IMPLANTS
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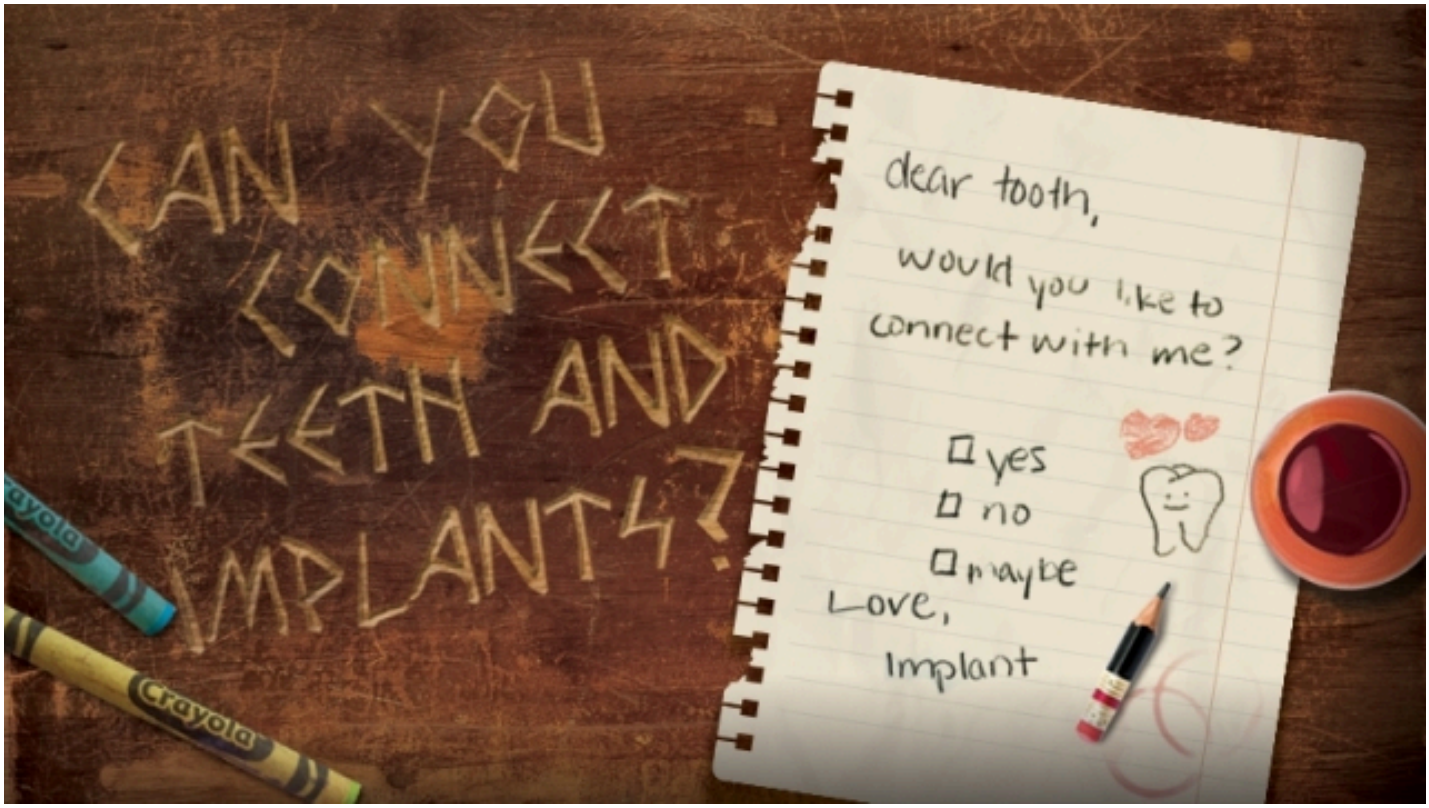
# Connecting Teeth and Implants: Yes, No, Maybe?

By Frank Spear (/spear-review/author/frank-spear/) on May 7, 2018 | (/bookmarks/bookmark/38681) SHARE




Whether or not it is acceptable to connect an implant (https://www.speareducation.com/spear-review/category/implants) to a tooth, or teeth, in a restoration is one of the most misunderstood areas of implant dentistry. The reason so much confusion exists is simple: there isn't one correct answer. To understand why, you must look at the mechanics of connecting an implant and a tooth; recognizing that the implant is essentially ankylosed, with effectively no mobility, the tooth has a PDL and may have minimal to significant levels of mobility. (See Figure 1 (/uploads/spear-digest/articles/2015/01/54/fig1.jpg).)

