

Periodontal Resective Surgery: Gingivectomy & Osseous surgery

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Objectives

- At the end of this presentation the student will be able to:
 - List and discuss the indications and goals of resective surgery
 - Describe the steps involved in a typical gingivectomy procedure
 - Compare and contrast osteoplasty and ostectomy
 - Describe the steps involved in a typical osseous surgery procedure
 - Describe how grade and depth of furcation involvement determine the appropriate treatment option
 - Discuss the treatment options for grade I – IV furcations

Surgical Therapy

- Goals

- Access to ensure removal of calculus Access root surfaces to get calculus off
Want new attachment to root and get health. Clean roots!
- Elimination, or reduction of the depth of the periodontal pocket by resection or regeneration/repair
- Establish a maintainable (by the dentist and patient) dentition

Nice of periodontal bacteria is deep pocket. Obligate anaerobes, gram (-). So if you can make PD shallower, its more difficult for those bacteria to live. Do this by resective or regenerative surgery

What are the goals of surgical therapy for treating periodontitis?

The number one goal is to have access to the root surface, better than with closed procedure during scaling root planing

Have access to root surface so you can completely visualize the root surface and ensure removal of plaque calculus

You also want to eliminate or reduce the depth of perio pocket by resection or by regeneration or repair and therefore establish a maintainable clinical situation so that the dentist and patient can maintain a dentition at a healthy state

Pocket Reduction Surgery

- Resective Reduce periodontitis?
 - Gingivectomy Not really used to treat periodontitis. You just cut away soft tissue. No access to root surfaces; you don't flap tissue and clean root surface. It is useful in pt with pseudopockets (deep PD but no attachment loss). E.g. calcium channel blocker → gingival enlargement, → can only see 1/2 of clinical crown → use gingivectomy to decrease PD
 - Osseous surgery Do this more now
- Regenerative
 - Flap debridement Raise flap, clean root surfaces, replace flap
 - Grafts More walls = more blood supply = better chance of regen. If you have 3 walls, you can put a bone graft. May use graft in addition to flap debridement
 - Biologics (EMD, PDGF, BMP-2) Growth factors that enhance regenerative therapy
 - Guided tissue regeneration (GTR)- barrier membranes

Flap debridement + graft has limited regeneration. You prob need to put a membrane to prevent soft tissue cells from flap from growing too quickly, allowing PDL cells to properly repopulate

Pocket reduction surgery, when we perform periodontal surgery to treat periodontitis besides full debridement of the root surfaces one of our main goals is to reduce the pockets or probing depths for the patient and that can be done in two ways, either respective type of surgery where we again are removing soft and hard tissue in the process of reducing the probing depth or we can do a regenerative procedure where the surgical procedure's goal reduced the probing depth by gaining back attachment and bone so you gain back CT, epithelial attachment and bone, so new attachment and bone in order to reduce probing depth

On the face of it regeneration sounds a lot better adding sounds better than subtracting well as he will talk about there are certain clinical situations that favor a regenerative procedure so periodontist like to regenerate whenever the clinical situation is such that there is a good chance that the regeneration will work and you will gain attachment in bone however there are many situations where the topography or shape of the bony defects around the tooth are not amenable to regeneration so regeneration is unlikely to be successful. And in those cases we often do respective procedure.

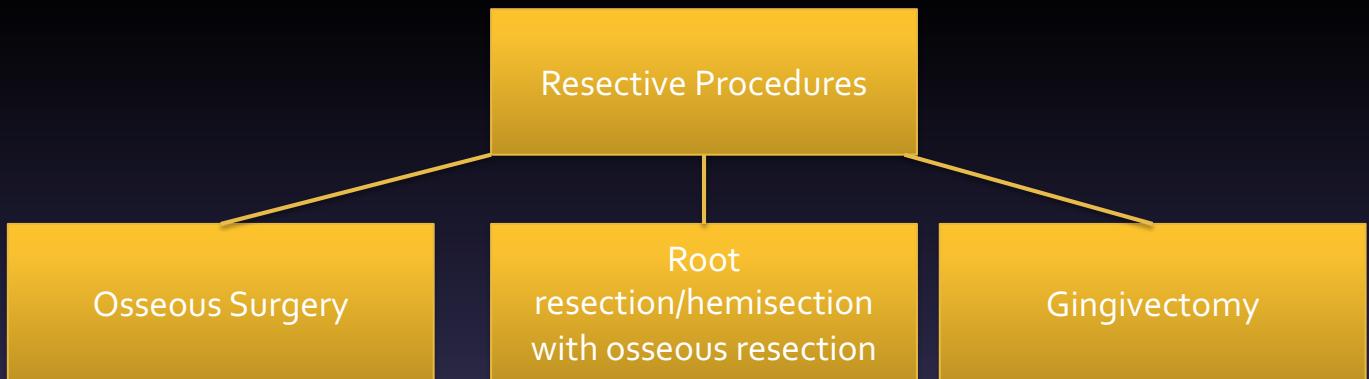
And there are many situations where if we do a whole quadrant of teeth, treat at one time, some portions of that quadrant may receive a respective procedure and in other areas get regeneration so in some cases we can split things up and do different things for different teeth within a certain quadrant or section.

But now talk about different procedures available

Under resective we can do gingivectomy which is removal of soft tissue only, or osseous surgery which involves some removal of soft tissue and also reshaping and removal of hard tissue, of bone

Three also regenerative procedures which can be simply just open flap debridebing, where you open flaps, clean root surfaces so we have good access and then put the flaps back where they were, we can also do the same thing but include various types of grafts, osseous grafts, biologic molecules or biological preparations or materials can be used to further enhance of growth factors if you will can further enhance the chance to regeneration. We can also become guided tissue regeneration where we use barrier membranes to help control which tissues can reenter that wound so we might try to exclude initially some of the soft tissue and or at least the tissue from the flap, exclude that tissue from the healing wound initially and allow hard tissue, bone cells and periodontal ligament cells to repopulation that wound preferentially or at least earlier in the healing process. There is a whole lecture later that focuses entirely on regenerative procedures.

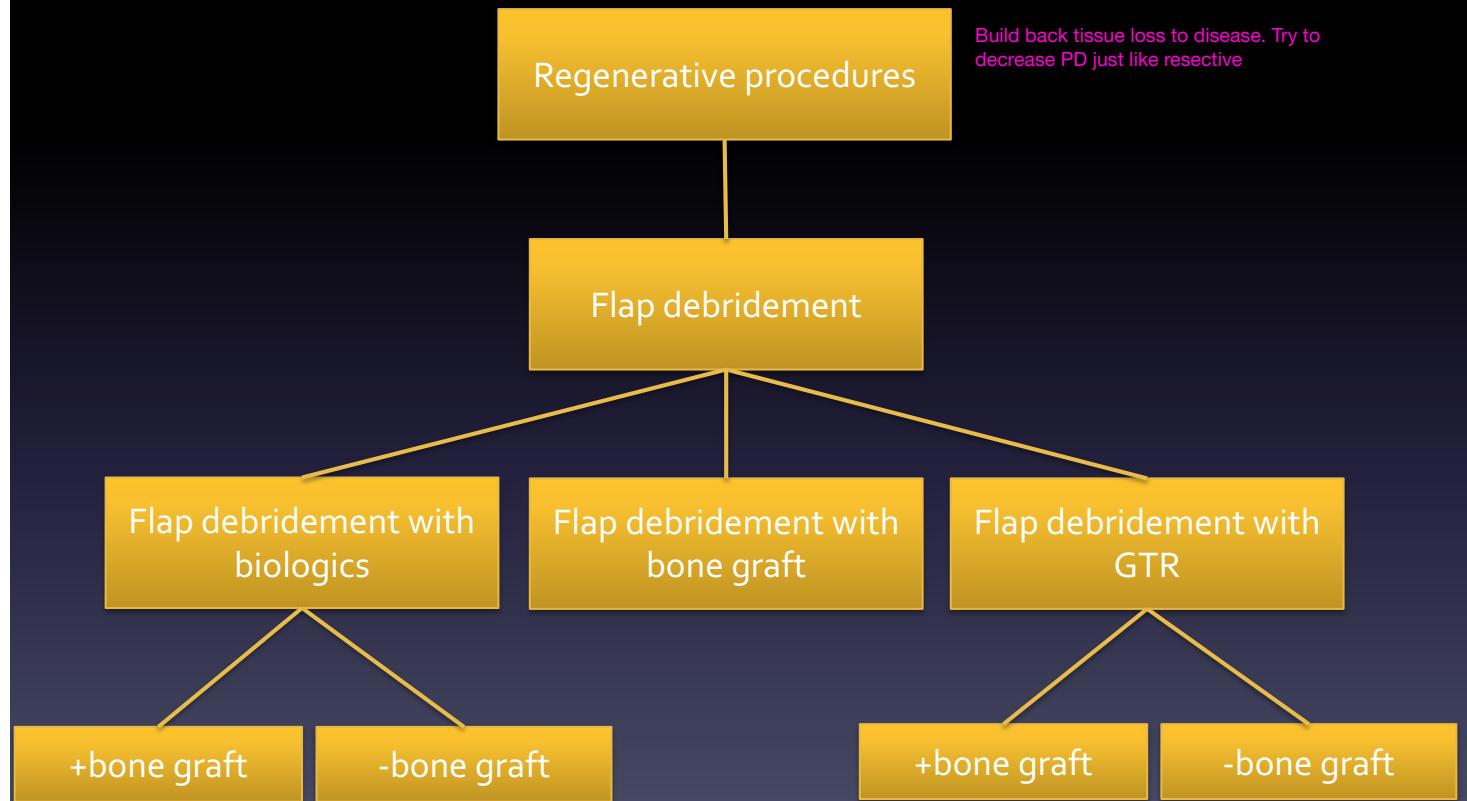
Pocket Reduction Surgery



Remove roots to have better access to
furcation. Not done often.

So again pocket reduction surgery, have respective procedures which include e gingivectomy and osseous surgery and at the end of presentation will talk about special respective- procedures sometimes as part of osseous surgery where we actually do some odontoplasty but we might decide to either do a root direction or hemiresection sort of removing roots with class 2 furcation involvements or in some cases class 3

Pocket Reduction Surgery



If on the other hand you decide to do another series of possibilities of pocket reduction surgery that is regenerative procedures we could do a simple flap debridement, or with that flap debridement we could also add either a bone graft, biologics, and biologics can include can be done with or without a bone graft, we can also do flap debridement with guided tissue regeneration and that can be done with or without a bone graft, and he didn't say it here in this slide but actually there's a possibility we could do flap debridement with a membrane, with and so that's guided tissue regeneration and we can include a bone graft and biologics so we can do all those things at one time, have barrier membrane, bone graft, as well as biologics so think of that as kitchen sink throwing kitchen sink at it but those are the different possiblites that might be included under pocket reduction surgery

Rationale for Pocket Reduction Surgery

- Regenerative (flap debridement, grafts, biologics, GTR)
 - Pocket reduction through new attachment (repair or regeneration)
- Resective (gingivectomy, osseous surgery)
 - Gingivectomy-pocket reduction by removing suprabony soft tissue (must not have vertical bony defects)
 - Osseous Surgery-pocket reduction or elimination by restoring positive bony architecture that the soft tissue can conform to without reforming a periodontal pocket (often done when there are vertical defects that are not amenable to regeneration)

Vertical defect w multiple wall supports regen. But if horizontal loss, then there is no potential for regen (no blood supply, no bony walls with cells to repopulate). So the only thing you can do is to remove soft tissue and reshape to minimize PD

So what is the rationale for pocket reduction surgery and either case whether is respective- for regenerative our number one focus want to get done with either precede is to make sure we have access to roots and remove all the calculus as much as humanly possible in terms of visible to the eye shouldn't have calculi remaining that is visible to the eye with good loupes

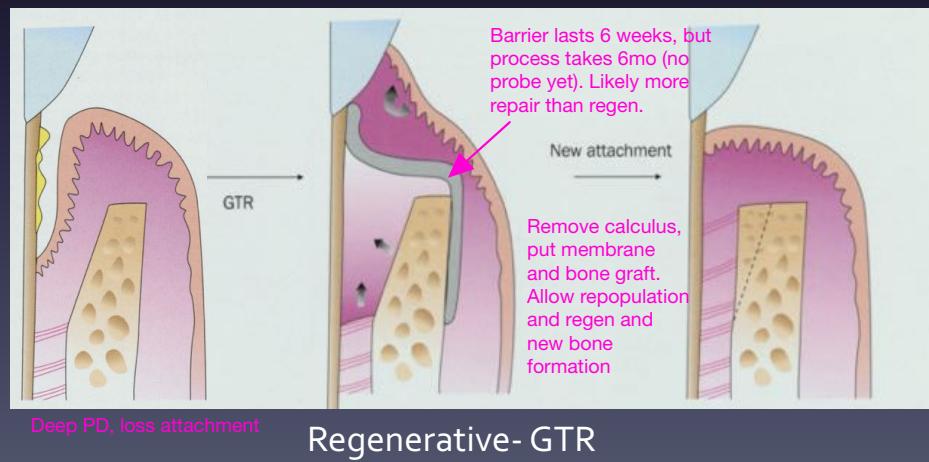
So get roots clean that's number one

And then in the case of regenerative therapy, we get pocket reduction through new attachment which again can be repair or complete regeneration, and the other alternative is we do, we have pocket reduction through respective-procedures which is either

-gingivectomy, that's pocket reduction through removing of supra bony soft tissue so you can't have vertical defects, if you have gingival vertical defects a gingivectomy won't work very well we will talk about that later -osseous surgery where we have pocket reduction or pocket elimination by restoring positive bony architecture the normal relationship between the inter dental bone and the facial and lingual bone that is called positive bony architecture so we reshape that bone so that the soft tissue can easily conform to it without reforming a periodontal pocket, there's a lot in that sentence but as we go along you might come back to this slide and re read that after he shows us some examples of what he is talking about here, but again this is often done osseous surgery is often done when there are vertical defects that are not amenable to regeneration so generally as he'll talk about, generally shallow bony defects maybe if they don't have very many walls remaining and also when they are not very deep vertical defects so we'll talk more about that

So lets look at the results of some of these procedures

Results of Pocket Therapy



So if we talk about a regenerative procedure, an example these terms of a artist illustration we can see that in panel A there is a vertical defect there so the gingiva is above the CEJ but there is detachment, you can see that there is a pocket there, there's detachment of the epithelial and CT attachment away from the root so there's loss of attachment but also the bone rather than being horizontal bone loss has a vertical component to it so in order to address that and in an attempt to regain some attachment especially in that area where there's vertical bony loss, we then reflect the soft tissue so we can see the bony defect, clean out any clean the root surface get rid of all the calculus and any granulation tissue that is in that vertical defect, clean that out completely and then we want to replace the flap and then as you see in panel D we want to place a bone graft, often times an allograph bone, bone from bone bank so its not the patient's own bone but bone from a diseased patient that's in a bone bank, so an allograph we put that in that vertical defect and then you can see that little white barrier membrane that's placed on top of the graft and then the soft tissue is flap is replaced back in the same original position right up to the CEJ and the idea there is that barrier membrane blocks the soft tissue from that vertical defect and allows bone tissue and periodontal ligament cells, bone cells and PDL cells to repopulate vertical defect first in the initial healing and that promotes regeneration,

