

# Exposure of unerupted palatal canines: A survey of current practice in the United Kingdom, and experience of a gingival-sparing procedure

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## Abstract

Patients with impacted ectopic canines often present to Orthodontic and Oral and Maxillofacial units, with 85% being displaced palatally. Current orthodontic opinion suggests that the creation of adequate space ultimately allows the spontaneous eruption of most impacted canines, but we are often requested to operate to facilitate their eruption. There are several approaches, techniques that vary depending on whether orthodontically assisted or spontaneous eruption is expected. There are few publications that describe either the techniques or their merits. We have used a gingival-sparing technique for more than 10 years in this unit. To determine current practice, we carried out a national postal survey of consultant oral and maxillofacial surgeons and staff grade/associate specialists. A total of 564 questionnaires were sent, and 353 replies were received (63%). There was considerable variation in the design of mucosal flaps used for exposure of the canines. Only 9% of clinicians avoided the gingival margin of the adjacent erupted teeth during operation. We describe this unit's practice of sparing the gingival margins, and highlight the merits of this technique.

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## Introduction

Canine teeth become impacted in 1–2% of the white population, and 85% are displaced palatally.<sup>1</sup> Techniques to expose palatal canines are either open, which involve orthodontic alignment of the tooth above the mucosa, or closed, when the canine is aligned beneath the mucosa.<sup>2</sup> Patients are referred to this clinic from orthodontists who work in both primary and secondary care, and request open exposure to allow spontaneous eruption; our surgical techniques have reflected this for more than 10 years.<sup>3</sup> We have preferred a conservative gingival-sparing approach. Recently it has become apparent

that surgical techniques for open exposure of palatal canines vary among operators even within our own region.

To find out what current practice was in the UK we sent a questionnaire to consultant oral and maxillofacial surgeons and specialist surgical grades included on the BAOMS directory of Oral and Maxillofacial Units.

## Methods

The questionnaire was mailed anonymously to 564 consultants, associate specialists, and staff grade practitioners who were listed on the British Association of Oral and Maxillofacial Surgeons list of maxillofacial units in the UK. The questionnaire showed diagrams of the four most com-

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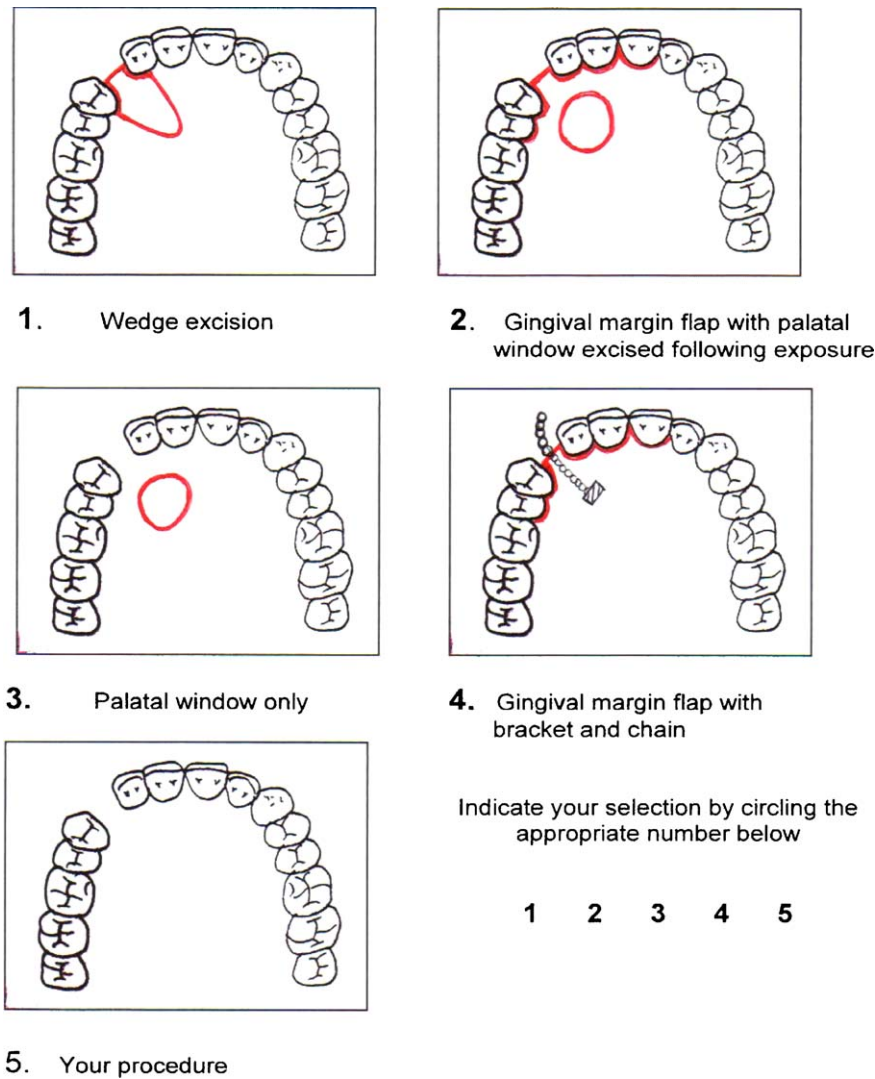