Under occlusal loading, the implant, being less mobile, will always be at greater risk of receiving increased load. The tooth will never be at risk of being over-loaded, as it is more mobile and would move under the load compared to the implant.

Connecting a single implant to a single tooth with significant mobility has the potential for the tooth to act as a cantilevered pontic extended from the implant. If there is one or more pont Live Chat and mobile tooth, there is a longer lever arm and the load on the implant will be

If the tooth has no mobility, the risk of significantly increasing the load on the implant is very low, even in the case of an FPD where there may be pontics between the implant and tooth.

There are other variables besides mobility to consider when contemplating connecting implants to teeth. Two significant considerations are the level of parafunctional activity of the patient, and also the number of implants and teeth being used in the restoration.

A patient with minimal to no parafunction, and teeth with normal mobility, present minimal risk when being connected to an implant. This risk is reduced when more than one implant is involved in the restoration. Much of what we know today about connecting implants and teeth was learned in the 1980s, when we were in the infancy of working with osseointegrated implants in the U.S.

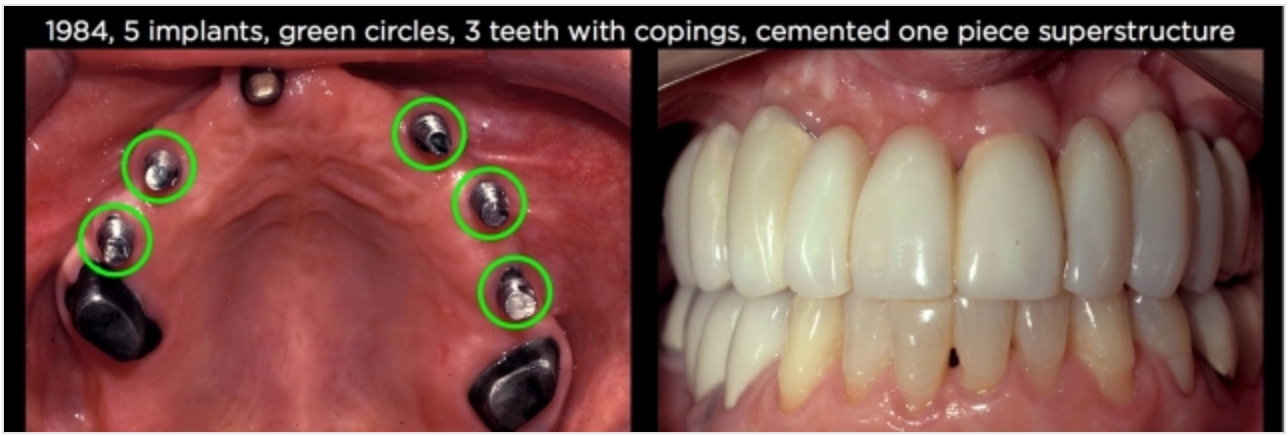



Figure 2

## Example 1:

An example is the patient shown in (Figure 2 above and Figure 3 (/uploads/spear-digest/articles/2015/01/54/fig3.jpg)). She presented in 1984 with a maxillary central incisor that had endo, a post core and one remaining molar on each side. Back then we rarely would have considered removing the natural teeth, so they were restored with permanently cemented gold copings. In addition, five implants were placed; three on one side and two on the other. Enough implants were placed to support the occlusion of the entire arch, in other words, the teeth were unnecessary. A one-piece superstructure was placed with temporary cement over all the teeth and implants.

The restoration is still successfully functioning at 30 years post treatment. This approach has been referenced in the literature for decades and is generally quite successful, assuming an adequate number of implants to provide occlusal support is used, or the teeth aren't mobile.[1,2]

In contrast, a patient with high levels of parafunction, and multiple mobile teeth, is at high risk for overloading the implant if the implant is rigidly connected to mobile teeth. This usually isn't producing a loss of integration, but instead a structural problem; loose or fractured abutment screws would be an example. The risk is extremely high if an inadequate number of implants is used in the restoration.