If we don't put a bone graft and don't put a barrier membrane like you see in panel C what happens is the soft tissue gets in there and sort of blocks the bone cells cause the soft tissue can migrate in back into the wound much more quickly than the periodontal ligaments cells and the bone cells and so if you get cells from the flap repopulating that site very quickly they sort of block the ability of the periodontal ligament cells na bone cells from getting into teh wound and it limits the amount of regeneration that might have occurred

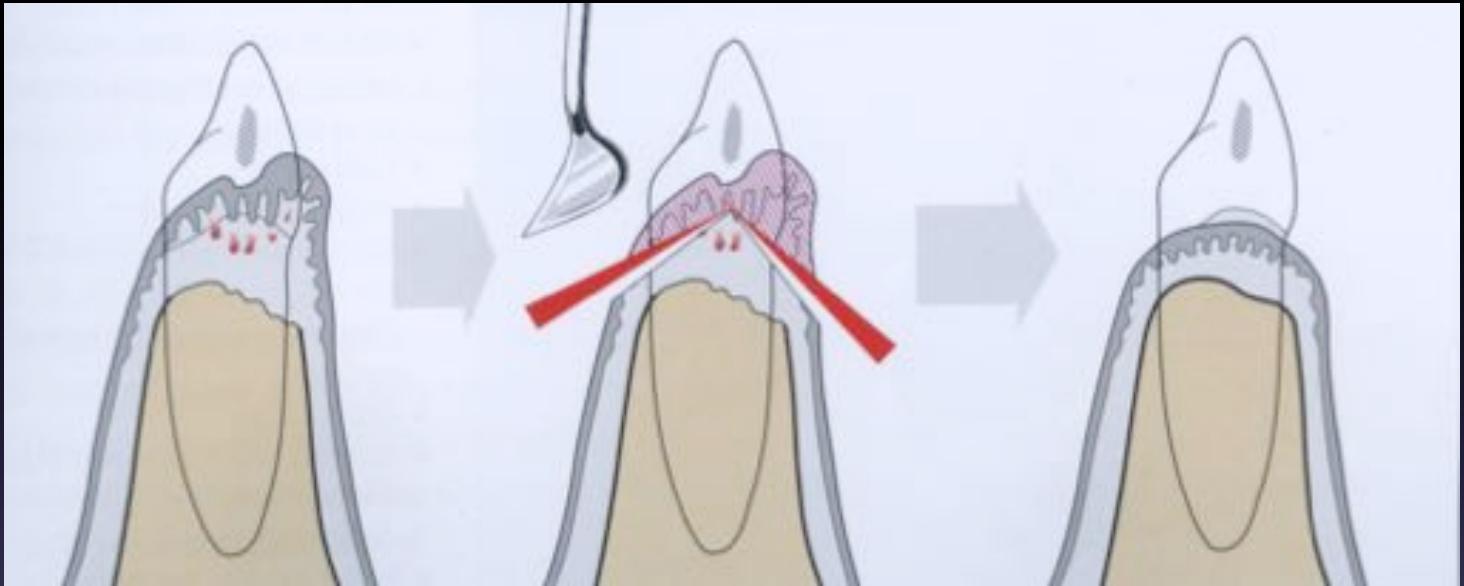
The same sort of thing is depicted in the three panels below, where you see again in left panel its calculus on the root and there is some attachment loss and we're then cleaning off the root surface, placing graft material, we have the barrier membrane there, they are actually putting it in this illustrating but often times you would put allograft particles of bone in that vertical defect, membrane over top of that and then we. Coronary position that flap as much as we can but again the barrier membrane keeps that soft tissue out of there and hopefully you get what we see in the right, new attachment that includes both new periodontal ligament with sharpey's fibers inserting into cementum on the left and bone on the right of that rightmost illustration so we get the bone back where it was lost, and we get periodontal ligament reformed as well as the epithelial attachment, that would be regeneration where we've gained new cementum, periodontal ligament and bone so you get all three of those, tats called regeneration and that's a type of new attachment, its also possible and its not illustrated here in this drawing to get new attachment where the probe doesn't probe very far apically so that there's new attachment to the root that previously was exposed, however if you don't get periodontal ligament and new cementum you might still get some new bone but you get an epithelial attachmetn to the root that is new attachment but it is not complete regeneration because you don't get new periodontal ligament and bone

He'll just summarize that last point, new attachment is when after your periodontal surgery the probe is not penetrating as far apically because you have attachment to the root surface that pveriously was had calculus on it and was exposed and so that's new attachment, and new attachment either can be complete regeneration when you get cementum, PDL, and bone reforming back to the way it was, or it could be just new attachment which we call repair where we do have attachment to that root surface that had calculus on it and that was exposed however we don't get all three tissues, cementum, bone, and PDL so we might get a little bit more bone but the attachment might be an epithelial attachment through hemidesmosomes rather than sharpey's fibers inserting into the cementum

Anyway, so that's a little bit about regeneration but you'll hear a lot more about that in the lecture

Now lets talk about how resective procedures can reduce probing depth

Results of Pocket Therapy



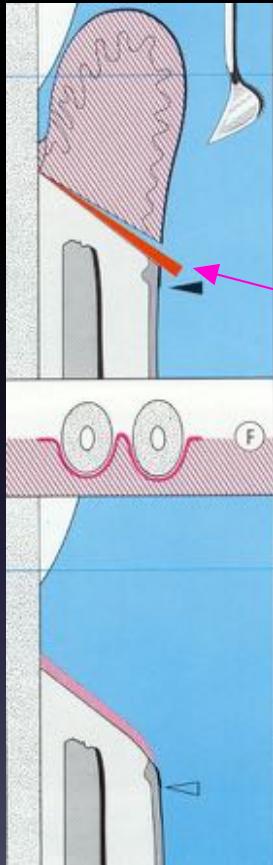
Resective- Gingivectomy

Uses external bevel incision from F and L, remove soft tissue. Notice flap is not raised, so no osseous surgery or cleaning roots. Problem: periodontitis pts might have calculus there

So here we see in this artist illustrating a situation with deep probing, you've lost bone and attachment and so there is a deep probing there but there's not vertical defect in the bone so the bone is kind this is looking at the proximal area you can see the contact on the tooth so under the contact we've lost some bone and we've lost some attachment but there's not vertical defect, its horizontal bone loss, consequently one option would be just to cut away some of the soft tissue so called gingivectomy so you go from you have on the left where there is. Deeper probing, you cut away some of the tissue and not on the right there is less tissue above the bone and therefore the probing is shallower, you also have root exposure as you can see there

Now he will say this procedure used to be the only respective procedure that was done back in 60s and early 70s, very commonly done procedure, we really don't do this very much anymore to treat periodontitis, the main indication for a gingivectomy typically is a situation where you have for example lets say you have a patient who takes a calcium channel blocker or they are taking anti-seizure medications, they don't have attachment loss but their gingiva has enlarged they've had they have gingival enlargement that has occurred over time and consequently have deep probing because they have excess soft tissue but no attachment loss, that is a situation where gingivectomy can be done but most of the time for periodontitis we are going to do a resective procedure it will be osseous one

Results of Pocket Therapy



External bevel incision. Used in gingivectomy. Kinda like festooning dentures



Resective- Gingivectomy

B. External bevel incision. You don't see root surface to the bone.
E/F Cut away excess tissue and reshape

But if we are doing gingivectomy

If you see on panel on left the type of incision this is important when you do a gingivectomy the type of incision that you do is called an external bevel incision so if you can see what's happening here in cross section, that's the panel to the left, the scalpel or knife you start in a more apical position and you cut through the tissue aiming upward towards the crown so you start a little more apical and then you make your incision aiming upward towards the crown and basically cut off the excess gingival tissue that is above the bone forming the periodontal pocket and that's what is happening when you go from A and you can see in B where they are doing this external bevel incision and you notice when you do that just like in the cross section you wind up with a very broad area of bleeding surface so there is not going to be any primary, there won't be any priming intention healing its going to be all secondary intention healing so the epithelium now that's apical is going to have to migrate half a mm a day until it covers over that area where you've made this external bevel incision and that tends to be uncomfortable that's one of the reasons why we don't do that much anymore and we have better ways to handle this sort of situation than doing this external bevel incision but that's what happens in a gingivectomy and you can see in the bottom panel in the illustration cross section, after you've done this external bevel incision there's from the grey epithelium that there are showing in cross sections that thin grey epithelium where the point where there is an arrow pointing, from there to the root surface that's a bleeding surface that has no epithelium on its and its going to have to heal by secondary intention so that tends to be uncomfortable but in that case you can clean the root surface because it will be exposed once you cut that gingiva away and then you can see as they go from panel A all the way down to panel H, that that will resolve the deep probings, the other thing he will say about this clinical example you see here is he doesn't have probing measurements for this patient to see if there's attachment loss but this actually might be one of these cases. Where you have excess gingiva where there's gingival enlargement and actually no attachment loss because if you look in panel A there's very little of the patient's crown that's visible and the gingiva is actually enlarged and up over half of the clinical crown and probably there wasn't attachment loss and they just cutting away this excess gingiva that's present so although this cross sectional image in the artistic illustration here shows indicates attachment loss, where there's attachment apical to this has been lost apical to the CEJ, he bets there's a good chance that this image that you see this actual clinical photographs are patient doesn't have attachment loss but any case that's the gingivectomy

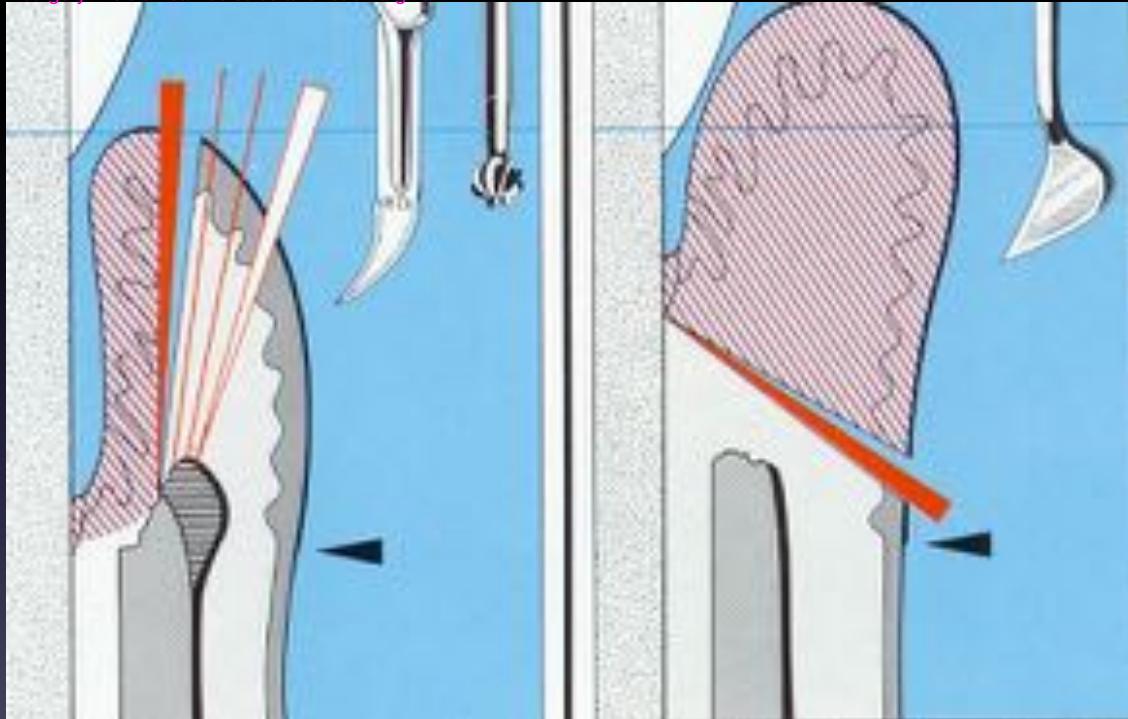
So again external bevel incision for the gingivectomy

Now let's talk about other types of incisions we might use for flap procedures because as you can see in this gingivectomy we don't really raise a flap we don't have any access to the bone, the bone is never exposed we just cut away gingiva that is coronal to the bone that's in excess

Internal vs External Bevel Incision

Internal. Incision parallels sulcular epithelium, leaves a bit of tissue. Epithelium covers the entire flap. Used in osseous surgery. Incision can be sulcular or submarginal.

Bleeding surface with no epithelium



Rateitschak, et al Color Atlas of Dental Medicine, Periodontology 2nd ed

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So lets go to different types of incisions

So you can see again in the right artist illustration, that's the external bevel incision which is done with gingivectomy

For a gingival flap procedure or don't for regeneration or a resective⁹ procedure we like to do a full thickness, mucoperioosteal flap and to do that we can either do sulcular incision so if we looked in this left panel you can see where that dark red incision , thick dark red drawing is, that's just a little bit not quite in the sulcus, if it was sulcular the blade would be even to the left of that and going right into the blue sulcus there between the soft tissue and the root and go right down to bone that way, but this would be just a little bit submarginal so its away from the tooth so there's a little bit of a if you will pocket lining that will be removed in raising this flap but in any case this is what we call an internal bevel incision as opposed to the external bevel which we did for the gingivectomy

We are taking our blade, going either right into the sulcus which would be a sulcular internal bevel incision or slightly submarginal below the gingival margin and cutting down into the bone but that's an internal bevel incision Notice there's other red lines, three more lines, the thin red line and then another thin red line and then another kind of white little incision to the right of that so as we go from that dark thick red line to the two thin red lines and the white incision, those four incisions each one is successfully from red to the white more submarginal, so we do submarginal incisions that will take away some of the tissue and allow the tissue margin to be more apical when we finish the surgery, but in any case all of those incisions all 4 of those in the left panel are internal bevel incisions And they go all the way down to the bone and through the periosteum so then when we reflect the flap, we take a full mucoperioosteal flap so that flap will include the epithelium that grey, the CT in this illustration is the white, and also that dark black which is supposed to depict the periosteum so that whole thing will be lifted up off the bone and once you get done reflecting that flap you will be able to see enamel, cementum, and root, calculus on the root, and the bone, but you'll see only hard tissue and no soft tissue once that flap is reflected

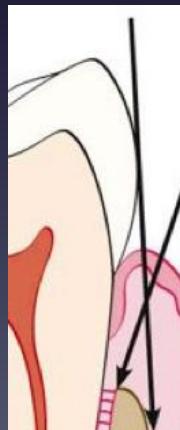
Lets look at some more examples of that sort of thing so you can tell the difference

Internal vs External Bevel Incision

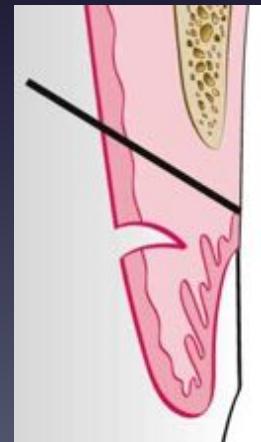


Internal

Can vary angle of blade. If incision is more parallel to long axis of tooth, then you make the flap thinner



External



So once again on the right side and the picture the clinical picture is for gingivectomy so that's the external bevel incision which starts a little apically and then angles coronally as it goes towards the root surface and this is all above or coronal to the bone right so it doesn't once you've done this incision, this external bevel incision, you remove soft tissues some fo the gingival tissue but you don't actually reflect the flap and expose the bone so you can't see the bone and you might actually not even see all of the root that is coronal to the bone so doesn't give you complete access to the root surface and it gives you no access to the bone, but again as he mentioned that's often done really in situations where there's no attachment loss and just excess gingiva that's the more common use of this procedure

