillofacial surgeons.¹ Most patients are able to accept such surgery under local anaesthetic. However, a significant number of patients are fearful of such treatment and require additional conscious intravenous sedation or a general anaesthetic.² Although deaths are uncommon during or immediately after general anaesthesia for dental treatment, they are more likely to occur than with other pain and anxiety reduction methods.³

Between 1996 and 1999 eight deaths were recorded in the United Kingdom as a result of dental anaesthesia. Following this, the General Dental Council (GDC),

the Royal College of Anaesthetists and the Department of Health issued closely related guidelines for the standards of care in general anaesthesia for dentistry.⁴ The guidelines emphasised that general anaesthesia is always accompanied by some risk and should be limited to:

- Patients who are unable to cooperate due to immaturity or physical/mental disability
- Patients in whom local anaesthetic has repeatedly proven to be unsuccessful or is unlikely to work due to extent of surgery or presence of infection
- Patients with history of hypersensitivity to contents of local anaesthetic ampoule
- Patients who are extremely nervous and refuse to undergo dental treatment while conscious.⁴

The aim of this investigation was to observe trends in choice of anaesthetic for mandibular third molar surgery in the Combined Department of Oral and Maxillofacial Surgery and Oral Medicine,

which is based across two sites: the Edinburgh Dental Institute (EDI), a dedicated oral surgery outpatient facility, and St John's Hospital (SJH) in Livingston, the regional Oral and Maxillofacial unit in a district general hospital. We attempted to answer the following questions:

- What proportion of patients are listed for general anaesthesia, conscious intravenous sedation and local anaesthetic?
- Is there a significant difference in choice of anaesthetic in patients seen at the EDI and SJH?
- What are the predictors for choice of anaesthetic?

METHOD

Data were collected retrospectively from electronic patient records. The selected cases were 301 consecutive new referrals for mandibular third molar surgery from general dental practitioners to each of the oral and maxillofacial departments in the EDI and SJH, from the 1 September 2009 onwards. The following information was

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collected: date of consultation, grade of assessing clinician, age, gender, post-code, required surgical procedure, choice of anaesthetic and predicted difficulty of procedure.

The predicted difficulty of extraction was assessed using a preoperative panoramic radiograph and the WHARFE scoring system described by MacGregor.⁵ The system considers: Winter's classification, height of the mandible, angle of the second molar, root shape and development of the third molar, follicle size and exit path of the third molar. The resulting score ranges between 0–15, with higher scores indicating increased surgical difficulty. The scores were calculated by a single investigator for reliability. A sample of 20 radiographs was reassessed by a second investigator to exclude bias. For patients who required extraction of both lower third molars, the higher score was recorded. The Scottish Index of Multiple Deprivation (SIMD) was used to derive social status from the postcode.

RESULTS

Population

A total of 301 patients were included in the study. One hundred and fifty patients were seen at the EDI, 77 female (51.3%) and 73 male (49.7%), with a mean age of 32 years (range 17–68 years old). A total of 151 patients were seen at SJH, 94 female (62.3%) and 57 male (37.7%), with a mean age of 30.3 years (range 14–65 years old) (Table 1). A chi-squared test showed there was no statistically significant difference in the proportion of male and female patients presenting at each site ($p = 0.07$). The age of patients presenting at the two sites was also not statistically significantly different as shown by a Mann-Whitney U test for significance ($p = 0.3544$).

Decision regarding choice of anaesthetic

At the EDI, 17 patients (11.3%) were listed for a general anaesthetic, 21 (14%) for conscious intravenous sedation and 112 (74.7%) for local anaesthetic. At SJH, 57 patients (37.7%) were listed for a general anaesthetic, 30 (19.9%) for conscious intravenous sedation and 64 (42.4%) for local anaesthetic (Table 1).

There was a highly statistically significant difference in the choice of general

Table 1 Population characteristics in the two sites

Parameter		EDI	SJH	Statistical difference
Population	Male	73 (49.7%)	57 (37.7%)	No difference
	Female	77 (51.3%)	94 (62.3%)	
Choice of anaesthetic	GA	17 (11.3%)	57 (37.7%)	$p = <0.0001$
	IV/LA	133 (88.7%)	94 (62.3%)	
WHARFE	Mean	5	5.6	$p = 0.001$
SIMD	Mean	6.8	5.4	$p = 0.0001$