## Example 2:


Figure 4

The patient in Figure 4 above and in Figures 5 (/uploads/spear-digest/articles/2015/01/54/fig5.jpg), 6 (/uploads/spear-digest/articles/2015/01/54/fig6.jpg), and 7 (/uploads/spear-digest/articles/2015/01/54/fig7.jpg) is an example. He was referred to me in 1986 after fracturing porcelain and solder joints on his fourth reconstruction in only 10 years, he has a history of severe bruxism. After removing the old reconstruction I was left with a maxillary right canine that had endo and a post core, and on the left side a lateral, canine and both premolars. All five remaining teeth had a Grade 2 mobility.

As mentioned earlier, in the mid 1980s we rarely would have considered sacrificing a natural tooth to place an implant. So the surgeon placed two implants, one in the right lateral position, and one in the right second premolar position. I then placed gold copings on all the natural teeth and the two implants. In addition a one-piece superstructure was temporarily cemented over the teeth and implants.

The problem is that the one-piece restoration is effectively cantilevered off of the two implants due to the Grade 2 mobility of the natural teeth. It took three years, but ultimately he lost the integration of the second premolar implant and it came out when I went to remove the temporarily cemented superstructure.

I then put the lateral incisor implant to sleep, and used composite to turn the lateral and second premolar, where the implants had been, into pontics. It is interesting when all the teeth are equally mobile, and you use a one-piece restoration, to see how well they do. He went seven years before finally the right canine root fractured. We then removed all the teeth and went to a completely implant supported restoration using eight implants to support his high levels of muscle activity.

Having focused on the risk for the implant when connecting them to a natural tooth, there is one concern for the natural teeth, intrusion, the tooth moving apically out from under the prosthesis.

This is an issue that has occurred for decades, not just with teeth and implants.In the old days of periodontal prosthesis, where each tooth received a gold coping that was permanently cemented with a full arch restoration temporarily cemented over the top, it was not unusual to see an isolated tooth or teeth intrude out from under the prosthesis, sometimes by as much as 1 to 1.5mm. (See Figure 8 (https://assets.speareducation.com/userfiles/Frank_Spear/connecting_teeth_and_implants_fig8.jpg).)

## Example 3:

Intrusion has been shown to occur when the tooth is connected to the implant with a non-rigid connection that would allow the tooth to move independently of the implant in an inferior direction. An example is the classic implant restorations from the mid to late 1980s.[3,4,5,6,7]

Most of the implant companies back then did not have any type of anti-rotational implant abutments, so it was necessary to connect the single tooth implant restorations to the adjacent tooth with a non-rigid connection so that the implant restoration didn't rotate and come loose. In addition, because of how weak the screw was connecting the restoration to the abutment, it was necessary to place the female portion of the non-rigid attachment on the natural tooth, and the male on the implant. This allowed for removal and retrieval of broken or loose screws after the restorations were placed. But it also created a situation where the natural tooth could intrude relative to the implant, and on occasion they did. (See Figure 9 below and Figure 10 (/uploads/spear-digest/articles/2015/01/54/fig10.jpg).)

