

Mini/micro screw implantation for orthodontic anchorage

Interventional procedures guidance

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www.nice.org.uk/guidance/ipg238

Your responsibility

This guidance represents the view of NICE, arrived at after careful consideration of the evidence available. When exercising their judgement, healthcare professionals are expected to take this guidance fully into account. However, the guidance does not override the individual responsibility of healthcare professionals to make decisions appropriate to the circumstances of the individual patient, in consultation with the patient and/or guardian or carer.

Commissioners and/or providers have a responsibility to implement the guidance, in their local context, in light of their duties to have due regard to the need to eliminate unlawful discrimination, advance equality of opportunity, and foster good relations. Nothing in this guidance should be interpreted in a way that would be inconsistent with compliance with those duties.

Commissioners and providers have a responsibility to promote an environmentally sustainable health and care system and should assess and reduce the environmental impact of implementing NICE recommendations wherever possible.

1 Guidance

1.1 There is limited evidence that mini/micro screw implantation provides adequate

orthodontic anchorage and there are no major safety concerns. Therefore, clinicians wishing to use this procedure should do so with normal arrangements for clinical governance.

- 1.2 During the consent process clinicians should ensure that patients understand that there is a failure rate associated with the use of mini/micro screws and that the success of dental alignment cannot be guaranteed. They should provide patients with clear, written information. In addition, use of the Institute's [information for patients](#) ('Understanding NICE guidance') is recommended.
- 1.3 Evidence about optimal screw size and site of implantation (upper/lower jaw or buccal/lingual side of the bone) is limited. Therefore, further audit and research to clarify these issues would be useful (see section 3.1).

2 The procedure

2.1 Indications

- 2.1.1 Some orthodontic procedures require a fixed anchorage point to which a force can be applied in order to move teeth that are malpositioned, misaligned or impacted. The teeth requiring realignment may be located in the upper or lower jaw. Treatment may require force to be applied in any direction, and over a range of time periods.
- 2.1.2 There are several methods for providing anchorage points for orthodontic treatment. The choice of method depends on the required site of anchorage and the direction and degree of the force to be applied. Usually, anchorage is achieved using the support of other teeth, but the forces of orthodontic treatment may cause unintended, iatrogenic movement in these teeth. External head gear can be employed to provide anchorage, although this may not be aesthetically acceptable to some patients. Surgically inserted osseointegrated dental implants can also be used to provide anchorage points, although a healing period is required before orthodontic force can be applied.

2.2 Outline of the procedure

- 2.2.1 Orthodontic screw systems can be used when sufficient anchorage cannot be achieved from existing teeth. Screws (referred to interchangeably in the

literature as mini or micro) are typically 1–2 mm in diameter and 8–15 mm in length, self-tapping or self-drilling, titanium alloy or stainless steel, and consist of a body that connects to the bone, a neck that protrudes through the gum mucosa and a head suitable for connection to orthodontic loading systems. However, various dimensions and types of screws are used and there is no universal agreement about how these are classified.

- 2.2.2 The procedure may be performed under local anaesthesia. A pilot hole is drilled into the maxilla or mandible where necessary, and the screw is inserted into the alveolar bone. For some screws a mucoperiosteal flap is created in the gum to aid insertion. More than one screw can be inserted if necessary. Orthodontic loading can be achieved immediately after insertion, although it is often undertaken at a subsequent visit.
- 2.2.3 Following completion of orthodontic treatment, the screws can be extracted (often without anaesthesia) and any incision sites are normally expected to heal spontaneously. The screws can be replaced if necessary.

2.3 Efficacy

- 2.3.1 Across four case series of 44, 29, 58 and 87 patients, screw implantation was reported to be successful (usually defined as stable anchorage for 1 year or until completion of orthodontic treatment) in 0–85%, 85%, 81–89% and 92% (208/227) of screws, respectively (absolute figures presented where available). Success rates varied with the type of screw used. The case series of 87 patients fitted with 227 screws reported no statistically significant difference in success rates for four different screw types at 15-month follow-up ($p = 0.154$; success rates varied from 80% to 94%). This series reported that the success rate was significantly higher for screws inserted into the maxilla (96%; 119/124) compared with the mandible (86%; 89/103) ($p = 0.01$). Another case series of 98 patients fitted with 140 screws reported that the overall success rate (defined as anchorage stability with no morbidity) was 84% (118/140).
- 2.3.2 A further case series of 85 patients fitted with 239 screws reported that the average rate of anchorage loss decreased significantly, from 23% (31/133) in one patient group to 5% (5/106) in a subsequent group, once parameters for the selection of screw size and site of insertion had been refined ($p < 0.001$). For more details, refer to the 'Sources of evidence' section.

- 2.3.3 Two Specialist Advisers considered the procedure to be novel and of uncertain safety and efficacy; one considered it to be an established procedure. They noted that only data from case series are currently available to support the efficacy of the procedure, but that two randomised controlled trials are underway in the UK.

2.4 Safety

- 2.4.1 In seven case series, the rate of screw failure (breakage) ranged from 3% (2/59) to 4% (8/227).
- 2.4.2 A case series of 85 patients (239 screws inserted) reported that no patients suffered haemorrhage, abscess formation or tooth injury (follow-up period unclear).
- 2.4.3 Two case series reported that there were no instances of contact with tooth roots during the procedure in 175 screw insertions relating to 87 patients. For more details, refer to the 'Sources of evidence' section.
- 2.4.4 The Specialist Advisers considered adverse events to be discomfort on screw placement and screw failure or loosening. Other theoretical complications were pain, infection, nerve damage and damage to the roots of adjacent teeth.

3 Further information

- 3.1 This guidance requires that clinicians undertaking the procedure make special arrangements for audit. The Institute has identified relevant audit criteria and developed an [audit tool](#) (which is for use at local discretion).

Andrew Dillon
Chief Executive
November 2007

Sources of evidence

The evidence considered by the Interventional Procedures Advisory Committee is described in the following document.

'Interventional procedure overview of mini/micro screw implantation for orthodontic anchorage', March 2007.

Information for patients

NICE has produced [information describing its guidance on this procedure for patients and their carers](#) ('Understanding NICE guidance'). It explains the nature of the procedure and the decision made, and has been written with patient consent in mind.

4 About this guidance

NICE interventional procedure guidance makes recommendations on the safety and efficacy of the procedure. It does not cover whether or not the NHS should fund a procedure. Funding decisions are taken by local NHS bodies after considering the clinical effectiveness of the procedure and whether it represents value for money for the NHS. It is for healthcare professionals and people using the NHS in England, Wales, Scotland and Northern Ireland, and is endorsed by Healthcare Improvement Scotland for implementation by NHSScotland.

This guidance was developed using the NICE [interventional procedure guidance](#) process.

We have produced a [summary of this guidance for patients and carers](#). Tools to help you put the guidance into practice and information about the evidence it is based on are also [available](#).

Changes since publication

14 January 2012: minor maintenance.

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Implementation of this guidance is the responsibility of local commissioners and/or providers. Commissioners and providers are reminded that it is their responsibility to implement the guidance, in their local context, in light of their duties to avoid unlawful discrimination and to have

regard to promoting equality of opportunity. Nothing in this guidance should be interpreted in a way which would be inconsistent with compliance with those duties.

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Endorsing organisation

This guidance has been endorsed by [Healthcare Improvement Scotland](#).