

A longer tooth, a tooth no lo

Contemporary periodontal surgery by
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When you hear the term periodontal surgery, what do you think of? Is it cutting off tissue (gingivectomy), or flap surgery, or is it bone regeneration? Do you think of long teeth and aesthetic complications?

What you first think of is probably driven by when or where you've graduated, or by personal experience of some of your own patients. In this short article, we hope to provide you with an update of the currently used surgical techniques for treatment of periodontal diseases, as well as an explanation of when and where each might be used.

The question of pocket depth

A question often asked is: 'What pocket depths should I do surgery on?' However, this question oversimplifies the issue. There are many

factors to take into account before we consider using periodontal surgery. While it is true that deeper pockets are more likely to experience progressive disease (Claffey et al 1990), there is no pocket depth for which conventional non-surgical therapy won't show some degree of success (Badersten et al 1984) provided the teeth have a reasonable initial prognosis. However, the important questions are:

1. Whether surgical therapy is likely to result in additional benefit beyond non-surgical therapy? But, perhaps even more importantly:
2. 'Am I going to improve the prognosis of these teeth by doing this surgical procedure?'

If the answers to these particular questions are uncertain, then periodontal surgery is generally not indicated, and either a more conservative approach, or extraction, is advisable. It is absolutely essential

to ask yourself this question before you embark on surgical treatment.

Non-surgical periodontal therapy

For the vast majority of patients, and teeth, non-surgical therapy is the gold standard and surgical therapy will not improve results further than that achievable with subgingival scaling and root surface debridement. Indeed, for shallow pockets, surgical therapy will cause a loss of attachment and aesthetic complications.

Of course, non-surgical therapy does have limitations, and we know from large prospective studies (Pihlstrom et al 1981), that the expected pocket depth reductions and clinical attachment level gains after scaling and root planing are fairly predictable. We cannot therefore expect our 8mm pocket to become a 3 or 4mm pocket on average – this is the exception.

So, knowing these figures, if it's pocket depth reduction that is the goal in a certain case, then surgical therapy may be employed. Of course, pocket depth reduction is only one of the desirable outcomes of periodontal surgery, and the decision



Fig 1

Minimal reflection approach (modified Widman flap)



Fig 2

Access surgery for open flap debridement



Fig 3

Both buccal and palatal flaps are required for access surgery

or nger?



should not be based on this alone. In the context of this article, it is impossible to discuss the surgical decision tree in detail, and the reader is directed to other, more comprehensive, sources of information for this.

Hopeless teeth

One of the most frequent mistakes that inexperienced operators encounter is the use of periodontal surgery for teeth of poor or questionable prognosis in the hope that an intervention as profound as full flap periodontal treatment will succeed. In fact, the opposite is true.

The teeth that have most to gain from periodontal surgery are those with a fair prognosis in the first place - those that have sufficient bone loss, but adequate remaining attachment and a reasonable outlook. Hopeless teeth should be carefully identified during treatment planning, and extracted early in the treatment process, to avoid patient 'burn-out' with repeated therapy of little success.

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Fig 4

Cyclosporin induced gingival overgrowth in a young transplant patient

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The different surgical techniques for treatment of periodontitis

(A) Access surgery (e.g. modified Widman flap, open flap debridement). These procedures are designed to allow instrumentation of the root surface under direct vision.

The modified Widman flap technique is a very conservative method where the buccal and palatal/lingual tissues are reflected only minimally (not beyond the mucogingival junction) to allow root surface debridement with better access than with conventional non-surgical therapy (Figure 1). It minimises the amount of tissue shrinkage post operatively, but where there are infrabony defects, it can often leave residual pocketing.

On the other hand, open flap debridement relies on full flap reflection to allow for maximum vision and access to the root surfaces for debridement (Figs 2 and 3). While this may make it easier to debride deep infrabony defects, open flap debridement may also leave residual deep pocketing if these defects are not recontoured with resective techniques, or grafted using regenerative techniques.

Access procedures are best used in those areas where there are deep pockets, but with few infrabony defects. In particular, modified Widman techniques can be used where tissue contour changes are undesirable, but it should always be noted that any surgical therapy in the upper anterior region is likely to run the risk of unacceptable aesthetic changes, and may be best handled non-surgically if at all possible.

(B) Resective surgery (e.g. gingivectomy, osseous surgery).

These procedures are designed to

achieve maximum pocket depth reduction. They should therefore be reserved for areas that are not in an aesthetic zone.

Before the advent of flap surgery procedures for periodontal therapy, gingivectomy was the most common periodontal surgical technique. It offers considerable pocket depth reduction, but this is often at the expense of removing attached gingiva, and it doesn't address any underlying infrabony defects, often leading to the re-development of deeper pocketing over time. It is still a useful technique, but is mostly reserved for cases of gingival hyperplasia where there is an abundance of attached gingiva and suprabony pocketing (Figs 4 and 5).