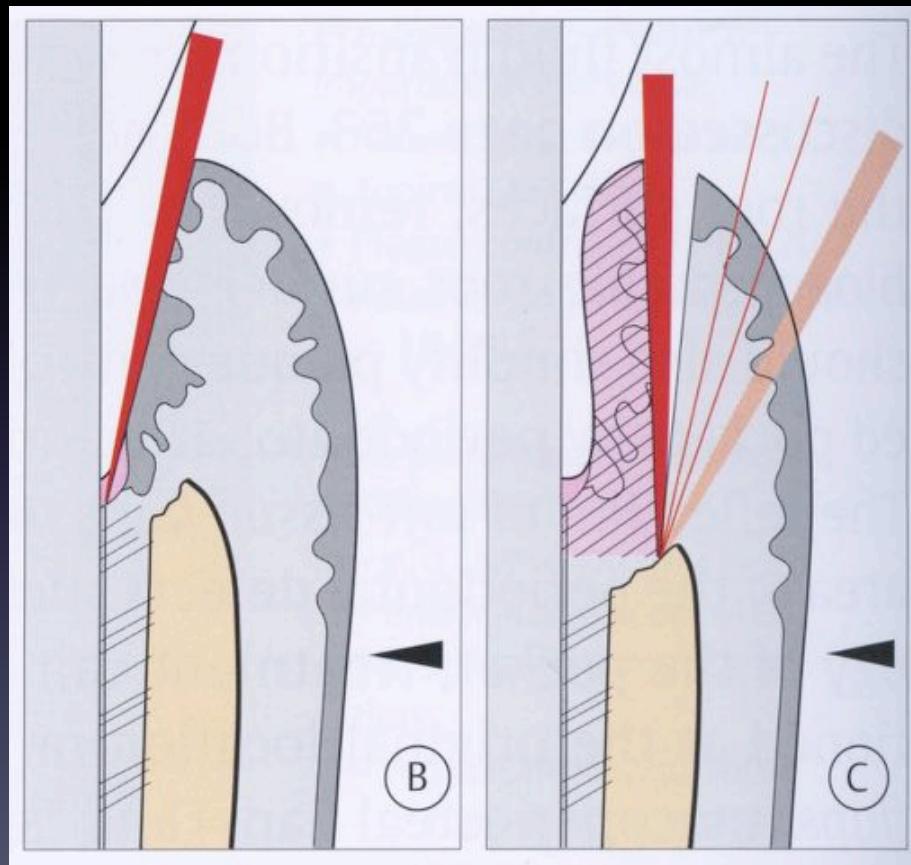
In the 60s and 70s it used to be done quite commonly as the only procedure to treat periodontitis but what was found is when you have vertical bony defects, vertical bone loss and then you don't have access to the bone to reshape it and so the pocket reduction or pocket elimination was not as effective with this gingivectomy so not don't very much any more only for this situation where you have excess gingiva with no attachment loss largely

Then on the left side of the slide you can see clinically a sulcular internal bevel incision has been done here so that the blade was placed into the sulcus just as you woulda periodontal probe essentially , the blade is sits right next to the tooth surface and slides along the tooth surface down to the bone, or it could be submarginal as he mentioned in the last slide so you could be some degree from the tissue margin apical but again still an internal bevel incision and that's what depicted also in cross section below where again, the incisions made somewhat in the long axis of the tooth as an internal bevel incision going down to the bone, notice that there is two black lines drawn there, there the incision has a different angle relative to the long axis of the tooth, so you notice that the the one the longest black arrow that you see the one where you can see the full length of the arrow, that particular arrow with that angle of internal bevel incision you are flap actually might actually might be a little bit thinner than if we angle it the other direction if that makes sense, don't worry if that technical detail is not completely clear but he wanted to make the idea there that you can go slightly different angles as you enter the tissue and it will make your flap thicker or thinner and sometimes if the flap is really thick sometimes you want to angle it like that longer arrow so that you can thin the flap a little bit to help reduce the pocket and those are little fine points that periodontists when doing periodontal surgery worry about so he just points that out

Lets talk a little bit more about internal bevel incisions and these are some points he alluded to a bit earlier but he'll not cover this a little bit more so again we've talked about an external bevel incision for gingivectomy and an internal bevel incision for standard either regenerative procedure or osseous surgery, either one when we are going to reflect a full thickness flap we have to do an internal bevel incision

Sulcular vs Submarginal Incision

(B) sulcular
(C) submarginal



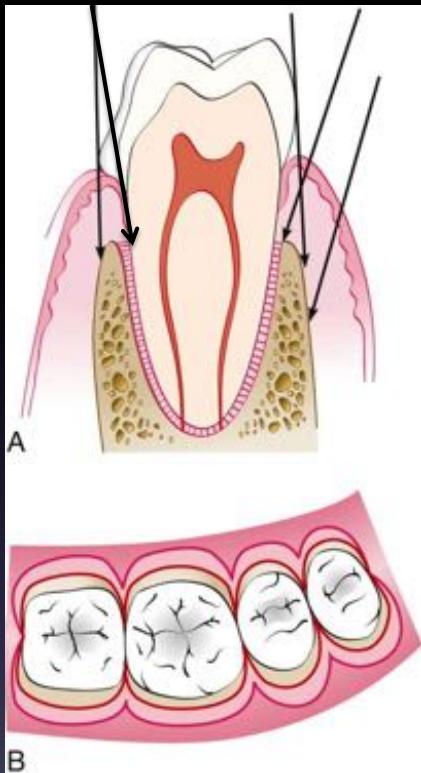
So if we have an internal bevel incision we can either do what he's drawn here on the left which is a sulcular incision that's where the blade actually goes in the sulcus just like your periodontal probe might and then encounters the soft tissue at the very bottom of the pocket, and then it goes through that epithelial attachment and through the PDL and goes down to the bone and once it cuts through there then you can reflect a full mucoperiosteal flap so can do the epithelium that's the gray in this, the medium gray that you see there it has rete pegs and everything

The light gray CT in the middle and then also that very dark black thin line that's right on top of the bone that represents your periosteum so that whole thing is lifted up off the bone so that you can then see the root and the tooth root, tooth crown and the bone, all the hard tissue can see clearly when you do that, okay

Not separate from that if we look at the right panel you can see that instead of the sulcular incision you have on the left you have submarginal incisions and there's 4 successive incisions, different ones where he's moved farther and farther apically so that the white, the heavy peach if you will, colored or lighter pink colored incision, the thick one, that's the most apical one and that would have a tendency to thin the flap a little bit maybe, but also would move that margin of the full thickness flap a little bit more apical when you later put the flap back at the end of your surgery and sometimes you want to do that to help reduce the probing depth

Just a little bit more on that then sulcular vs submarginal

SULCULAR VS SUBMARGINAL INCISION



Sulcular



Submarginal

Carranza, et al Clinical Periodontology, 11th edition

So here we see two examples the upper clinical picture is he sulcular incision and then the lower picture is showing you a submarginal incision and you can see that sort of what we call a scalloped it has a little, not a straight line incision, its scalloped submarginal incision so its not at the gingival margin but apical to that and that's because when we finish the surgery we want our gingival margin to be at that 3 or 4 mm more apical to the CEJ than where it started and so we can see that in the artist illustration on the left in the B, you can see that not only can we have incisions that are submarginal but its drawn here there are several different position that that submerging can be and depending on the pocket depth I may go more submarginal to reduce the height of the soft tissue on the tooth where he has a deep pocket so its submarginal, sulcular is where he typically especially if he is doing a regenerative procedure he wants to keep all the tissue so he's going to keep that incision right in the sulcus and not take away any soft tissue whereas when he does submarginal incision he is taking away some soft tissue with in this case internal bevel incision, also in that right illustration in panel A there, you can see that he is again showing with successive arrows different arrows are either closer to the margin but they're all pretty much submarginal incisions, well lo shouldn't say that

In panel A, if we look at the three arrows to the lingual or right side of that Tooth cross section each one of those 3 arrows are different levels submarginal but they are all submarginal but also the angle of that arrow might make the flap either thinner or thicker and so that some of the things that periodontists worry about

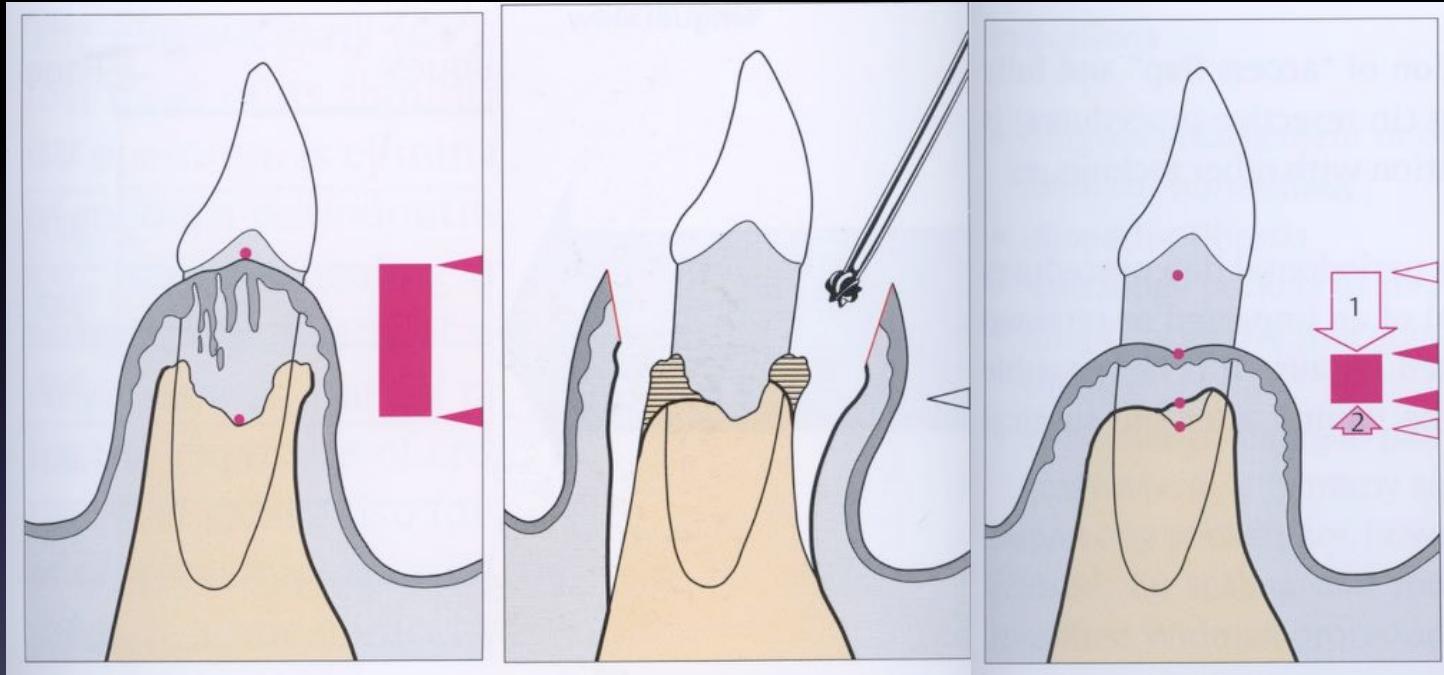
Similarly if you look at the two arrows on the left side of panel A, you can see that one arrow, the darker one is sulcular and then the other second one which is more to the left is submarginal

So again sulcular vs submarginal those are some of the things we need to know about when we are doing periodontal surgery

So lets talk about how we do osseous what happens in osseous surgery

Results of Pocket Therapy

Internal bevel incision, reflect flaps, put tissue more apically, PD is reduced. Tissue is more apical

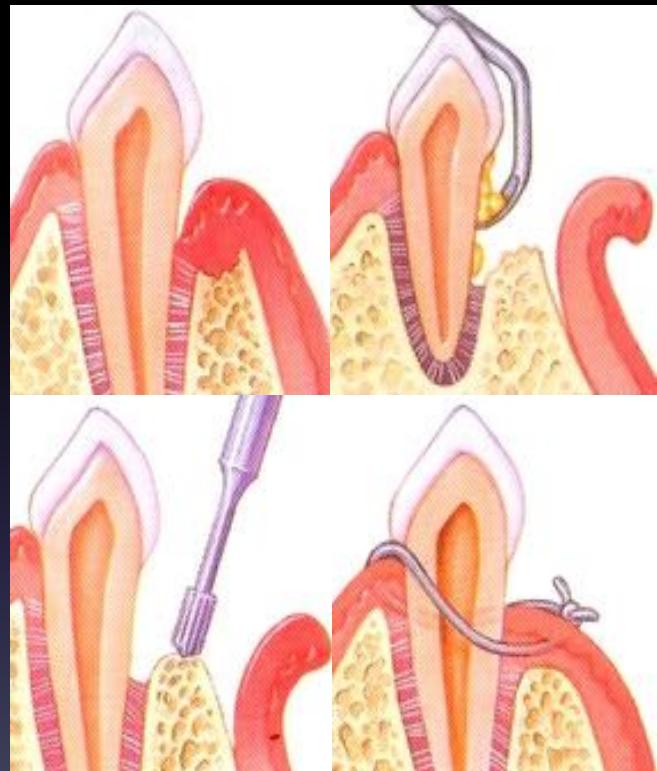
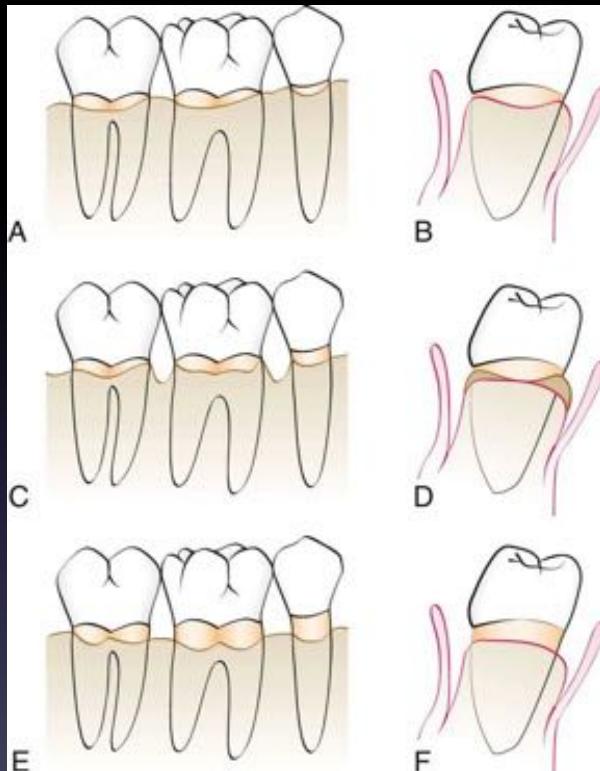


Recession and deep probing. Deep vertical defect present

Resective- osseous surgery

So now unlike the previous artist illustration where we had attachment and bone loss but we have horizontal bone loss, you can see this is a two wall defect where there's a buccal wall and a lingual wall and there's a crater so called crater but a vertical defect right under the contact area so if we just did the gingivectomy and cut the tissue off right at the level of that bony crest it would reduce the pocket but because of that vertical defect it would still be a deeper probing left so when you are going to do osseous surgery to reshape the bone and allow the tissue to be placed at that new bony level where we then have shallow probing depth so you can see that we have in the middle panel we've reflected full mucoperiosteal flap, then with a rotary instrumentation with a hand piece we'll take away that cross hatched part of the bone so reduce the deep so taking away doing osteotomy, taking away some of the bone some of the supporting bone as well as osteoplasty which is reshaping some of the bone that is not directly attached to the tooth, reshape that bone and then place the flap not back where it was but at a more apical position in that new shaped bony position which gives you a shallow probing depth and of course as we are doing that we are cleaning the root surface