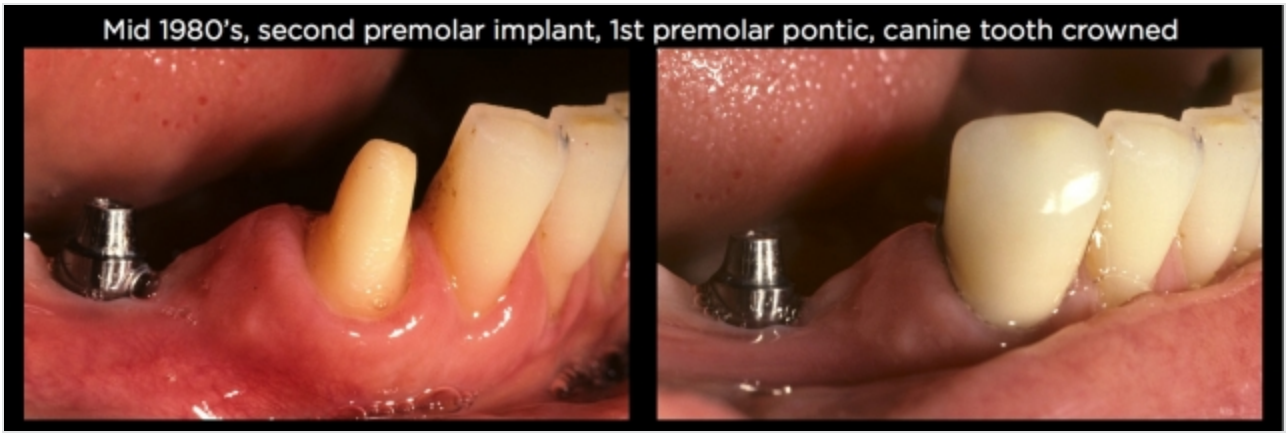



Figure 9

The classic coping and one-piece superstructure design used in the 1980s and 1990s (Figures 2 (/uploads/spear-digest/articles/2015/01/54/fig2.jpg), 3 (/uploads/spear-digest/articles/2015/01/54/fig3.jpg), 4 (/uploads/spear-digest/articles/2015/01/54/fig4.jpg), 5 (/uploads/spear-digest/articles/2015/01/54/fig5.jpg), 6 (/uploads/spear-digest/articles/2015/01/54/fig6.jpg) and 7 (/uploads/spear-digest/articles/2015/01/54/fig7.jpg)) is also susceptible to natural tooth intrusion if the temporary cement washes out between a coping and the superstructure, it now allowed the natural tooth to move independently of the restoration, and intrusion was a possibility. Several theories have been postulated as to why intrusion occurs.[8,9,10]

With the risks of overloading of the implant, and intrusion of the teeth, it would seem reasonable to ask WHY you would want to connect an implant and a tooth, but there are times where it may be necessary, and sometimes even desirable.

## Example 4:

The most common reason would be because you HAVE to, an example might be a patient missing a lower first and second molar. A surgeon places two implants, one for each missing molar, but what if the first molar implant doesn't integrate? A new implant is placed for the first molar, but it also doesn't integrate. The patient says NO MORE, they want the restorations, your only choice is to connect the second molar implant to the second premolar and do a 3-unit FPD.

## Example 5:

An additional reason for choosing to connect implants and natural teeth is a situation where it simply isn't possible to surgically place all the implants you would like, so you need to connect the available implants to a tooth or teeth and use an FPD.

If it is necessary to connect implants and teeth, the question becomes what does the design of the restoration look like. Ideally the design accomplishes two things, one is to prevent the tooth from intruding, the other is to provide some stress relief for the implant if the tooth being connected is mobile. The stress relief primarily applies when connecting a mobile tooth to a single implant.

The other consideration when connecting an implant and a tooth is whether you would like the implant restoration to be retrievable, so you can get the restoration off and deal with issues like loose or fractured abutment screws.