Fig. 1. The questionnaire.

monly used procedures for the exposure of palatal canines (Figs. 1 and 2). A further image was included to allow respondents to illustrate their own technique if it was not already shown. Respondents were asked to indicate which surgical

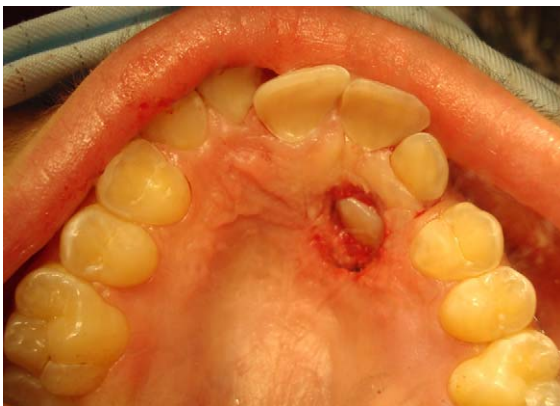


Fig. 2. Gingival-sparing exposure of 23.

procedures they used, and – where appropriate – the dressings. The grade of the clinician who completed the form was also requested.

The procedures shown on the questionnaire were:

1. A full thickness palatal mucoperiosteal flap is raised from the gingival margins sufficient to allow exposure of the unerupted canine crown. After removal of the overlying soft and hard tissue, a wedge of the raised mucosa is excised over the canine crown to the gingival margin of the flap; the flap is replaced and a dressing placed.
2. A full thickness palatal flap is raised from the gingival margin as in procedure 1. The remaining tissues overlying the canine crown are removed, but a window of tissue overlying the canine crown is excised and the flap replaced, usually with a dressing over the exposed crown, rather than removing a wedge of tissue including the gingival margins of the adjacent teeth.

3. This is the gingival-sparing procedure that we use, which is described in detail below.
4. A full thickness palatal gingival margin flap is raised and the tissues overlying the canine crown are removed as in procedures 1 and 2. A low profile orthodontic bracket with a gold chain attached is bonded to the canine crown. The overlying tissue is not excised. Bonding is usually to the palatal aspect of the crown, but in a rotated tooth may be to the most accessible proximal surface. The flap is replaced with the chain, which is positioned from the canine into the mouth through the incision into the gingival margin at the future position of the tooth. The free end of the chain is retained with composite to an adjacent tooth, sutured to the mucosa, or attached to the arch wire if present.

#### *Surgical technique for the gingival-sparing approach*

Preoperatively the position of the canine is assessed both clinically and radiographically.

A full thickness mucoperiosteal oval of tissue overlying the crown is excised under either local or general anaesthesia with a 15C blade. Bone and follicular tissue overlying the crown is removed with hand instruments. Rotary instrumentation may occasionally be required to remove the overlying bone. Exposure is complete when the tip of the cusp and the maximum convexity of the crown are uncovered. After haemostasis a Coe-pak™ dressing is placed, retained with sutures or a cover plate. Coe-pak™ Automix NDS is dispensed from the mixing delivery gun and the periodontal dressing is placed directly over the exposed crown. Pressure with a finger and a separating agent is then applied to smooth the dressing flush to the palatal mucosa. If a cover plate is used, the periodontal dressing should be delivered directly into the cover plate before placement.

The patient should be reviewed between five and seven days later, the dressing removed, and the patient shown how to keep it clean. Orthodontic follow-up should be arranged for six months later.

## Results

A total of 565 questionnaires were sent out, 343 to consultants and 221 to staff grade and associate specialists (SAS grades). Of these, 354 replies were received (63%), 346 of which (98%) provided enough information to allow inclusion in the survey. Of the replies included, 199 (58%) were from consultants, 37 (11%) from SAS grades, and 10 (3%) did not including the grade of the respondent.

A total of 240 clinicians (69% of the respondents) selected a single procedure, the remainder chose combinations of the procedures described (Tables 1 and 2).

The results show that over half the respondents included the closed exposure technique in their practice, with the remaining 45% never doing a closed procedure. However, 7 clinicians placed an orthodontic bracket during an open expo-

Table 1  
Number (%) of clinicians selecting a single or multiple procedures ( $n = 346$ ).