Results of Pocket Therapy



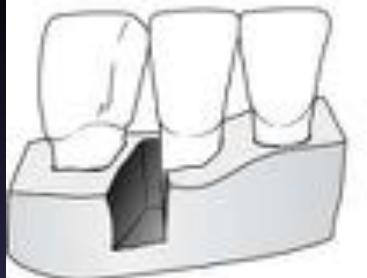
Most attachment loss under contact → crater 2 wall defect. Put flap back apically to improve PD
Resective- osseous surgery

Here is more artist rendition of that sort of thing happening where you can see in A and B, we reflect the flap and then in D, we reshape the bone to get rid of the vertical defect and then when we are back at F we can then replace those flaps at a more apical position and decrease the probing depth and that's the same thing that's being depicted in those two right panels where again the flaps reflected, roots cleaned, bony is reshaped and then the tissue is reapproximated but at a more apical position

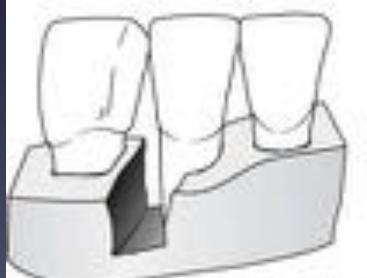
Classification of Intrabony Defects



3 wall



2 wall



1 wall

Not enough walls, can't do regen



Here again is some information about vertical defects, I think we've talked about this before but just by review, vertical defects are one of the things that's used to classify them is how many remaining bony walls there are so you can have in that top illustration a situation where there's some bone destruction next to the tooth but there is still a buccal, lingual and proximal wall remaining, so that's a three wall defect, and that tends to be more amenable or often times you can have a greater chance of regeneration if you have more walls to have cells to supply bone cells and PDL cells to that healing site

The middle situation is where you only have 2 walls which could be a proximal wall and a lingual wall as depicted here or it could be a buccal and lingual wall and missing the proximal wall, the latter which is often called a crater, so there that the 2 wall defect

And then you can have a 1 wall defect which in this case is showing remaining proximal wall but you clearly have a situation where you have only a lingual wall and missing a proximal and buccal wall or only a buccal wall, missing a proximal and lingual, just in this case a 1 wall defect

And there's some dried skulls there they are showing you examples of in the top a 3 wall defect, in the middle you can see the 2 wall defect, they have a buccal and lingual wall but missing proximal and then on obo you have a proximal wall remaining but no buccal and lingual wall so 1 wall defect

Indications

- Regenerative
 - Deep vertical bony defects
 - 3-wall defects
 - Class II furcations
 - Severe Attachment loss
 - Class II mobility
 - Poor crown : root ratio
- Resective
 - Horizontal bone loss
 - Shallow vertical defects
 - Class I or III furcations
 - Class I or no mobility
 - Favorable crown : root ratio

No bone left if you do regen but have deep vertical bony defects

If tooth is significantly mobile or unfavorable CR ratio, you can't afford to lose more bone

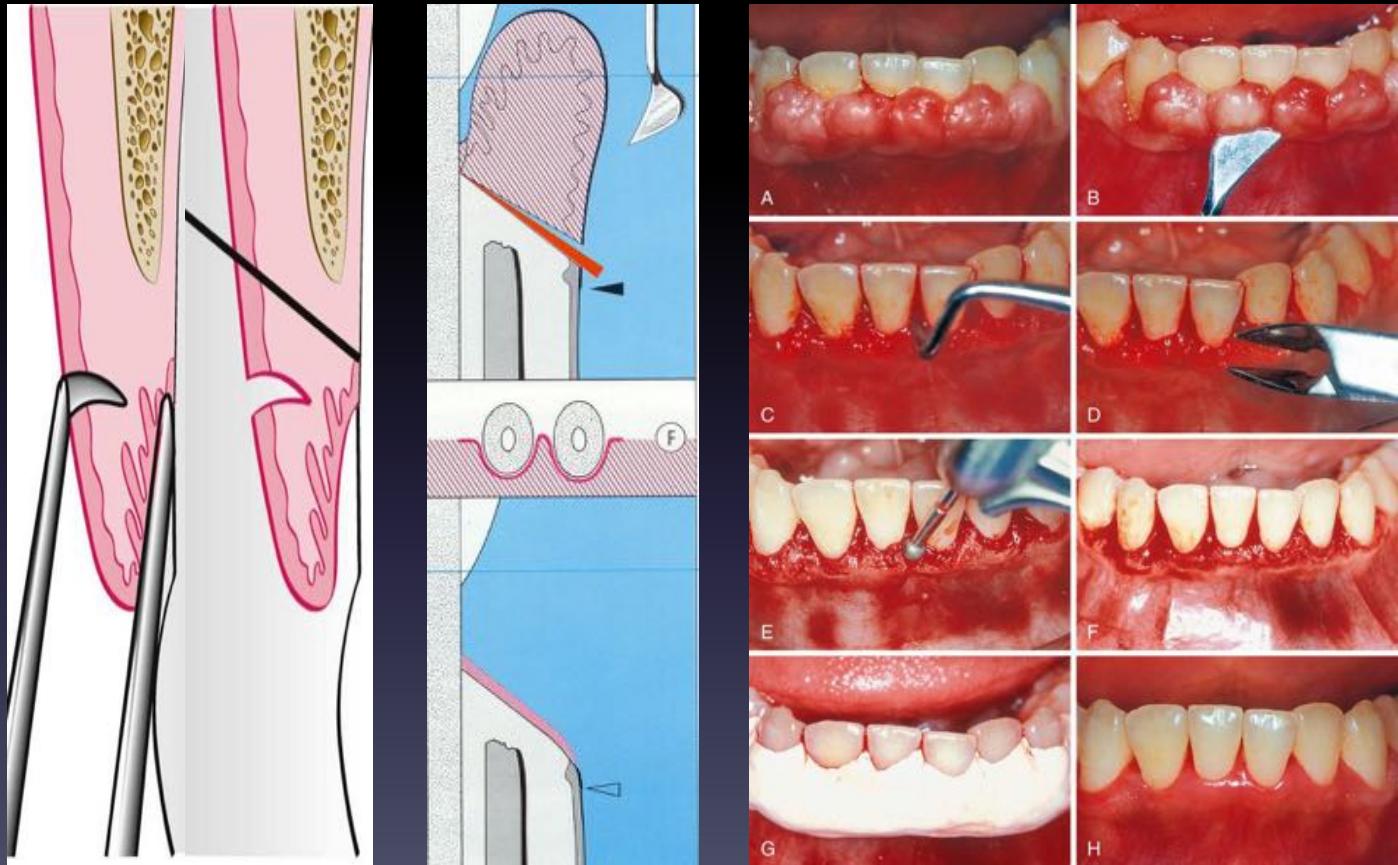
So what type of procedures do we do regenerative or resective
And he's listed under each general type of procedure the type of clinical characteristics of a particular site or region in the mouth that would favor either respective or regenerative

So if we have deep vertical bony defects, especially if they're not only vertical but narrow so the distance from bone to root is not really wide, especially if there's 3 walls, class 2 furcations can be amenable to regenerative, if you have really severe attachment loss, resective procedures don't typically aren't indicated because there's already a lot of loss and you can't afford to take away anymore because there's so much already lost, if there's class 2 mobility, there you are already have a lot of mobility so again tooth can't afford to have more attachment, more bone taken away without further, without compromising the tooth further, as well as if you have a poor crown root ratio again you can't take away bone if you already lost a whole lot so all these things that on this list to the left are things that would make us consider more regenerative approach

On the other hand, if you have horizontal bone loss or shallow vertical defects especially if those defects are wide where they're really not amenable to regeneration, class 1 or class 3 furcations cause you don't regenerate one furcations and 3 if you try to regenerate a class 3 furcation it doesn't work, also no mobility or the very most class 1 mobility and with a crown root ratio that's favorable, those are situations where you can consider reshaping the bone and that won't be a compromise for the tooth because you still have enough even if you reshape if you have enough bone remaining for the tooth to have a good prognosis

Gingivectomy

Mostly for pseudopockets and not periodontitis



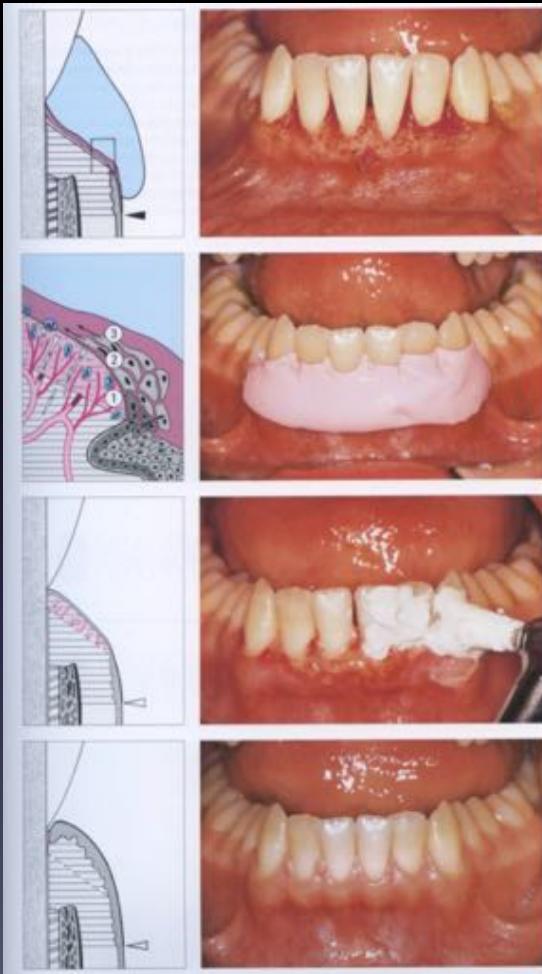
Most importantly once you've done what you are going to do in panel E and F they don't show it here but you certainly would take curettes and remove any calculus from the root surface or crown surface before you finished,

Gingivectomy



This is just another case just showing the same steps, both clinically as well as looking at the showing the external bevel incision and artist illustration how that might be done, so anyway, you can kind of look at this in detail if you like, but these are the steps of the gingivectomy

Gingivectomy



And then there's a few more panels or illustration just showing the gingivectomy as well as the healing of the gingivectomy, again typically not a situation where you have vertical defects or a lot of bone destruction and actually nowadays most often used when there's no attachment loss at all and really there just excess gingiva due to gingival hypertrophy, maybe gingival enlargement due to various medications that cause that, that's where gingivectomy particular these days would be used

Now lets talk about osseous surgery

Osseous Surgery Definitions

- Osseous surgery- periodontal surgery involving modification of the bony support of the teeth
- Osteoplasty- reshaping of the alveolar process to achieve a more physiologic form without removal of supporting bone Reshape w/o removing supporting bone (attached via sharpey's)
- Ostectomy- the excision of bone or a portion of bone to correct or reduce deformities caused by periodontitis including the removal of supporting bone.

So first of all some definitions

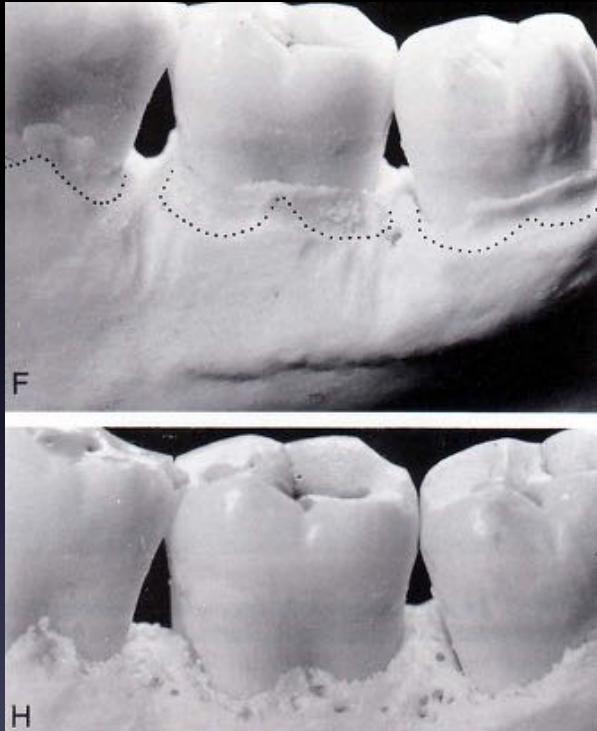
So a general term osseous surgery it means a periodontal surgery involving of course flap reflection and then modification of the bony support of the teeth, so reshaping of the bone, that's osseous surgery

Now there's two forms of osseous resection that can happen, its it can be osteoplasty where there's reshaping of the alveolar process to achieve a more physiologic form without removal of supporting bone, meaning the bone that's removed is not attached to the tooth by sharpey's fibers

And then there estoectomy which is excision of bone or portion of bone to correct or reduce deformities caused by periodontitis and includes removal of supporting bone so that's bone that actually directly attached to tooth by a periodontal ligament

Now when we say more physiologic form, just try to describe that a little bit and will show some examples momentarily but the idea is gingiva tends to follow when it heals for example if you reflect the flap and put it back as it heals, its going to follow gentle changes in the bony height apical coronally, if on the other hand there are sudden changes, like you have with disease with a vertical defect, the bone can't be say you know at the CEJ on the facial surface of a tooth and then because there's a 10mm probing the gingiva go down 10mm down the root and then on the next tooth where there's not much attachment loss come back up 10mm, its not going to follow those sort of sudden changes in the position of the bone apical or coronally, what would happen if you didn't make any, if you reflected a flap and didn't make any adjustments in the bone where there's vertical defects when you put the flap back, basically wherever the vertical defect is, if on either side of that the bone is at a more coronal level, the gingival will just be connect the higher levels of bone and basically reform a deep pocket, basically what you need to do to decrease the probing depths is take away some bone so that where the bone is more coronal on a tooth it can gradually work its way down to where there's been the bottom near the bottom of a vertical defect and then gradually work its way more coronally in a smooth, gradual movement so the soft tissue can follow that, so he'll show some examples of that that will hopefully make the point a little bit more

Osteotomy



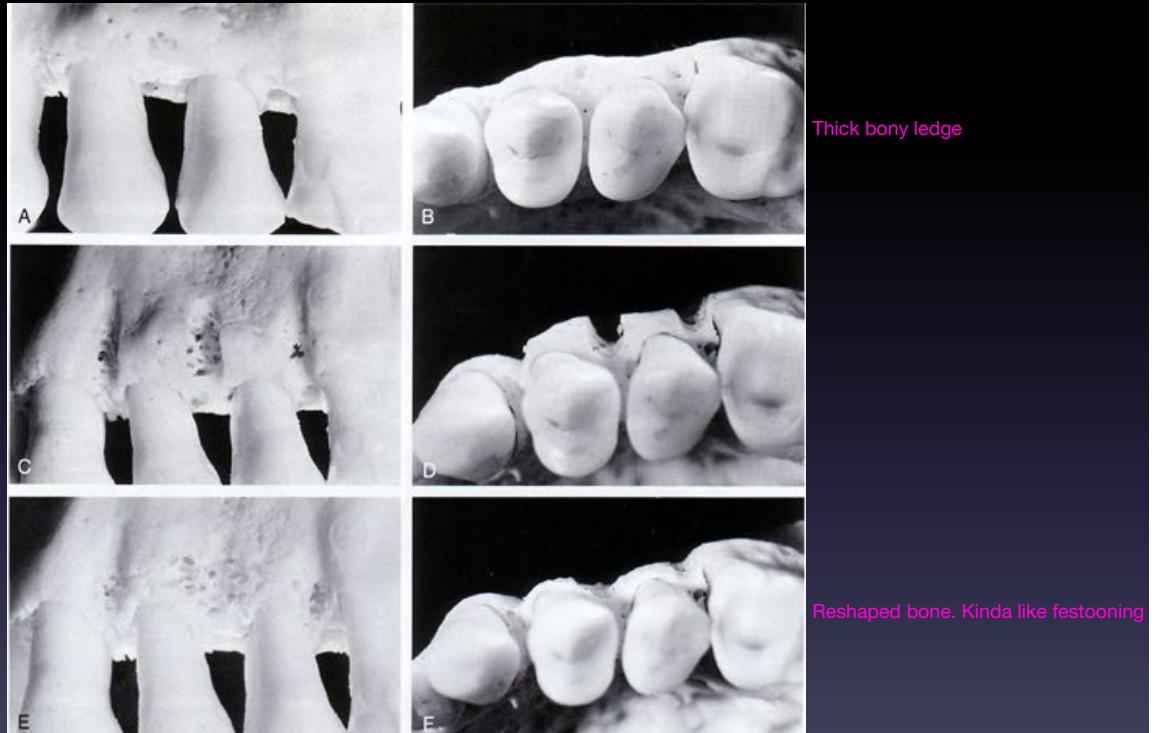
Positive architecture. Interdental bone is more coronal than F/L bone. Soft tissue follows; result is shallower PD.