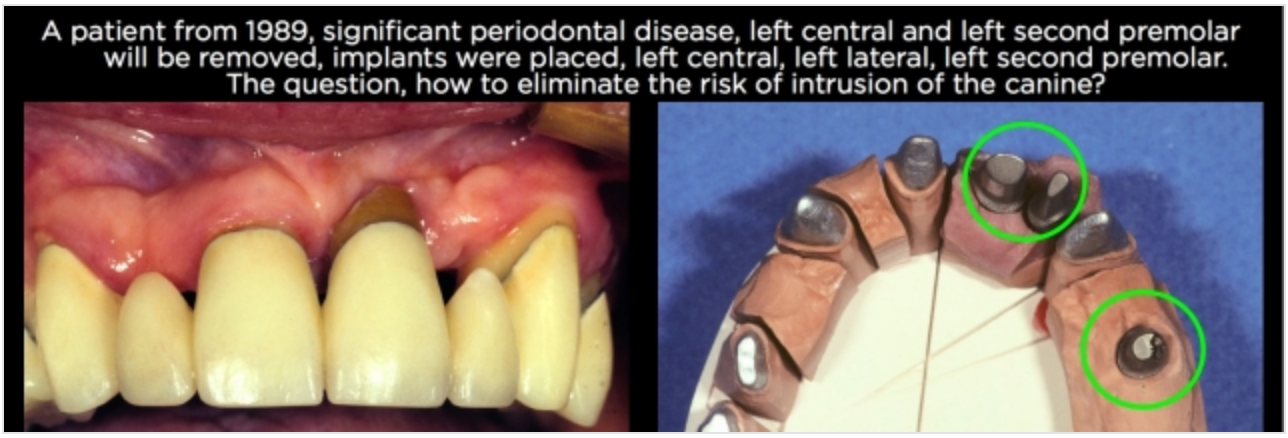



Figure 11

## Design Options:

I'll use the patient shown in Figure 11 above to illustrate some design options. She presented in 1989 with significant periodontal disease and an FPD from the left central to left canine to left second premolar. The left lateral and left first premolar were pontics. The decision was made to remove the left central and left second premolar due to the severity of the periodontal defects.

The surgeon placed three implants, one in the left central and lateral and one for the second premolar; the canine was acceptable periodontally and was retained. We will have to connect the implants to the canine to create an FPD. The first thing I would recognize is that the three implants are more than adequate to support the occlusion, so the canine isn't necessary for the restoration to be successful, but it is present, and the patient doesn't want it removed.

My concern in planning the design of her restoration was primarily focused around two areas: preventing intrusion of the canine out from under the restoration and providing the ability to remove the implant restoration to access the abutment screws. These were UCLA abutments, and in this era we didn't even have torque drivers or gold screws yet, so screw loosening was a very real issue that had to be planned for.

My solution can be seen in Figure 12 below and Figure 13 (/uploads/spear-digest/articles/2015/01/54/fig13.jpg). I had the technician make the crown on the canine with a lingual that was cast separately, and had a small screw to retain it to the actual cemented crown. The crown was permanently cemented to the canine tooth, but the removable lingual was soldered to the implant restorations. The five unit restoration was temporarily cemented and the lingual set screw placed to prevent intrusion of the canine.

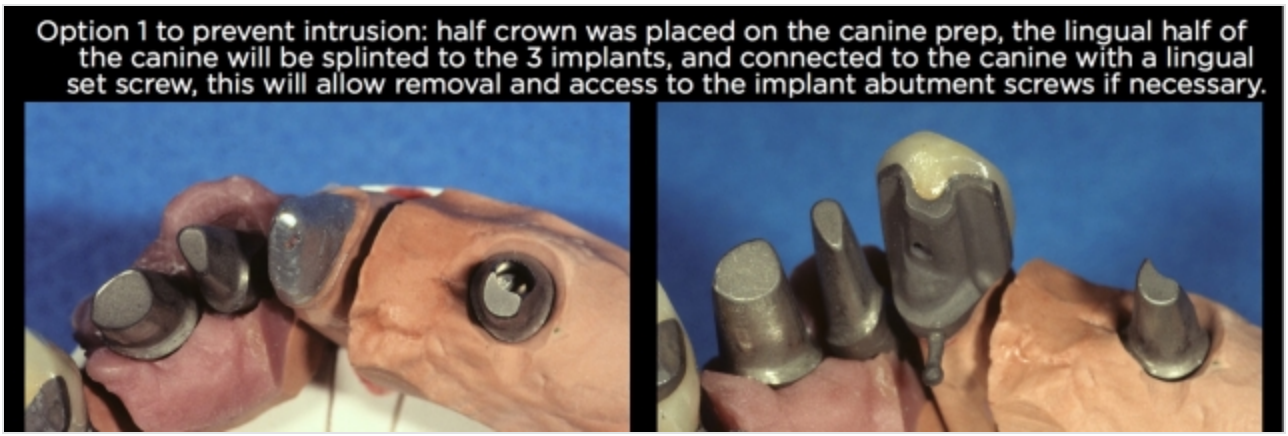



Figure 12

I could have left the central and laterals as single unit restorations, and just done a 3-unit FPD from the canine to the second premolar implant. Instead I connected the central and lateral creating the five unit splint which had the advantage of eliminating any risk of implant overload due to the fact the canine had Grade 1 mobility. A relatively complex design, but it has worked for over 25 years.

If I would have treated the same patient today, with a retained canine, and second premolar implant, I would have designed it as shown in Figure 14 below. The biggest difference is today I would have used a modern internal connection implant, such as a Straumann, which would have eliminated my concern over screw loosening and also eliminated my concern over needing the retrievability of removing the implant restoration to gain access to the abutment screw.

