

Nerve injury associated with orthognathic surgery. Part 1: UK practice and motor nerve injuries

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Abstract

The head and neck is anatomically complex, and several nerves are at risk during orthognathic operations. Some injuries to nerves are reported more commonly than others. To find out what consultant surgeons tell their patients about the prevalence of common nerve injuries before orthognathic operations, we did a postal survey of fellows of the British Association of Oral and Maxillofacial Surgeons (BAOMS). We also reviewed published papers to find out the reported incidence of injuries to cranial motor nerves during orthognathic operations. Only injuries to the facial nerve were commonly reported, and we found only case reports about injuries to the oculomotor, abducens, and trochlear nerves. The risk of temporary facial nerve palsy reported was 0.30/100 nerves (95% CI 0.23 to 0.50) and permanent facial nerve palsy was 0.06/100 nerves (95% CI 0.02 to 0.15).

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Introduction

The head and neck is anatomically complex with intricate associations between the nerves serving structures in the region. Reports of injuries to nerves close to the surgical site are more common than injuries to those that are more distant. When obtaining informed consent for an operation it is important to provide information on the risks and complications associated with the procedure.¹ The likelihood of a risk occurring and its perceived morbidity will affect the patient's decision.

In the first part of this 3-part series we report what consultant oral and maxillofacial surgeons (OMFS) in the United Kingdom (UK) tell their patients about the risk of nerve

injury before bimaxillary osteotomy, and present a systematic review and meta-analysis, where appropriate, of the reported incidence of injuries to motor nerves after orthognathic operations.

In parts 2 and 3 we will examine the incidence of sensory disturbance of the cranial nerves after orthognathic operations.^{2,3}

Methods

Postal survey

We identified practicing consultant OMF surgeons in the UK from the website of the British Association of Oral and Maxillofacial Surgeons (BAOMS), and sent them questionnaires to find out what information they gave to patients in writing about the complications of orthognathic operations, and

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Table 1
Risk of common nerve injuries during orthognathic operations quoted by consultant oral and maxillofacial surgeons in the UK.

	No. (%) replies	Mean (SD) percentage risk quoted	Range reported (%)
Facial nerve:			
Temporary	2 (1.69)	2.5 (2.12)	1 - 4
Permanent	2 (1.69)	0.5 (0.71)	0 - 1
Infraorbital nerve:			
Temporary	50 (42.37)	54.32 (35.77)	1 - 100
Permanent	52 (44.07)	1.92 (2.91)	0 - 10
Inferior alveolar nerve:			
Temporary	85 (72.03)	78.38 (28.67)	4 - 100
Permanent	97 (82.20)	11.77 (9.36)	0 - 50
Lingual nerve:			
Temporary	31 (26.27)	24.84 (35.92)	0 - 100
Permanent	32 (27.12)	5.48 (9.67)	0 - 50

what risk of injury, both temporary and permanent, to the facial, infraorbital, inferior alveolar, and lingual nerves, they quoted. The reference operation was a bimaxillary osteotomy consisting of a maxillary Le Fort I advancement and a bilateral sagittal split mandibular setback osteotomies.¹

Review

We searched Medline and PubMed using the terms orthognathic surgery, maxillary osteotomy, mandibular osteotomy, complications, morbidity, and nerve injury. References were identified, and these textbooks were searched for further references. Searches were limited to papers in the English language.

Data were collected on a Microsoft Excel® spreadsheet, and statistical analysis was done with the help of StatsDirect® (StatsDirect Ltd, Altrincham, UK).

Results

Postal survey

We received 230 replies (66.3%). A total of 114 surgeons did orthognathic operations (49.6%) and 116 (50.4%) did not. The results of those who did orthognathic operations and answered the specific questions on the risk quoted for nerve injury are given in Table 1. Many replies were incomplete, possibly because surgeons do not quote specific percentages of risk, particularly for less common injuries.

The highest and lowest figures varied considerably among surgeons, for example, from 0 to 100% for temporary paraesthesia of the lingual nerve, and from 1% to 50% for permanent injury to the lingual and inferior alveolar nerves.

Review of published papers

In orthognathic operations the motor nerve most commonly injured was the facial nerve. Only injuries to this nerve were analysed statistically. We found many case reports about facial nerve palsy,⁴⁻¹³ and enough case series to do a statistical analysis.¹⁴⁻²⁴ Table 2 shows the incidence/100

nerves of temporary dysfunction, and Table 3 the incidence/100 nerves of permanent dysfunction. Permanent was defined as an injury that persisted for more than 12 months.

We identified 7492 osteotomy sides for analysis, including extraoral vertical ramus osteotomies (VRO) and sagittal split osteotomies (SSO). The risk of temporary facial nerve palsy reported was 0.30/100 nerves (95% CI 0.23 to 0.50) and permanent facial nerve palsy 0.06/100 nerves (95% CI 0.02 to 0.15).

The incidence of temporary dysfunction after extraoral VRO was higher than after SSO, but not significantly so ($p=0.06$). However, the incidence of permanent dysfunction after extraoral VRO was significantly higher than after SSO ($p=0.0016$).

Other injuries to cranial motor nerves have been described and these are shown in Table 4.

Discussion

As the cranial nerves run through and in close proximity to the facial skeleton, they are at risk of injury during several stages of oral and maxillofacial operations. Informed consent for operation must include a discussion of the risks associated with the procedure and the likelihood and consequence of them occurring. Opinions vary about the specific risks that should be included, but it is becoming clear from case law in England that a risk associated with substantial inconvenience or one that may be considered important by the patient, should be discussed even if rare, whilst more common complications with low morbidity that do not affect patients substantially, need not be discussed in detail.¹ Ideally, figures from personal audits of surgical results would be used, but this may not be possible with less common injuries, and surgeons therefore rely on published reports for the necessary information.

The most commonly reported cranial motor nerve to be injured during orthognathic operations is the facial nerve,⁴⁻²³ although the cause is often not clear. Dendy suggested 3 possible mechanisms: compression from retractors on the medial ramus, fracture of the styloid process with posterior movement, and direct pressure as a result of retraction of the distal segment.⁵

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