For periodontitis, the opposite occurs.

Cohen ES, Atlas of Cosmetic and Reconstructive Periodontal Surgery, 1994

So here's a situation where there is some bony destruction around these teeth and so here they are going to show you what osteotomy is, he doesn't know if saw this if he would do osteotomy the way they are doing it exactly but you can see that if they take bone away from the apical surfaces where they are showing F they bout dotted line where they are going to take bone away and in H you can see that that bone was attached to the roots with PDL so that's osteotomy,

Osteoplasty

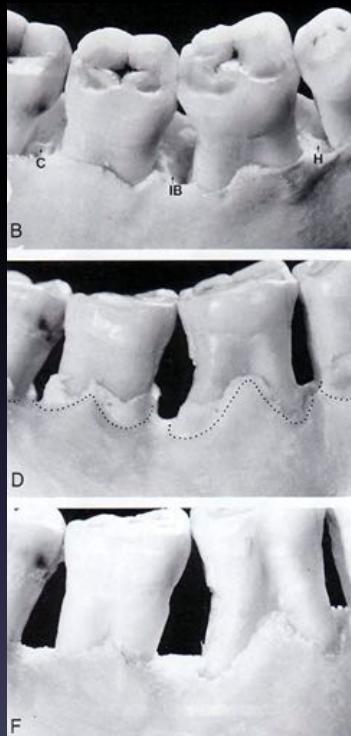


Cohen ES, Atlas of Cosmetic and Reconstructive
Periodontal Surgery, 1994

Conversely if we look at this slide, if we look at say, if we look at panel C, we can see that there is portions of the bone that sticks out say on the radicular surfaces of the teeth and it's kind of bumpy there and so we want to smooth that over so if you look at C and D, they made some grooves interdentally and there's some sharp areas of bone that maybe for whatever number of different reasons they decided they wanted to smooth that over When they smooth that over and go from D to F, that smoothing over none of that bone that they took away was attached to the root surface so that would be osteoplasty

So no

Osteectomy and Osteoplasty



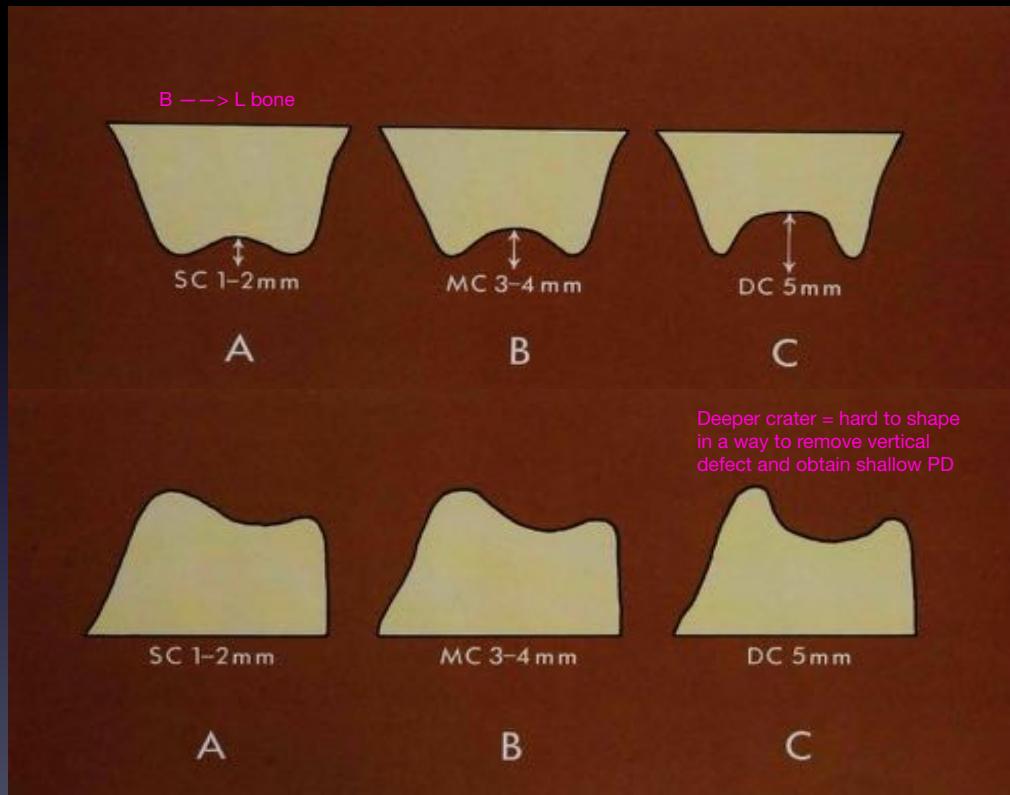
Buccal bone brought down to level of defect. Soft tissue will grow back to have shallower PD

Cohen ES, Atlas of Cosmetic and Reconstructive Periodontal Surgery, 1994

This side gives a little bit better idea of how osteotomy and osteoplasty might be employed so lets look at panel B and if you look at the first molar on the distal you can see that vertical defect where it says IB, probably what they meant is intrabony defect but that's a vertical defect there, now if the tissue is at the CEJ and it was a deep probing there, if we reflected the flap, clean the root surface really well and put the flap back you are liable to still have a deep probing because again the tissue would go directly across say front the straight facial of the second molar to the straight facial of the first molar and it would connect those two dots, it wouldn't follow down to the bottom of that pocket and then come back, bottom of the vertical defect and come back up there's no way to have the soft tissue follow that and have a shallow probing depth so what we generally would do then is take away some of that buccal wall and proximal wall and lingual wall away from that vertical defect so it was more like a horizontal bone loss there by the time we got done adjusting it and then we would start at the straight facial of the first molar and gradually work our way down to the where the bottom of that vertical defect is and then keep working distally and go back to the and come back coronally and sort of stop at the mid facial of the second molar so its a gradual slope and that's what you see now they're making a little dot there showing you how in D they are doing to start from the furcation, work their way down to the bottom of that defect and then work that's what the dots are, work their way back up to the furcation or the second molar because you wouldn't want to take bone away from furcation and make class 2 furcation

So that's kind of how you do osteotomy and some osteoplasty but you can see they definitely took bone that was attached directly to the root they took some of that away to allow to create a what we call physiological shape of the bone so that the soft tissue can follow it in such a way that there's shallow probing depth

Depth of Craters an Important Factor in Osseous Surgery



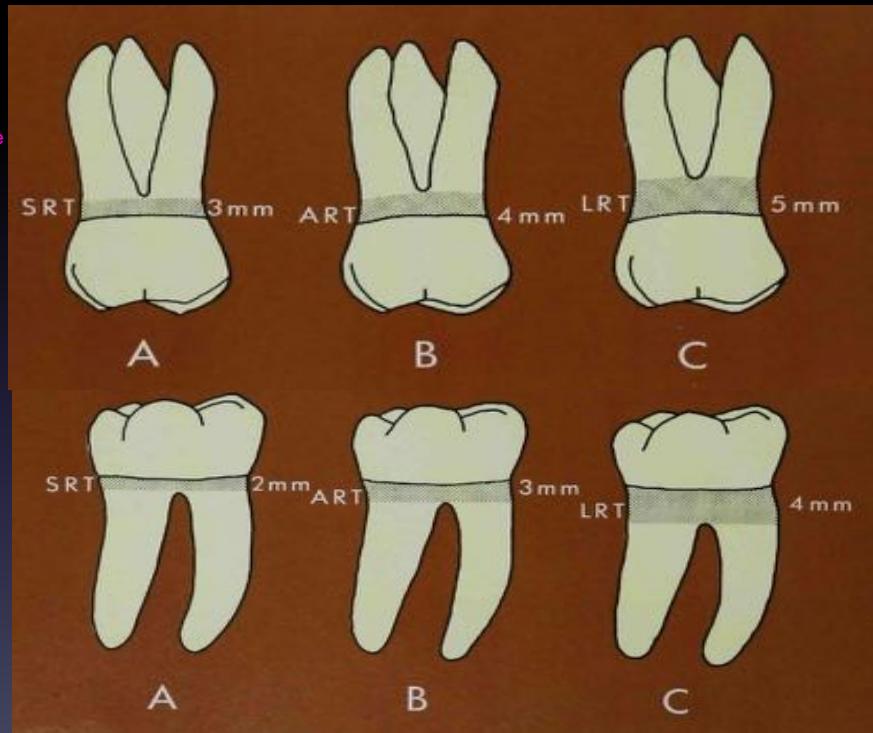
Oschenbien Int. J. Periodontol Rest dent 1986

The depth of the craters are really an important factor in osseous surgery because if you have a really deep crater probably won't be able to eliminate that without taking away way to much bone and making it difficult you might actually make the crown root ratio unfavorable maybe tooth would be loose when you got done if you took away too much bone so if you have a really deep vertical defect you might want to consider regenerative procedure instead or some other process just a flap debridement and replace flap but you wound't want to try to eliminate the vertical defect like he showed a moment ago if it was really really deep so this shows you gives you an idea of what's what is a shallow a moderate and deep vertical defect so again really deep defects we might not be able to deal with those with osseous surgery

Another important factor we need to consider when thinking about osseous surgery is what is the root trunk like?

Length of Root Trunk an Important Factor in Osseous Surgery

CEJ to furcation varies 3-5mm.
More space in root trunk = more room for reshaping



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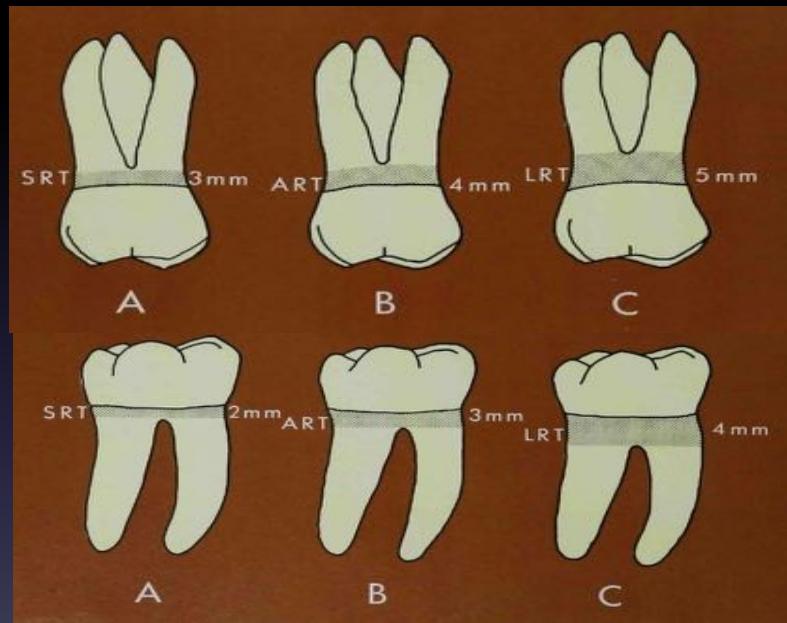
So lets look at that and this is again showing for maxillary molars and mandibular molars that teeth have different distances from the CEJ to the entrance of teh furcation and so we see short root trunk, medium, and long root trunk

So the longer the tooth trunk, the longer the root trunk, the more he can do osseous surgery an eliminate vertical defects without exposing the furcation

Conversely if you have a short root trunk and you have a deep vertical defect, maybe you can't do enough osseous surgery to get rid of the vertical defect because if you try to get rid of vertical defect then the bony crest will be so far apical you will wind up opening up the furcation so in any case, the main thing for you understand is the longer root trunk, the easier it is for you to be able to take away bone without opening up the furcation and therefore have a better chance of eliminating vertical defects and allowing to eliminate _____

Root Trunk Length

- Short: $\leq 3\text{mm}$
- Average: 4mm
- Long: $\geq 5\text{mm}$

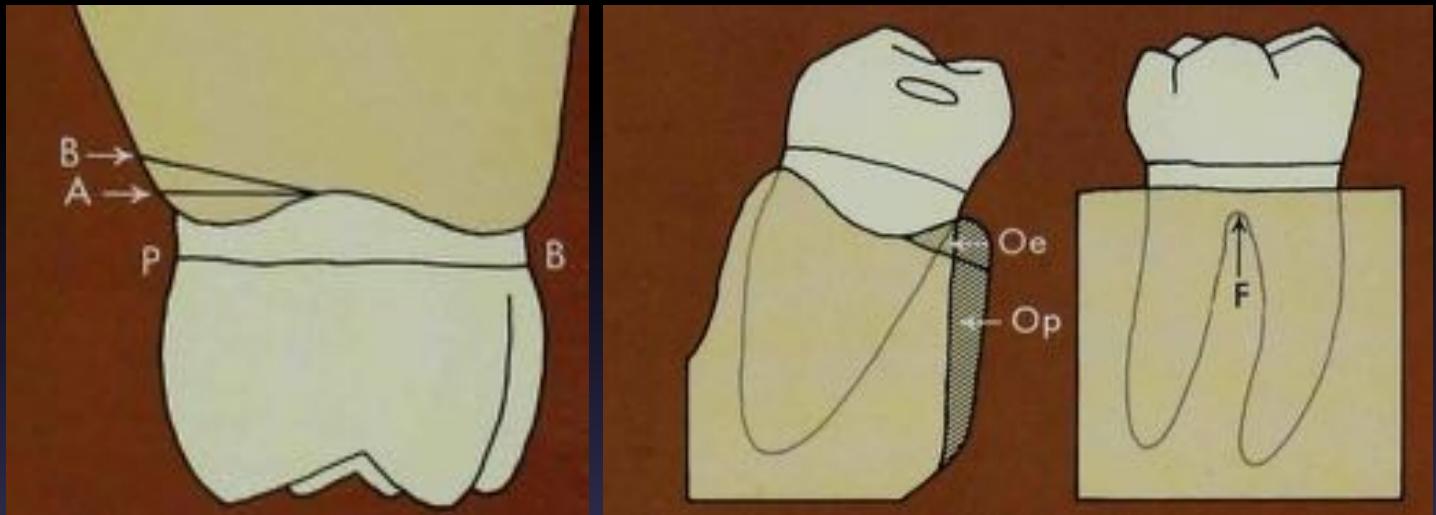


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Again this is showing you what's short, what's a short root trunk average and long root trunks for maxillary and mandibular molars

So lets look at how we would go about if we had a bony defect in a little bit simpler diagrammatic artist rendition how we would reshape bone to eliminate a deep probing

Osseous Surgery



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Lingual flap is lower

So here we see in cross section a mandibular molar, and you can see its also showing a maxillary molar, same kind of thing on the left side, mandibular on the right side, notice we are making note so lets look at the right panel which has 2 has a cross section showing the proximal surface and then it shows the same tooth which is mandibular molar from the first molar from buccal and you can see where the on the buccal, the bone is coronal to the furcation, on the buccal furcation, you can also see when you look at the cross section that there's a crater, notice they put a little oval indicating where the contact there is, so right under that contact area, there's this crater so there's a buccal wall and a lingual wall and the bone is lost right under the contact and that's typical what you find, the deeper probing is under the contact

So if we were to open a flap, clean that root surface and put the flap back, the soft tissue would connect those two peaks the peaks of the bone, the buccal and lingual and because of that vertical defect inter proximally would reform that deep probing if we just left it like that and didn't touch the bone so what we want to do is reshape that bone in a way that allows that tissue to be at a more apical level and decrease the probing depths so what would we do?