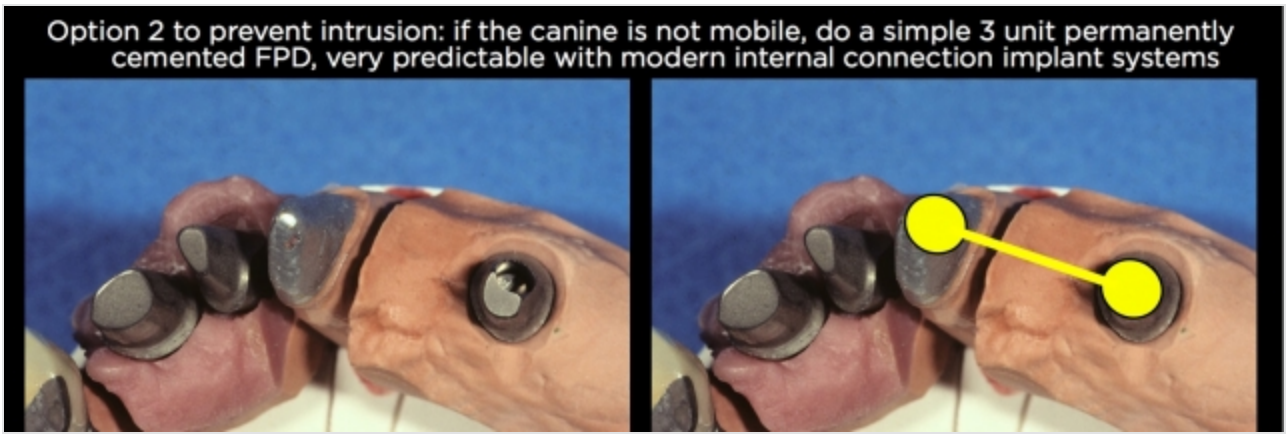



Figure 14

Without the need to have the implant restoration retrievable, I would have considered two design options based upon the mobility of the canine. If the canine had virtually no mobility, or what I would consider normal mobility, I would have torqued the abutment to place on the implant, and then done a simple 3-unit FPD, permanently cementing the restoration to the implant abutment and the canine. The permanent cementation eliminates the risk of the canine intruding. (See Figure 14.)

If the canine had slight mobility, a plus to Grade 1, I would have connected the canine to the second premolar implant using a non-rigid connector, but the key is how you orient the connector to prevent intrusion of the canine. The traditional approach as seen in Figure 10 (/uploads/spear-digest/articles/2015/01/54/fig10.jpg), where the female attachment is on the natural tooth won't prevent intrusion, instead the female needs to be placed on the mesial of the second premolar implant crown which will be permanently cemented to the implant abutment. Then the male is attached to the distal of the first premolar pontic, which is attached to the canine. This approach will not allow the canine to intrude as long as the canine restoration is permanently cemented. (See Figure 15 below.)