Key: EDI = Edinburgh Dental Institute; SJH = St John's Hospital

Table 2 Predictive factors in choice of anaesthetic

		GA (EDI + SJH)	IV/LA (EDI + SJH)	Statistical difference
Mean WHARFE		5.77	5.16	$p = 0.01$
Mean SIMD		5.4	6.4	$p = 0.0068$
Assessing clinician (n)	Consultant (30)	12 (40%)	18 (60%)	$p = 0.0149$
	Trainee (167)	31 (18.6%)	136 (81.4%)	
	Staff Grade (104)	31 (29.8%)	73 (70.2%)	$p = 0.0375$
	Trainee (167)	31 (18.6%)	136 (81.4%)	
	Consultant (30)	12 (40%)	18 (60%)	No difference
	Staff Grade (104)	31 (29.8%)	73 (70.2%)	

Key: (n) = total number of patients assessed; EDI = Edinburgh Dental Institute; SJH = St John's Hospital

anaesthetic *versus* other modalities at SJH compared to the EDI. A chi-squared test with Yates correction gave a value of 26.912 and p value <0.0001 . The relative risk of a general anaesthetic *versus* other modalities at SJH is 1.86 with a 95% confidence interval of 1.5–2.26.

Predicted difficulty of extraction

WHARFE values for EDI patients were a mean of 5 and a median of 5 (SD 1.8). The WHARFE values for SJH were a mean of 5.6 and a median of 6 (SD 1.9). This small difference in WHARFE values is highly statistically significant at $p = 0.001$ using a Mann-Whitney U test.

Of all patients having a general anaesthetic (ie EDI + SJH), the mean WHARFE value was 5.77 and the median was 6 (SD 1.9). Of all the patients having local anaesthetic with/out additional intravenous sedation, the mean WHARFE value was 5.16 and the median was 5 (SD 1.8). There is a small difference in difficulty of the cases between the two populations with general anaesthetic cases being more difficult. A Mann-Whitney U test showed

this difference to be statistically significant ($p = 0.01$) (Table 2).

Effect of deprivation (SIMD index)

The mean SIMD decile for patients at the EDI is 6.8 and the median is 7 (SD 2.7), however, the mean for SJH is 5.4 and median is 5 (SD 2.7). The difference in SIMD deciles between the two sites is highly statistically significant using a Mann-Whitney U test at p value <0.0001 .

For all patients having a general anaesthetic, the mean SIMD decile was 5.4 (SD 2.7) and the median was 5. For patients having local anaesthetic with/out additional intravenous sedation the mean SIMD decile was 6.4 (SD 2.8) and the median was 7. The difference in SIMD decile for patients having a general anaesthetic compared to other modalities is highly statistically significant (shown by a Mann-Whitney U test) at p value = 0.0068 (Table 2).

Effect of grade of assessing clinician

There was an association between the grade of assessing clinician and the

choice of anaesthesia. A Fisher's exact test showed that there is a significant difference in referral patterns for general anaesthetic between consultants and trainees ($p = 0.0149$, relative risk 2.155) and staff grades (SAS) and trainees ($p = 0.0375$, relative risk 1.606) but no significant difference between consultants and SAS ($p = 0.3747$) (Table 2).

DISCUSSION

The decision to undertake mandibular third molar surgery under a general anaesthesia should be based on current guidelines, application of clinical experience and judgement, and should involve the patient. It is important that only those who require general anaesthesia are listed and local anaesthesia with/out intravenous sedation should be used in preference.⁶ The GDC recommends that other methods of pain and anxiety control are considered and discussed with the patient before opting for a general anaesthetic.⁷ Patients should be aware of and understand the inherent risks associated with general anaesthesia.⁷

Following the introduction of clinical guidelines^{3,7,8} there has been a decline in third molar surgery under general anaesthesia and an increase in the number of patients being treated under local anaesthesia with conscious intravenous sedation. Studies before the release of such guidelines show that the majority of patients requiring third molar removal were treated under general anaesthesia and a minority were treated with intravenous sedation. Lopes *et al.*⁹ found that in a cohort of 522 patients, 52.7% had surgery under general anaesthesia, 44% under local anaesthesia and 3.5% with additional intravenous sedation. In a further study by Edwards *et al.*² in patients requiring third molar surgery 62% were listed for general anaesthesia, 32% for local anaesthesia and 6% with additional intravenous sedation. A comparative study of practice in Scotland before and after the introduction of new guidelines showed a significant decline in general anaesthesia for third molar surgery (from 54% in 1995 to 30% in 2002) and an increase in the use of intravenous sedation (35% in 1995 to 54% in 2002) after introduction of the guidelines.¹⁰