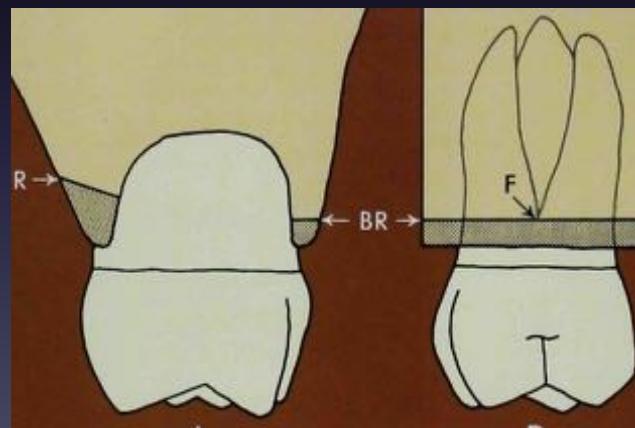
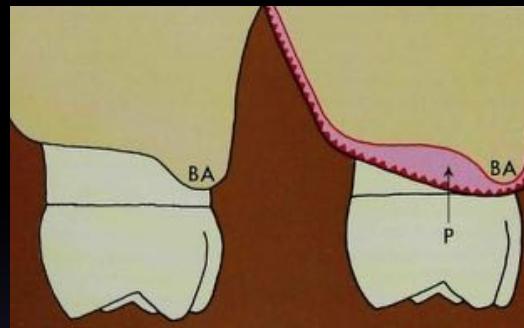
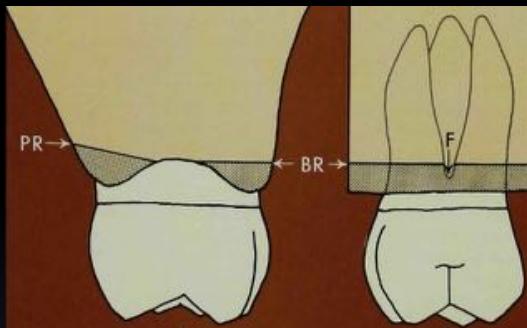
All the cross hatched bony area there in that right panel with the cross section of that mandibular molar that's what would be taken away with a bur, and then reshaping the bone in that fashion some fo that would be osteoplasty and some would be osteotomy and once we got done with that then it would be a gradual slope from that buccal wall of the defect, it would just slope straight down, some people call that a ramp to the lingual so if you think about a why do we call it a ramp, the thing that comes to his mind when he says ramp is boat on a trailer and you want to put it in the water you drive it with your car to the ramp and it slides, the trailer is backed down the ramp so that the eventually the bone gets into the water so that's think of that that's a ramp so that the bone is going to be higher on the say in this case mesial buccal line angle and then at that line angle as we go in the cross section towards the lingual its going to slope straight down because we've taken away the lingual wall, reshaped that lingual wall in the crater and thinned the bone out a little bit on the lingual and allow that flap to be more apical on the lingual than the facial, now why didn't we take the buccal wall away?

Well if we reduced the buccal wall that would give us a problem because it might actually then cause us to open up that buccal furcation so that's why we didn't do that

The furcation entrance tends to be more apical on the lingual than the facial and mandibular molar, don't worry about all that delial

So this is how we do reshaping, in a similar fashion you can see what it looks like for maxillary molar, the same thing you can see how its showing from the there's a little bit of a crater there in this maxillary molar, we are going to reduce the lingual wall of the crater of the two wall defect and reshape it, go from where it starts off to A and then down to B and now start a little what we might call a ramp to the lingual but allow a soft tissue to be more apical on the lingual and the bone and the soft tissue sloped as it goes lingually or palatally and in that way reduce the interproximal probing depth

Osseous Surgery with Compromise



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So now you'll notice in the upper panels it's shown how sometimes we compromise a little bit on our osseous surgery when we have a deeper vertical defect so in the upper left panel you can see that if we were to take away all the cross hatch bone that it shows in that left panel, the left cross section, left aspect of the left panel, if we took all that bone away we would open up that buccal furcation that's what it shows in that right buccal view in this left panel on the slide

So instead of that what they would suggest then now move to the upper right panel you can see that they have done the osseous surgery and they took away the lingual wall of the crater but they left some of the bone left on the facial and so there will be a little more than a probing dip than otherwise but still they reduce the probing considerably but they left that bone on that buccal mesial or distal buccal line angle because they don't want to open up the furcation, and so there's a little bit of a compromise, now in that bottom panel where you have a deeper vertical defect, well there you might take a little bit of the bone on the facial, but just get down to the level of furcation but not apical to furcation level and it can take a little bit of the lingual bone off so it allows you to get the soft tissue more apical but you leave a little bit of the vertical defect because you don't want to open up the furcation, that would be a bit off a compromise, you know one of the things we might consider rather than doing osseous surgery is depicted in the lower panel, is do a regenerative procedure that's the other option

Now let's see some real surgery where this sort of thing is being done

Osseous Surgery

Crater



So now if you see in panel A, that's a 15mm probe, so he can tell from that that's probing 7mm on the mesial aspect of the second molar so now if we go to panel B you can see the flap reflected, its hard to see but you can see the buccal wall but we know based on wheterht the probe is going 7mm from the CEJ that we know its much deeper than that and there's probably a little more on buccal wall of bone and the crater is underneath he contact just like he showed us in some of these artists illustratetions, so now whatt are we going to do, well if you go to C you can see where we start at the furcation, do some osteotomy on the straight facial of the distal buccal root of the first molar, work our way down to the bottom of the defect, take away the buccal and lingual wall way down there and then gradually work our way back up to the buccal furcation of the second molar because we don't want to open up the furcation

So you can see if you start in the mesial buccal line angle on the first molar there is a gradual movement apically and then a gradual movement back coronally to the distal buccal line angle of the second molar and that's a sort of gradual curvature that the soft tissue can follow, again if we made abrupt changes in body position, the soft tissue wouldn't be able to deal with that and would just connect the dots and go straight across and have a deep probing come back so that's kind of what we do to try to reduce probing depths and you can see in panel D they've apically positioned the flap so now whereas before in panel A you can't see the CEJ cause its covered by the soft tissue, we've now moved the soft tissue down to the new bone level and then that will heal and there will be a root exposure but it will be some indication to clean really well and dentist will clean really well and have minimal probing depth and hopefully be able to maintain attachment at that new level in a healthy fashion

Remember. He said there is root exposure there but this won't be as esthetic as it was before but its not in a place in the oral cavity that shows very much and it used to be many decades ago that this sort of surgery would be done all around the mouth even in the anterior but we now don't do that so we would do other in certainly in the anterior teeth especially maxillary anterior we would av eid this kind of surgery because its not particularly esthetic but he will show us an example where that had been done and you will see why we wouldn't; t do this in maxillary anterior

Osseous Surgery-not good for esthetic areas



"Party Gums"

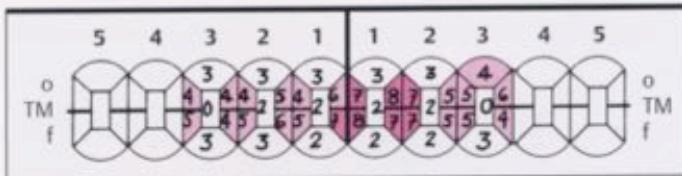
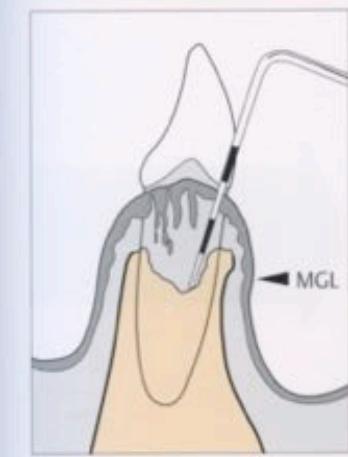


So here's if you look in this upper left panel, someone has had osseous surgery in apically positioned flap done even though they had severe periodontitis and so that's probably not so esthetic, and in fact back then they used to make what they called party gums and that would just snap in for a more esthetic situation but really that's just not the way to treat this sort of situation so we don't do that anymore

There we would just do a regenerative procedure or at the very least open the flap to get good access to root surfaces, clean roots really well and put flap back where it was, and if you did that you might get shrinkage of the tissue and some root exposure but it would be nothing like this

So again osseous surgery not something you would consider doing in the maxillary anteriors

Osseous Surgery



So lets look at some cases where osseous surgery is done and talk about it step by step

This is from textbook where it even shows some artistic illustrations to show what's going on here so you can see since its deep probing going on, its probing 7-8mm, and there's a crater defect where there a vertical contact under the contact but there is buccal and lingual contact remaining, what showing in cross sectional artist illustration in lower left panel

So not lets go to slide where it shows all the steps

Osseous Surgery



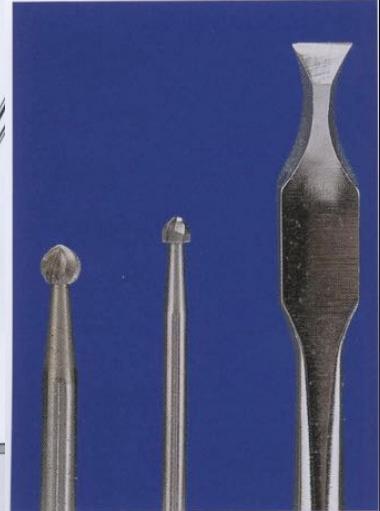
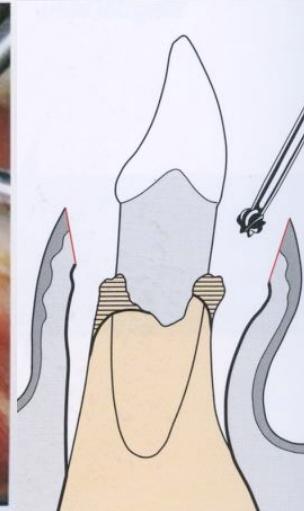
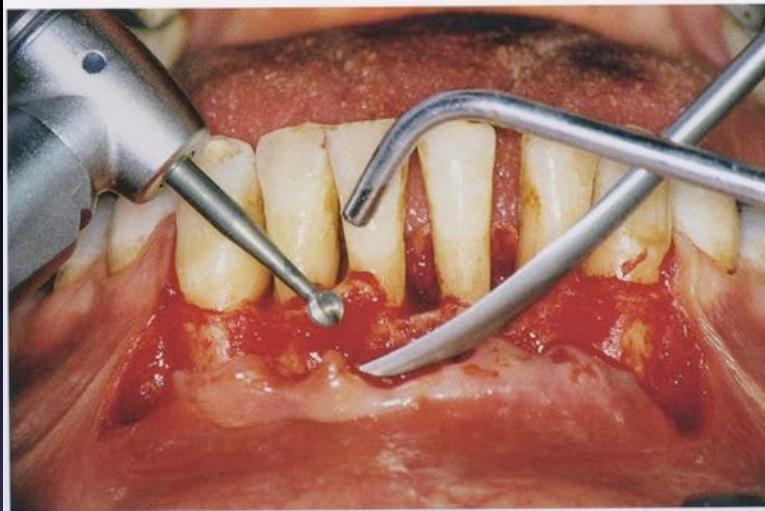
So in this case they did sulcular incisions facially, that's the upper left picture

And then the middle that's sulcular incisions, t

Then the top right flaps are reflected and the roots are being debrided with hand instruments also use cavatron, get things good and clean

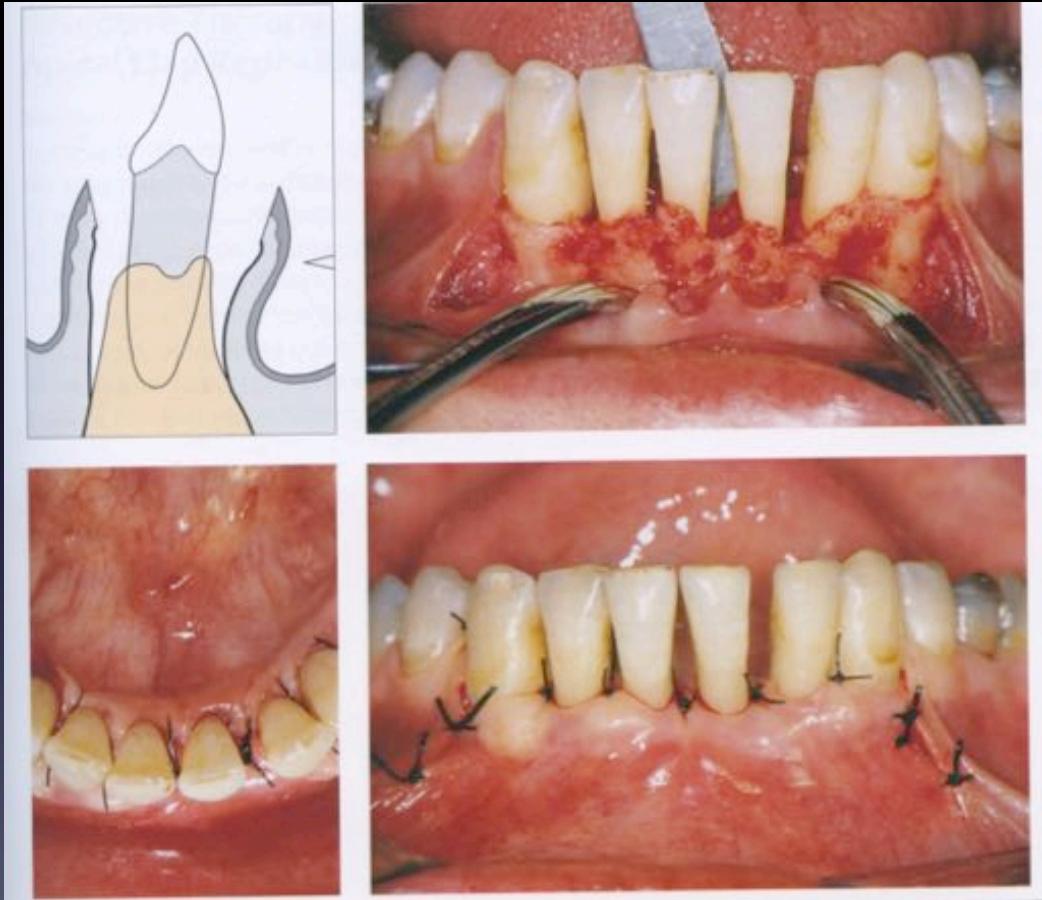
Once that's done we make sure all the you can see in the middle row, middle image where they're got flap reflected from the lingual, the vertical defects actually have granulation tissue in them or we spend a lot of time when doing periodontal surgery cleaning that out so we can see the roots really well and so that's what's being done now in the middle row all the way to the right in all the soft tissue out of the vertical defects, clean the roots really well, and then once we do that, once that's complete, and you can see in the bottom right panel, they are using a fine diamond to clean the roots, these days we use the cavatron or a diamond coated cavatron tip frequently to do our in addition to hand instruments to make sure we get good root preparation, eliminate all the calculus