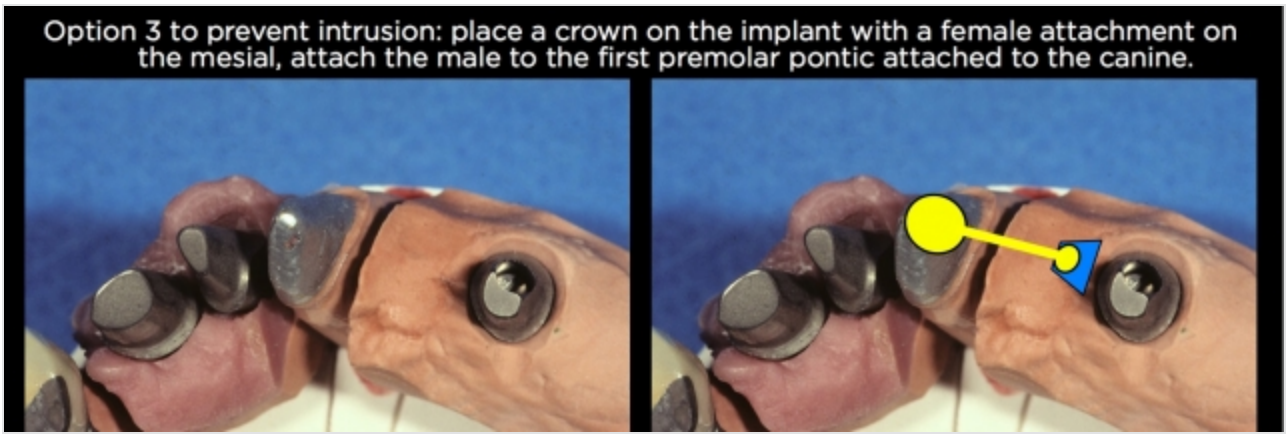



Figure 15

The key when using a non-rigid connection to attach the slightly mobile canine to the implant is to be sure the attachment isn't too rigid, as many precision attachments are. Before cementing the canine restoration I would try it in and see if you can mimic the mobility seen in the canine as a single tooth. If you can't, I would rubber wheel the male attachment to provide a greater amount of freedom in its fit into the female attachment.

Chee and Mordohai published a unique case in 2010, where rather than an attachment, they simply created a deep rest seat on the implant crown similar to what would be done on a removable partial denture; the male portion of the rest was attached to the pontic which was attached to the natural tooth.[11]

## The Biggest Risk

The highest risk implant to tooth connection would be if the implant was to be used as a pier abutment, with a pontic and natural tooth on each side of it. I don't have any clinical examples where I have used an implant as a pier abutment between natural teeth, but I have been asked about it several times by different clinicians. I am including a case of using natural teeth as pier abutments to illustrate the challenge.

The case illustrated is missing laterals and first and second premolars with he canines in the first premolar position. She was treated in 1985, before we had UCLA abutments, and was treated without implants. Today it would have been a very clean implant case, and much less complex. The biggest challenge of pier abutments is they act as a fulcrum in the middle of the prosthesis, so that when the patient bites on either end, there is a tension applied at the opposite end, which wants to unseat the restoration. (See Figure 16 below.)

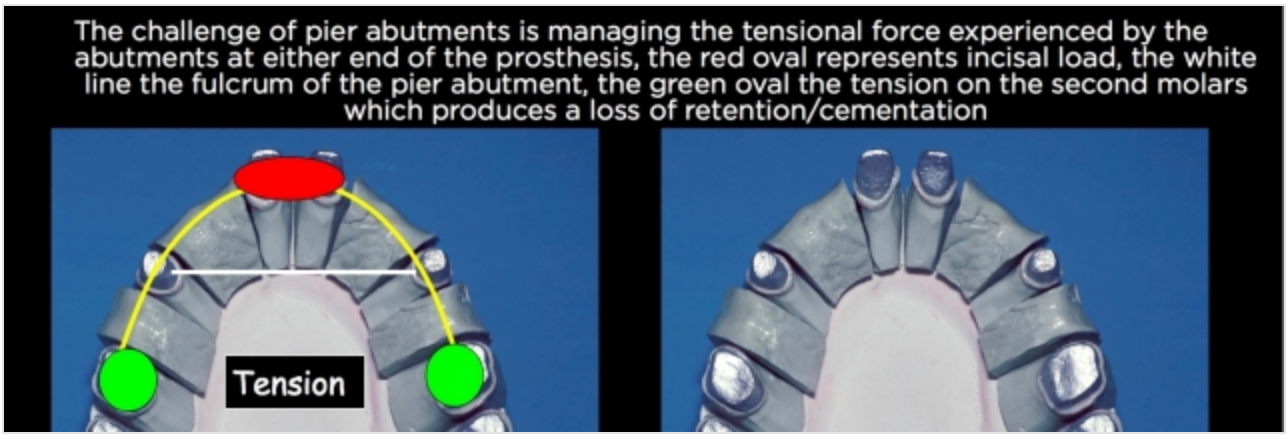



Figure 16

The solution is to utilize attachments as stress breakers. The typical location is what is seen in this patient, the distal of the pier abutment. In her case the restoration is rigidly splinted from first premolar to the centrals and the opposite first premolar, there are then female attachments on the distal of the first premolar pier abutments. The male is attached to the mesial of the second premolar pontics. (See Figures 17 (/uploads/spear-digest/articles/2015/01/54/fig17.jpg), 18 (/uploads/spear-digest/articles/2015/01/54/fig18.jpg) and 19 (/uploads/spear-digest/articles/2015/01/54/fig19.jpg).) [2]

If the pier abutment was an implant, I might have also considered placing an attachment on the mesial of the pier abutment dependent upon the mobility of the anterior teeth. In this case the restoration seen on this patient is still functioning fine 29 years after placement. (See Figure 20 (/uploads/spear-digest/articles/2015/01/54/fig20.jpg).)