Flap procedures have more or less replaced gingivectomy now as they allow positioning of the tissues, give access to infrabony defects, and allow for recontouring of the bony tissues to allow flap adaptation and pocket reduction (osseous surgery). Osseous surgery is where infrabony defects can be recontoured using diamond and carbide surgical burs, and this allows good tissue adaptation to eliminate infrabony pocketing (albeit at the expense of longer looking teeth) (Figs 6,7 and 8).

(C) Regenerative surgery (e.g. guided tissue regeneration - GTR).

GTR can be employed to recapture missing periodontal tissues such as bone, cementum and periodontal ligament. However, certain anatomical features need to be present to allow for regenerative procedures to be completed successfully, and often this is not the case where periodontal tissues have been severely destroyed by the disease process.

In general, if a defect has an infrabony defect of greater than 4mm in depth, with containing bony walls,



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then GTR may be successful. However, upper molar furcations, and F₃ ('through and through') lower molar furcations do not exhibit positive outcomes as a rule, and are not good candidates for GTR procedures. Smoking and poor plaque control are the biggest predictors of a poor outcome with these procedures. Many materials are in use for GTR. Most are based around the use of a combined hard tissue graft and a resorbable collagen membrane, but some other single material techniques are in frequent use also (e.g. enamel matrix proteins).

Bone grafting materials are usually from animal (xenograft), human (allograft), self (autograft) or synthetic (e.g. calcium triphosphate) sources. Membranes are most often resorbable collagen materials of animal origin, and these have mostly replaced the non-resorbable types due to the ease of use, enhanced biocompatibility, and the avoidance of the need for a second surgery to remove the product at a later date (Figs 9 and 10).

(D) Combination procedures.

Even within a quadrant, the local bony architecture can vary considerably, meaning that some areas require resective work, yet others may be candidates for GTR, all within the same surgery (Figs 11, 12 and 13). It is very often helpful to combine techniques at one surgical sitting, and this gives the most appropriate approach for each individual tooth, avoiding the 'one size fits all' mindset.

It is often possible to predict the areas for the various approaches by carefully scrutinising the clinical data and the radiographs. One can frequently identify the presence and magnitude of any infrabony defects in advance of the procedure, and create

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Fig 5

Two weeks after gingivectomy for gingival overgrowth (child)



Fig 6

Interproximal infrabony defect to be recontoured



Fig 7

Recontouring of osseous defect with surgical burs



Fig 8
Reduction of osseous defect allows flap adaptation



Fig 13
Bone and membrane in place in GTR site



Fig 14
Surgical access to furcation for calculus removal



Fig 9
Upper premolar bony defect



Fig 10
GTR procedure with bone and membrane in situ



Fig 11
A quadrant suitable for a combination approach



Fig 12
GTR in one region, but osseous surgery more posteriorly

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a provisional flap design to allow for several possible scenarios at the time of surgery.

It is absolutely essential to have radiographs that clearly show the apices of all the teeth in the surgical field before contemplating surgery. Bone loss to the apex of a tooth in the surgical field is never something you want to encounter for the first time at the time of surgery, although it happens on occasion even with the best preparation in the world.

Conclusions

This short review merely scratches the surface of the decision making process in the use of surgical therapy to treat periodontal diseases. However, it is important to ensure that before contemplating the use of a surgical technique, the operator must evaluate carefully what they wish to achieve from the procedure. Is it for access to an area that cannot be reached non-surgically, for example, within a furcation region (Fig 14)? Or, is it to reduce the pocket depths as much as possible (e.g. flap and osseous surgery)?

The notion of surgery to address a particular pocket depth is oversimplistic, and ignores the bony

anatomy, the attachment level, the local anatomy, and the prognosis of the tooth. It is important to have a clear objective before we enter into an invasive technique, and to ask ourselves what we hope to achieve by the procedure.

Periodontal surgery is a fantastically successful treatment modality when used appropriately. Not only is it more relevant than ever (as patients keep their teeth for longer), but it is an exciting field in terms of development.

Even as you read this there are new materials, at advanced stages of development, that will revolutionise periodontal surgery and grafting technology. The use of integrated human growth factors, and the careful orchestration of biological repair and regeneration mechanisms are already a reality (Kaigler et al 2006). It looks like another update in periodontal surgery is only around the corner.

Dr. Barry Dace and Dr. Rachel Doody are both Masters of Science graduates of the Advanced Education Programme in Periodontics at the University of Minnesota, USA, and are currently in practice limited to periodontics and implant dentistry in Blackrock, Co Dublin. For further information and events at their practice, please visit www.number16.ie

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