Osseous Surgery



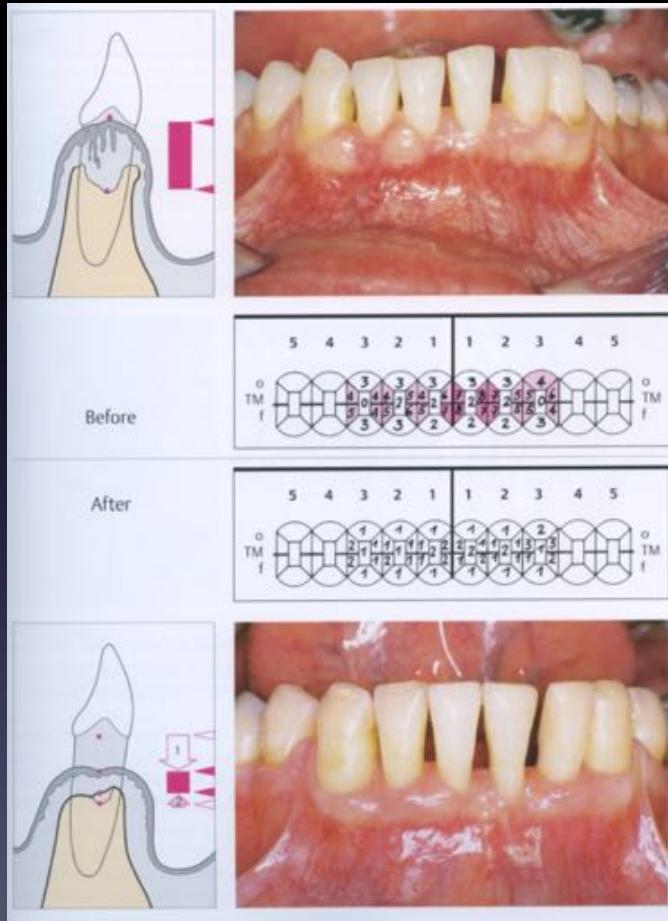
Once we've done that you can come in there and you can see the artist cross section illustration where they are showing you where they are going to reshape the bone to get rid of the crater osseous defect the vertical defect so that's what going to happen with the rotary instrument and in some cases we'll completely remove it, that's what they are showing in artist cross sectional illustration you can see that most of the buccal and lingual rwall is removed but not all of it, a little bit of the vertical defect is left because it was deemed that too much osseous resection, too much ostectomy would have to be done to completely eliminate the defect and so that's that they did

Osseous Surgery



And now this is after the osteotomy has been done you can see between the two centers there is a little bit of the vertical defect left but not all of it and so now the flap in the lower panels the flap is reapproximated but at a more apical position so its apically positioned and you can see the root exposure because of that but that allows so now the soft tissue can follow the bone as its been reshaped and at a more apical position so that after it heals the probing depths will be shallower

Osseous Surgery



And that's what they are showing here that they are able to although there is root exposure there is minimal probing depth and you can see how nice and pink and firm the tissue is so basically how we can with osseous surgery

Management of Furcations

- Objectives, indications, contraindications are similar to procedures already described
- Objective can be:
 - Maintenance
 - Regeneration-SRP, flap debridement, GTR
 - Resection- osseous surgery
- What you do often depends on grade and depth of the furcation

So now lets talk a bit about furcations and how we can use, how we can treat furcations, basically the same thing as he said when he was just in general talking about treating periodontitis and that is that we can do either resective procedures or we can do regenerative procedures and in some cases if the probing depths are not really deep and we have a furcation involvement we might just do maintenance so that's certainly a possibility so the indications for maintenance, regeneration or resection- is the same or similar to what we already talked about What you do often depends on the grade of the furcation or class of the furcation, 1, 2, 3, or 4 And the depth of the furcation so that if its a class 2 furcation if it only probes 1mm horizontally he might not need to be particularly aggressive might even if have shallow probing depth might even just maintain that height but on the other hand if I have a deep probing depth and can probe 4mm horizontally into grade 2 furcation there you might want to try to regenerate it

Glickman (1958)

Grade I: pocket formation into the flute but intact interradicular bone.

Grade II: loss of interradicular bone and pocket formation of varying depths into the furca but not completely through.

Grade III: through-and-through lesion

Grade IV: Grade III with recession exposing furca

So you remember the different grades of furcations sometimes called class of furcation but you can look at this even more on your own but we already talked about that



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Management of Furcations

- Grade I furcation
 - Either SRP or a gingival flap procedure or osseous surgery (if associated with a deep pocket or surgery is indicated for other sites in the sextant)



So if we have a grad 1 or class 1 furcation if the probing is not really deep might just do root planing, if there is deep probing depth you may choose to do just a gingival flap to access the root surface to get it clean or if there a deep probing depth and we feel like we want to reduce the probing depth by respective surgery you may also do that

All those might be possible depending on a number of factors that we might determine clinically

Management of Furcations

- Grade II furcation
 - If shallow with shallow pocket, may SRP only
 - If deep, surgical debridement may be indicated
 - Surgical therapy may include: GTR or Osseous Sx.



With grade 2 furcation, if its shallow, in other words we don't have a deep horizontal component to the furcation, and if the probing depth is not deep we may just root plane it

If its a deep probing depth but it doesn't probe horizontally very much then we may simply do a flap debridement. If on the other hand, it does have a significant horizontal component or a deep probing we may decide to do guided tissue regeneration to try to gain back attachment and three a number of factors periodontists consider to decide GTR, might be successful or not, he'll give us one example if the interdental bone levels inter proximal bone levels are coronal to the roof of the furcation, say if its a mandibular molar, then that is a greater chance of regeneration, but if the proximal bones levels are apical to the roof of the furcation your chances of success are much less and that has to do with blood supply and sources of bone and PDL cells the try to repopulation of that furcation, in any case the important for you to know if its a deep probing depth and a deep horizontal component probing into that grade 2 furcation then we may decide to do regeneration or osseous surgery to try to deal with that deep probing

Management of Furcations

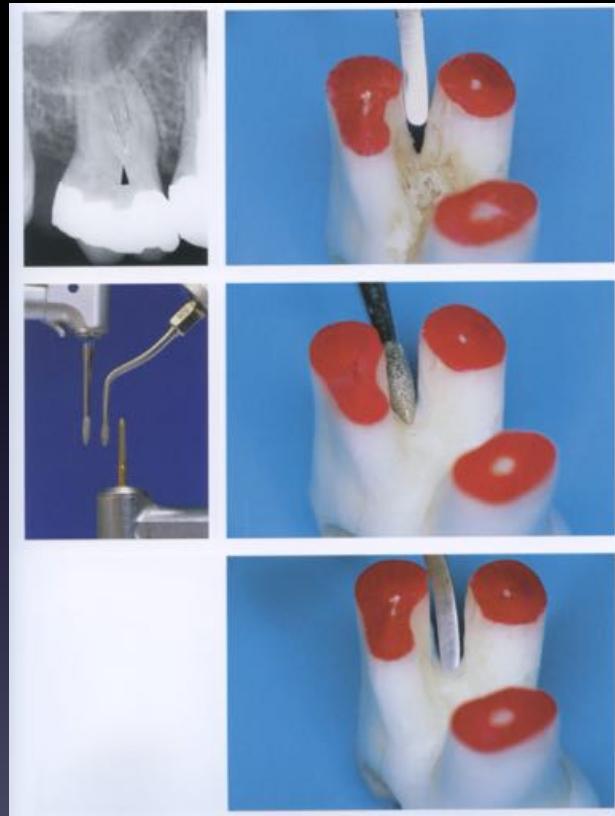
- Grade III furcation (“through and through”)
 - Surgical debridement probably indicated
 - Flap debridement or Osseous Sx., GTR not predictable
 - Root resection may be considered
 - Problems with root resections include: root caries, tooth/root fracture, endodontic failure
 - If tooth is not strategic or periodontal status is hopeless, tooth may be extracted

If we have a grade 3 or class 3 furcation where there is through and through we can probe all the way through and see the probe come out the other side or we can probe from the facial very deep, from the lingual very deep say if its a mandibular molar and we know the probes would overlap then we know that there is a communication from facial to lingual all the way through the furcation of in the case of maxillary molar from facial to distal, facial to mesial or for that matter mesial to distal if its trifurcation but in any cases communication all the way through the furcation, in that case surgical debridement is probably indicated because there is likely calculus in the root of the furcation and even with surgery it is very hard to get those little bifurcation ridges in grooves that are very hard to remove even with the flaps open and so with a closed procedure its just impossible so definitely if you have a grade 3 furcation surgery is like indicated, probably either just a flap debridement, flap access to the root of osseous surgery, guided tissue regeneration, a regenerative procedure is just not predictable and usually not successful for that so usually don't consider regeneration for grade 3 furcation

In a maxillary molar if its a grade 3 furcation say facial furcation to distal for example, we might consider a root resection where we take off the distal buccal root ___, show us some examples of that or an example of that Problem though is when we do root resections in the long term sometimes you wind up with root caries, root or tooth fracture, or endodontic failure

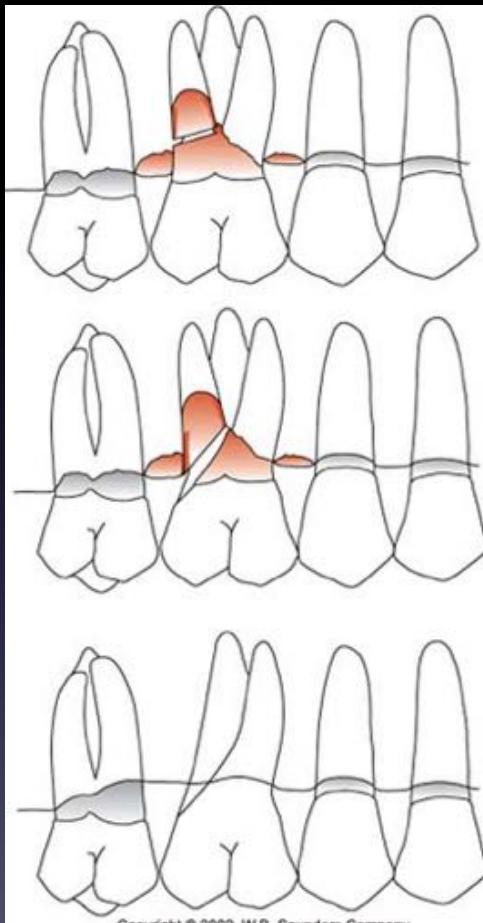
If the tooth is not strategic, you really don't need it, its 2nd molar that is unopposed or something like that, especially if the periodontal status seems to be hopeless you may decide to extract The tooth

Odontoplasty



The other thing that we often will do when we are during apertiotonal surgery, we have say a grade 2 or class 2 class 3 furcation, will often do odontoplasty to open up that furcation especially if we don't think we can do regeneration, so that you can see her vein the upper panel, curette won't fit in there so we just reshape that a little bit, then we can get curette in there or we can get a cavatron in there and maintain that a little better in the future

Root Resection



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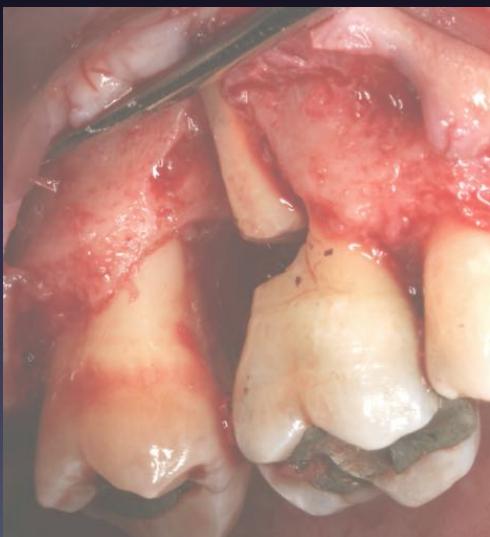
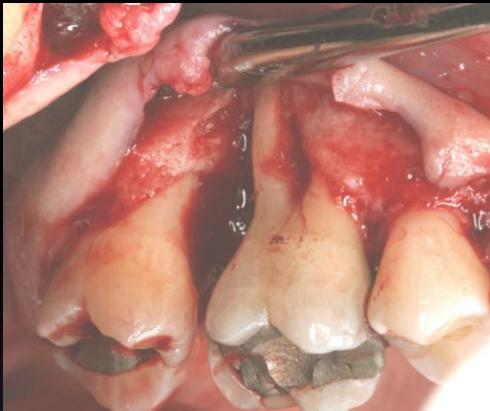
This is an example of an artist illustration where if you had a grade 3 furcation buccal to distal then you might want to take that distal buccal root off and so he will show us clinically that looks like

Root Resection-distobuccal root amputation



Here's a tooth that has that very same situation he just described so we get the flaps reflected