## Connecting to Maintain Mobile Natural Teeth

The final reason I have connected implants and natural teeth is to maintain mobile natural teeth in the anterior, which subsequently retains bone and soft tissue, specifically the papillae. Of course the key is to use enough implants that the mobile tooth or teeth don't risk overloading the implants, and to permanently cement the restorations to prevent intrusion of the natural teeth.

The patient shown in Figures 21 (/uploads/spear-digest/articles/2015/01/54/fig21.jpg), 22 (/uploads/spear-digest/articles/2015/01/54/fig22.jpg), 23 (/uploads/spear-digest/articles/2015/01/54/fig23.jpg), 24 (/uploads/spear-digest/articles/2015/01/54/fig24.jpg) and 25 below is an example. She is 63 years old, and has significant apical root resorption on the centrals and laterals. Interestingly enough she did well with them for almost 50 years following orthodontic treatment as a child, but now the laterals have a Grade 2+ mobility, and the centrals a 1+. Her chief complaint is that she can't use her incisors to function.

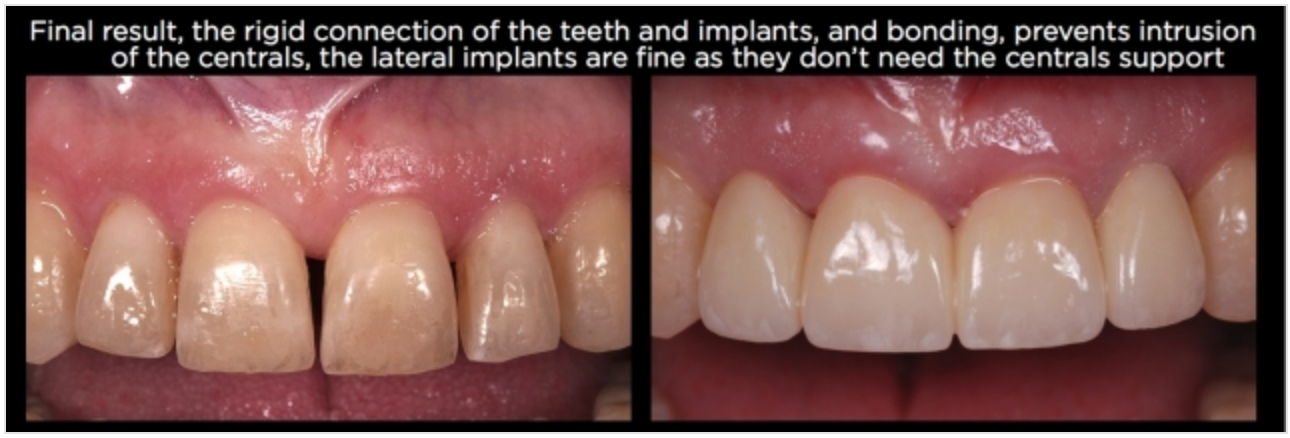



Figure 25

The original plan was to consider removing all four incisors and place two implants either in the central location or lateral location, then do a four unit FPD. But in reality, the centrals are quite healthy except for the mobility, so the decision was made to remove the laterals, place implants, and then prepare the centrals for crowns and splint them rigidly to the lateral implants.

There is no risk of overloading the implants as the two implants don't need the central support, and there is also no risk of the central intruding as they are rigidly connected to the implants, and also permanently cemented to the central preps.

While the original plan would have been successful, this approach maintains the gingiva and papillae across the anterior.

In conclusion, it would be safe to say that the most predictable and least risky restoration would leave the teeth and implants free standing, but experience and the literature make it clear that implants can be safely connected to natural teeth as long as consideration is given to the challenges of implant overload, and preventing intrusion of the natural teeth.[12,13, 14]

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IMPLANTS - THE SURGICAL/RESTORATIVE CONNECTION

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