Procedure (Fig. 1) <sup>a</sup>	No (%) of procedures
<b>A</b>	
1	84 (24)
2	35 (10)
3	19 (6)
4	99 (29)
Other	3 (1)
<b>B</b>	
Two:	
1 and 2	5 (1)
1 and 4	46 (13)
2 and 4	34 (10)
3 and 4	3 (1)
3 and 2	3 (1)
Multiple:	
1, 2, and 4	6 (2)
1, 3, and 4	3 (1)
2, 3, and 4	2 (<1)
1, 2, 3, and 4	4 (1)

<sup>a</sup> 1 = wedge excision; 2 = gingival margin flap with palatal window excised after exposure; 3 = palatal window only; and 4 = gingival margin flap with bracket and chain.

sure. A total of 247 (71%) did an open exposure, and among these well over half also did the wedge excision (procedure 1). Despite the more extensive loss of tissue. Half included conservative removal of tissue (procedures 2 and 3), but most included a palatal gingival margin flap to provide access to the impacted tooth before excision. Only a few did not include the gingival margins on adjacent teeth in either the flap or margins of excision.

Whitehead's varnish and Coe-pak™ were the dressings most commonly used, being almost equal in both the group with wedge excision and those with a palatal flap with window excision. The use of Coe-pak™ is usually described in the palatal window only procedure, and this is the dressing preferred in our unit. Other dressings included BIPP, Surgicel™, bone wax, and Septoplast™ (Table 3).

We made a retrospective study of all palatal canines exposed over a 3-year period (2005–2008). The first orthodontic follow-up was up to nine months postoperatively, so we were unable to assess the time of eruption. Of the 247

Table 2  
Number (%) of clinicians who included or excluded individual techniques from their practice ( $n = 346$ ).

	Included in techniques used	Never included
Palatal flap and wedge excision (procedure 1)	148 (43)	198 (57)
Palatal flap and window excision (procedure 2)	89 (26)	257 (74)
Palatal window only, no flap (procedure 3)	34 (10)	312 (90)
Closed exposure (procedure 4)	189 (55)	157 (45)

Table 3

Results for the use of dressings are taken from the replies that indicated that a single procedure alone was used.

Procedure <sup>a</sup>	Dressing placed	Coe-pak <sup>TM</sup> with sutures	Coe-pak <sup>TM</sup> with cover plate	Whitehead's varnish pack	Other dressing
1	67/82	5	25	32	6
2	28/35	3	11	13	2
3	20/22	5	11	6	2
4					

<sup>a</sup> 1 = wedge excision; 2 = gingival margin flap with palatal window; and 3 = palatal window only.

canines exposed, nine required a second procedure. Eight were re-exposed and the one that did not erupt spontaneously was removed, giving a re-exposure rate of 3%.

## Discussion

Advances in orthodontic techniques that allow alignment of canines that were previously considered to be unsuitable for treatment have made exposure an option for more patients than previously. Early open exposure allows eruption of the impacted tooth before orthodontic treatment, with the possibility of reducing the duration of active treatment. It may also be used after the orthodontic space has been opened up to allow improvement in the position of the impacted tooth,<sup>4</sup> and to reduce the need for wide access. There is currently no evidence to our knowledge that confirms the superiority of either closed or open exposure.<sup>2</sup>

The continued widespread use of the wedge excision in open exposures is surprising. The importance of excising only keratinised mucosa to minimise periodontal complications was documented as early as 1976,<sup>5</sup> and conservative exposure and natural eruption of the impacted canine has minimal effects on the periodontium.<sup>6–8</sup> Exposure without a palatal flap has provided sufficient access for removal of bone, and the gingival-sparing tissue excision is used by half of the surgeons who use open exposure, which illustrates its adequacy for subsequent spontaneous eruption.

Although a recognised complication of open exposure is the regrowth of palatal soft tissue over the crown of the canine tooth, this can usually be excised under local anaesthesia. Failure of the bond or fracture of the chain in a closed exposure requires a further palatal flap, and bonding of another orthodontic attachment.

Failure rates for closed exposures of 11.4–30.7% have been quoted.<sup>3,9</sup> These results were published in 1997 and 1986, and bonding techniques and materials have advanced since then.

Our re-exposure rate of 3% for open exposures compares favourably with that currently reported (5%).<sup>10</sup> A comparison of methods for retention of the dressing is currently the subject of a randomised control trial within this department. Orthodontists have documented a noticeable change in colour of canine teeth after exposure and orthodontic alignment,<sup>6</sup> most noticeable in a unilateral case. We have also found this to be the case after gingival-sparing surgery and spontaneous eruption. Ferguson<sup>11</sup> described a conservative

approach that seems to have limited acceptance among surgeons who replied to our questionnaire, although it is likely that a similar procedure is practiced for exposure of superficial palatally impacted canines in primary care. Our success with a conservative technique suggests that it merits wider dissemination.

The technique of gingival-sparing has been used successfully in our unit for more than 10 years for both deep and superficially impacted palatal canines. The success of the procedure relies on the premise that the tooth will erupt spontaneously after removal of the overlying tissues. The results in terms of periodontal condition and colour of the canine at least equal those of other techniques, and we hope that a prospective study will confirm this. The procedure is quick and minimally invasive with no need to raise a palatal flap.

Our results suggest that there is no place for the excision of gingival tissue as practiced in the wedge excision. This risks the supporting structures of adjacent teeth, and is unnecessary to expose palatally impacted canine teeth successfully.

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