Root Resection



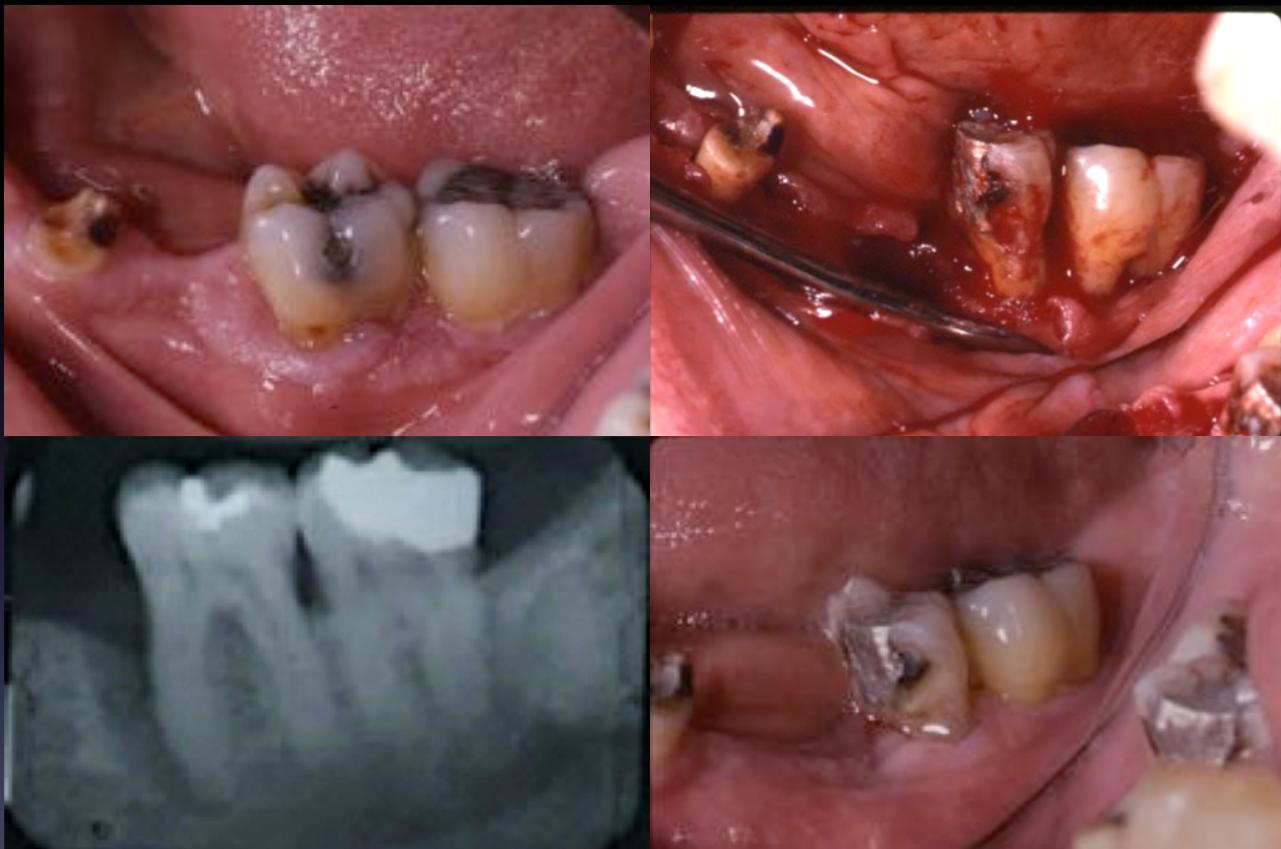
You can see there is communication from the buccal, it goes right through the distal furcation so we go in there and cut the root off that's why you can see now and once we've done that

Root Resection



It takes a few steps but notice if you look at the top row, sequentially he took pictures as he went along, you can't just cut the root off and leave the root stump because that acts like an overhang like and overhanging amalgam and collects plaque so what he's done here successively is reshape that and you basically eventually get to what we would call an L shaped crown so it almost looks like if you look at the middle of the bottom row, that it almost looks like a premolar little cusp hanging off the distal and that's kind of when you restore it you actually make a crown that is L shaped, what you wouldn't want to do is make a new crown that looks just like the tooth before the root resection and you know, reestablish a huge overhang in your restoration so it takes some finesse and working with your lab person to get a proper restoration an L shaped restoration when you've done a root resection but in any case that's what was done in this case

Root Resection-Hemisection



In this case he'll show hemisection where we've got a tooth here, a mandibular first molar where the bone is gone to the apex and it was attempts at regeneration were unsuccessful so the decision was to keep the distal root and use it as an abutment to as part of an FPD and so what happened here is it was hemisected and basically just cut right through the furcation and remove the mesial root and kept the distal root and you can see in that lower right panel after he did that and its healed, actually looked like a premolar and that's just how it was treated so you can see now

Root Resection-Hemisection



In this final restoration we were able to utilize that root to help support this large fixed restoration

Case Treated with Regenerative and Resective Surgery

So just want to finish this presentation off on kind of show you a case that was treated with both resective and regenerative therapy to give you an idea of how this works and so just kind of go step by step so while all 4 quadrants were treated or all 4 posterior sectants were treated with surgery he will show one of the sections that had osseous surgery so we can what that looks like and one section where we see the regenerative procedure to have an idea of how that ideas

Evaluation of Initial Therapy

- Plaque score 87% plaque free surfaces
- BOP 50% of sites
- Probing depths > 4mm 38%

So this is the patient evaluation of initial therapy they had 87% plaque free surfaces, really good home care but they have BOP on 50% of the sites since there still were quite a few sites that have deep probings and then residual calculus so again initial therapy was not successful in completely resolving the patient's periodontitis

Treatment Plan Surgical Phase

- Maxillary posterior sextants- osseous surgery with apically repositioned flaps
- Mandibular left posterior sextant- open flap debridement with GTR # 18-19, 19-20
- Mandibular right quadrant- flap surgery with apically repositioned flap #25-29, GTR#30-31
- Both GTR procedures utilized a guidor membrane and DFDBA

So here's what the treatment plan

Basically the mandibular sectants received regenerative procedures you can read the details of that and the maxillary sectants received osseous surgery

Both the GTR procedures had guidor membrane that is a brand name for barrier membrane and DFDBA which is decalcified freeze = dried bone allograft so its bone particles from a bone graft and they been decalcified so its just a protein from the protein particles that are represented the protein of from a bone bank



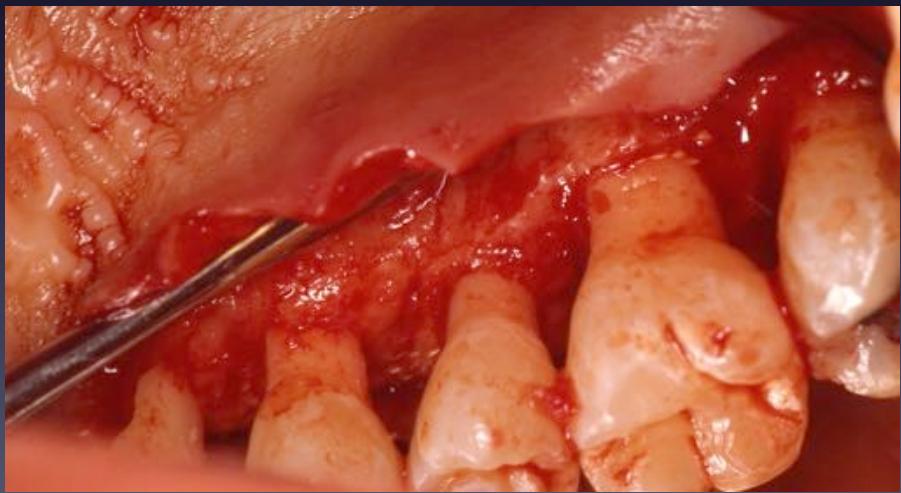
So lets look at the osseous surgery first, can see what things look like pre operatively
Can see patient did really good job with home care and there is even stippling in the tissue so that's how good this patient home care was and how effective as effective as can be the initial therapy was but there is still deep probings and BOP so we needed to address that



So we made sulcular incisions so an internal bevel, sulcular incision on the facial, on the lingual we did an internal bevel, some marginal incision and why do we that, well think about it on the facial he can reflect the flap past mucogingival junction and he can move that apically if he wishes to reduce the pockets so can be moved apically or coronally for that matter, he can put that flap wherever he wants it but as you know on the palate there is no mucogingival junction so the flap can't be positioned apically because its down to the palate so the only way to get that tissue margin more apical is to do a submarginal incision and take away some of the soft tissues so that's what we did on the palate



Here's after the flaps have been reflected on the facial and on the palatal top is facial view bothom is palatal view
And we've now root planned all the root surfaces and you can see especially when you look at the facial view, can
see the vertical defects that remain and this patient had a lot of attachment loss and bone loss so while we did
reshape them and did do some osteectomy and osteoclasts we didn't completely eliminate the vertical defects just
like he showed on some of the diagrams the artistic diagrams we looked at earlier, artist renditions, because we
didn't want to take away too much bone, we did want to reduce probing depths so in fact we did take some of it
away and that's what we will see in next image



Where you can see he reshaped things a bit and made physiologic architecture that the soft tissue can follow it in such a way to have reduced probing depths and



Now when he sutures the tissue back you can see now that on the facial there now several mm of root exposed because the flap is been reflected the flap has mucogingival junction and move that flap apically and on the palate its more apical position but by virtue of the submarginal incision since we can't reposition or apically position the flap on the palate since its ___ down?



And here's what things look like after couple weeks of healing so you can see now that there's more root exposure, the tissue looks nice and pink and firm and tats so that was really nice healing, if we now look at this same sextant after



| | Maxillary | | | | | | | | | | | |
|-----------|-----------|----|---|---|---|----|----|----|----|----|----|----|
| PD | 3 | 3 | 3 | 2 | 3 | 3 | 4 | 2 | 5 | 3 | 2 | 4 |
| FGM-CEJ | -3 | -2 | 1 | 1 | 1 | 0 | -1 | 0 | -2 | 0 | 0 | -1 |
| CAL | 0 | 1 | 4 | 3 | 4 | 3 | 3 | 2 | 3 | 3 | 2 | 3 |
| Furc Inv | 1 | | | 1 | | | | | | | | |
| MG Inv | N | | | N | | | N | | N | | | |
| Bleed/S | B | N | B | N | N | B | N | N | N | N | B | |
| Mobil | | | | | | | | | | | | 1 |
| PLQ | 1 | 0 | 1 | 0 | 0 | 0 | 1 | 0 | 0 | 1 | 0 | 0 |
| | Facial | | | | | | | | | | | |
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| PLQ | 0 | | | 0 | | | 0 | | 0 | | | |
| Bone Loss | | | | | | | | | | | | |
| Bleed/S | B | N | N | B | N | N | N | N | N | B | N | N |
| MG Inv | N | | | N | | | N | | N | | | |
| Furc Inv | 1 | | | 1 | | | | | | | | |
| CAL | 0 | 2 | 4 | 4 | 4 | 0 | 1 | 1 | 1 | 2 | 0 | 1 |
| FGM-CEJ | -3 | 1 | 1 | 1 | 3 | -2 | -2 | -1 | -2 | -2 | -1 | -3 |
| PD | 3 | 1 | 3 | 3 | 1 | 2 | 3 | 2 | 3 | 4 | 1 | 4 |

So here's the sextant after year of healing and maintenance and you can see that we've achieved for the most part minimal probing depths, 3-4mm as one 5mm probing but in that case that was much deeper than that to begin with and were able to maintain that but we have minimal probing depths and you can see that there's open embrasures internally the patient can get proxy brush in there and keep it clean and its allo easy for the dentist to keep it clean so those are maintainable probing depths where to begin with they were 6-7-8- mm probing depth so we really improved things considerably

The next thing he will show us is another sextant where we used a regenerative procedure



So here is a mandibular sextant where we did a regenerative procedure and as you can see here we've done sulcular incisions so internal bevel incisions, sulcular incisions where we want to keep all the tissue try to keep every bit of the papilla, everything don't want any don't want to take away any of the soft tissue because you want all hat to be available when you close things up, to try to enhance the regenerative effort



So now he has a flap reflected and you can see the vertical defects in between the premolars, in between the 2nd premolar and 1 molar and as well as between both molars and so we endeavor to get the roots clean as we can and the ways he already described to us in the past and then the next step is



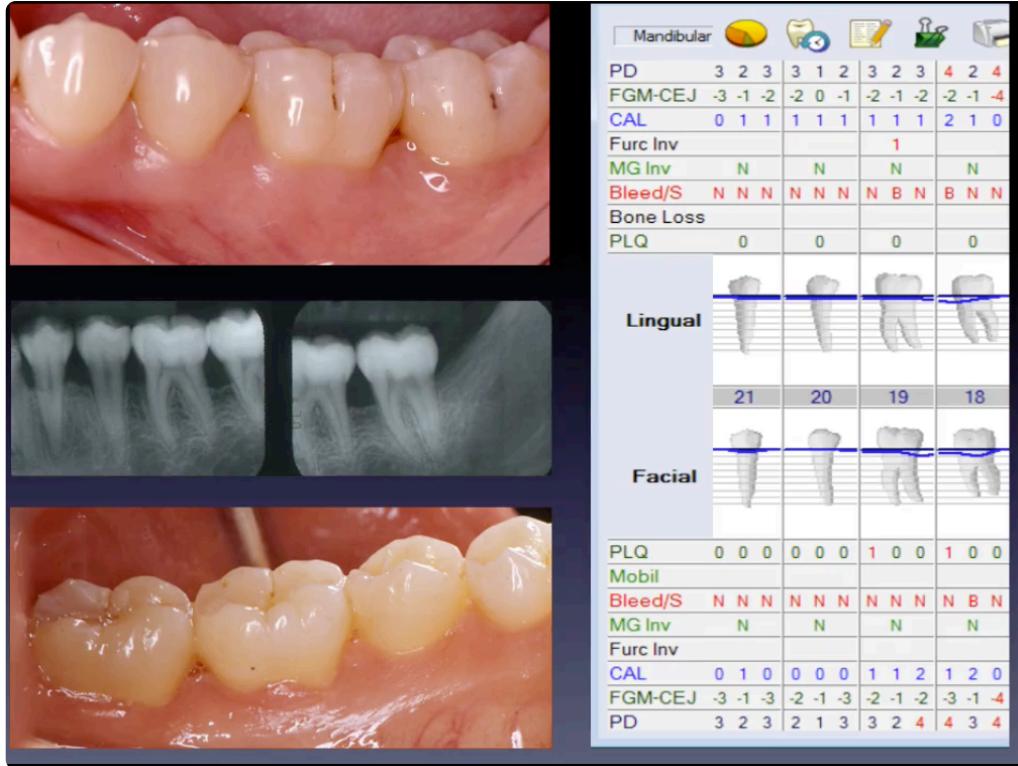
Actually there's two steps that already occurred here so on the one hand he put a particulate bone graft in those vertical defects, you didn't see that happen but that's already been done and then he took the barrier membrane and sutured that and there's two membranes there, one goes in between the second premolar and the first molar and the other barrier membrane went between the two molars and so there are its hard for you to see how they work but they are kind of in the shape of an H where the cross piece of the H goes under the contact and then the rest of it sits facially and lingually, this membrane basically covers over the bone graft interdentally and goes facially and lingually and actually covers the furcations and allows us to try to gain some attachment even in the furcations and also in the interdental area



Then suture that back and he's trying to get not just primary not just a replace flap but actually he tried to coronally position the flap so if you go back later on and look at the position of the flap margins they are actually up on the enamel more coronal than they were to begin with, you know before the surgery and then



This is one week healing and this is what you want to see when you do the regenerative surgery, its nice to see that all the tissue covers over the membrane so nothing is exposed so that happened here very nicely and that when we come back



So now when we get to this site a year later after a year of maintenance we can see that the result has been really good where good maintainable probing depths, 3-4 mm and the other thing he didn't show us up front so you saw clinically a vertical defects that were present now if you look radiographically you can see that all those interdental areas you don't see any vertical bone loss and that's because those areas were successful in regeneration and in fact that 1 st molar had radiographic evidence of a furcation involvement which grade class 2 furcation and now its only class 1 furcation on the lingual so we even get some new attachment and bone in the furcation area so things did improve greatly and we were able to get a nice regenerative result with this particular for this particlear sextant

Questions? Discussion?