The present study compared the practice of two distinct operational sites of the same department. The department of Oral

Surgery at the EDI is an outpatient training centre that lacks onsite theatre facilities for general anaesthetic. It is staffed by trainees (including senior house officers, postgraduate students and specialty registrars), SAS and predominantly oral surgery consultants. Patients requiring general anaesthesia are treated in a daycare facility at a distant site in Edinburgh. The department of Oral and Maxillofacial surgery at SJH is a regional unit for maxillofacial surgery within a district general hospital. It is staffed by trainees (senior house officers), staff grades and maxillofacial consultants. Both units offer treatment under local anaesthesia with/out conscious intravenous sedation on an outpatient basis.

The populations presenting at the EDI and SJH were similar with regard to age and gender distribution. However, patients seen at SJH are almost twice as likely to be listed for general anaesthesia (relative risk 1.86) than those seen at the EDI. It is generally accepted that general anaesthesia is reserved for cases of greater surgical difficulty as well as for anxiety management. However, this study has shown patients presenting at SJH have a mean higher WHARFE value of 0.6 compared to those at the EDI. The difference in WHARFE values of teeth presenting at the two sites was statistically significant, however, it is highly unlikely that 0.6 represents a clinically significant increase in difficulty.⁵ It has been shown that it is difficult to estimate the complexity of surgical removal based only on a radiograph and the best time to assess difficulty of extraction is during the operation.¹¹

The WHARFE method of assessing third molars therefore has limitations and discrepancies between predicted difficulty and estimated difficulty of surgery have been noted.² Therefore, in the data presented here it is unlikely that such a small mean difference in difficulty of cases is responsible for the great difference in the prescription of general anaesthesia between the two sites.

The Scottish Index of Multiple Deprivation (SIMD) 2009¹² provides a relative measure of deprivation across all of Scotland. It combines 38 indicators across 7 domains, namely: income, employment, health, education, skills and training, housing, geographic access and crime. The overall index is a weighted sum of

the seven domain scores.¹² A two decile difference is seen in patients presenting at the two sites with patients at SJH coming from areas of greater social deprivation. This observed difference achieved statistical significance. The data presented here show that SIMD decile is a predictor for choice of anaesthetic, with patients from a lower SIMD decile more likely to have a general anaesthetic.

Finally, the grade of assessing clinician was also found to be a predictor of choice of anaesthetic. Trainee grades are less likely to prescribe a general anaesthetic compared to SAS or consultant grade clinicians. This differs to previous studies where consultants were found to be more likely to list patients for local anaesthesia.²

The data presented here are in keeping with a similar study comparing three oral and maxillofacial departments in the West Midlands. Kim *et al.*¹³ found that the larger, hospital-based maxillofacial units used general anaesthesia extensively for third molar surgery, whereas a smaller unit without access to theatre facilities and staffing depended predominantly on local anaesthesia and conscious intravenous sedation.¹³ A similar scenario exists in the present study where the two sites assessed have access to different resources. The decision to treat under sedation or general anaesthesia depends on a number of factors and may well be influenced by available local resources. Easy access to general anaesthesia may lead to less patients being treated under sedation and vice versa.¹⁴

General anaesthesia is associated with greater risk to patients than other anxiety control methods and is also far more expensive. The average cost per patient for a general anaesthetic in the United Kingdom is higher than for treatment with conscious intravenous sedation, which is far more cost effective.¹⁵ With conscious intravenous sedation there is a higher rate of patient turnover at less expense¹³ and reduced post surgical morbidity.¹⁶ In addition, Edwards *et al.*¹⁷ showed that patients treated under general anaesthesia took more time off work postoperatively than those treated under local anaesthesia and suggested that patients treated under general anaesthesia make increased postoperative demands on primary care services.

Patients should be actively discouraged from receiving dental treatment (including

oral surgery) under general anaesthesia.¹⁸ Conscious sedation should be considered a viable alternative to general anaesthesia.

CONCLUSION

Significantly more general anaesthetics are being prescribed for mandibular third molar surgery at the regional Maxillofacial centre at SJH than at the dedicated Oral Surgery facility at the EDI. This finding is not related to difficulty of the cases presenting at each site but may be related to the nature of a maxillofacial clinic compared to a dedicated oral surgery centre. Career grade staff are more likely to prescribe general anaesthesia for third molar removal than trainees and again this finding may be related to the nature of working at each site. Patient choice is also important; with patients from areas of greater social deprivation apparently making 'less healthy' choices.

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