Pulp Capping—Fact or Pulp Fiction?

fbarnett
West Chester, PA
Posts: 412
Reg.: 6/23/2002


Pulp capping is often a hotly debated topic. Many failures occur after 5 years or more, so perhaps the impression is that it works great. When they fail, is it due to incorrect pulpal diagnosis at the time of capping, incorrect capping materials, the negative effects of coronal leakage or some other factor. Do newer generation materials provide for better clinical success?

The following abstract should provide some fuel for the capping vs. no capping debate. What do you Townies have to say?

Do you recommend endodontic treatment or pulp capping on a cariously exposed fully developed tooth?


Pulp capping of carious exposures: treatment outcome after 5 and 10 years: a retrospective study.

Barthel CR, Rosenkranz B, Leuenberg A, Roulet JF.

Department of Operative and Preventive Dentistry and Endodontics, Charite, Humboldt University Berlin, Foehrer Str. 15, D-13353 Berlin, Germany.

One hundred twenty-three pulp cappings had been performed by students in 1984 to 1987 (= 10-yr group) or in 1990 to 1992 (= 5-yr group) and were followed up in 1997. Teeth were checked for sensitivity (CO2/electrical pulp testing), percussion, and palpation; radiographs were taken to assess periapical status. In addition several other factors were determined that might have an influence on the success or failure rates, such as base material, type of restoration, site of exposure, etc. Results showed 44.5% failures (18.5% questionable and 37% successful cases) in the 5-yr group and 79.7% failing, 7.3% questionable, and 13% successful cases in the 10-yr group. As a factor of influence, the placement of a definitive restoration within the first 2 days after pulp exposure was found to contribute significantly to the survival rate of these teeth. (Emphasis added.)

mmelkers
Washington
Posts: 1,897
Reg.: 9/9/2000

Posted: 7/4/2003 7:05:05 PM

Fred, thanks for the info! Here are my thoughts—for the little effort needed to accomplish a direct pulp cap, a 37% success rate at 5 years and 10% success rate at 10 years seems low. Low, but still great. When I look at the low cost of a pulp cap, often in a situation where the definitive restoration is a direct composite vs an endo, core and crown, hey I will take the cost and the odds easily. If they work, great. If they fail—who knows what we will have in 5 or 10 years. I would imagine that we will still have endodontists. My direct caps run about $80. So for $0.80-16 a year gamble, why not. What does an endo core and crown run these days? What do you think?

drstrangelove

Posted: 7/4/2003 7:15:34 PM

After having a couple of direct pulp caps end (after several years) in a spectacularly painful toothache, I tend to err towards endo initially...
As an added thought, yes I would definitely think materials would make a difference (bonded composites) as would immediate placement. I would be interested in the protocol prior to capping after the exposure, the method of capping and the materials that were used over the caps and the correlated failure rates.

I thought that I would add these to the mix as there is a bit of treatment date updating...

Dycal versus Nd:YAG laser and Vitrebond for direct pulp capping in permanent teeth. Santucci PJ.

Center for Advanced Dental Education, St. Louis University, St. Louis, Missouri, USA.

PURPOSE: To determine the efficacy of laser-assisted direct pulp capping by comparing the survival rates of permanent teeth treated with Nd:YAG laser and Vitrebond (3M Corporation, St. Paul, MN) direct pulp caps to permanent teeth treated with the traditional calcium hydroxide direct pulp cap over intervals of up to 54 months. SUMMARY BACKGROUND DATA: While there are case reports and evaluations of various laser techniques in the literature, statistical studies comparing the success of laser-assisted applications to traditional techniques are needed. This is a retrospective investigation of one such laser assisted application. METHODS: A retrospective chart review of all active and inactive patients resulted in the identification of 83 patients who received direct pulp caps in a total of 93 permanent teeth; 29 with calcium hydroxide and 64 with Nd:YAG laser and Vitrebond. RESULTS: Life table analysis of the data of this retrospective study demonstrated that the teeth treated with the laser and Vitrebond direct pulp cap showed significantly greater survival rates than those treated with Dycal direct pulp cap over intervals of nine to 54 months postoperatively. The cumulative proportion of teeth surviving postoperatively for the Dycal (L.D. Caulk Corporation, Milford, CT) direct pulp cap was 89.7% at 1 month declining to 79.4% at 3 months and 76% at 6 months and then continued to decline in the final two intervals finishing after 54 months at 43.6%. For the laser and Vitrebond direct pulp cap the cumulative proportion surviving stood at 98.4% after 1 month, declining to 93.8% at 3 months and 90.3% after 6 months but then held steady in the final 2 intervals finishing at 90.3% after 54 months. CONCLUSION: The laser and Vitrebond direct pulp cap produces a significantly more predictable pulpal response after the first 6 months than the Dycal direct pulp cap. The survival rate of teeth treated with the laser and Vitrebond direct pulp cap is significantly greater than those treated with the Dycal direct pulp cap over intervals of 9 to 54 months. Direct pulp capping is a worthwhile procedure that should be performed when indicated, especially in light of the 90.3% survival rate achieved with the laser and Vitrebond direct pulp cap at 54 months.

Clement AW, Willemsen WL, Bronkhorst EM.

Vakgroep Cariologie en Endodontologie, Katholieke Universiteit Nijmegen.

Direct pulp capping is not generally accepted as a routine dental procedure. It is claimed to be an unpredictable procedure with a low success rate. However, some clinical studies do show success of direct pulp cappings. The aim of this study was to make an inventory of the success rate of direct pulp cappings performed by dental students, and of the variables which influenced the outcome. The success rate for the first 18 months after treatment was 73.8%. Only the variable ‘type of tooth’ showed a statistical significant correlation: front teeth showed a higher percentage of success than premolars and molars.

Hi Fred. This topic has been debated ad nauseam on DentalTown, and I must have quoted the Barthel study at least half a dozen times. It is the only long-term retrospective study in the literature. The low success rates are appalling but sometimes when you’re in the GP trenches...
you need to do these when finances come into consideration and extraction is the only other option.

The argument Mike used above is one that many dentists use i.e. “What have you got to lose?”, you can always do endo later if it fails, etc. However, a painful tooth is not a pleasant experience and they happen at the most inconvenient times and the pulp capped teeth that become necrotic 5-10 years later invariably become calcified, making ours and Fred’s endodontic procedures extremely difficult with increased risks of perforations etc.

Fred, if you have read the whole Barthel study like I have, you will see that simplistic statements by some such as all that is required for a satisfactory outcome is a “total seal” or the complete arrestment of bleeding (hi JKanca) do not give the full story. There are many factors why direct pulp capping is unpredictable but the one most important factor that Barthel relates to in this study is the PRESENCE OF INFECTED DENTIN CHIPS. Sorry to bore you but I get excited about long-term retrospective studies. Basically the cutting of dentin produces grinding debris. When the last layer of dentin is removed to give a mechanical or carious exposure some dentin chips may be lodged near the exposure site and others pushed deeper into the pulp tissue. It is the deeper chips, in particular according to Barthel that can cause longer term problems. If chips lodged deeply in living pulp tissue come from carious dentin there is the likelihood that the bacteria embedded within the chips will thrive and proliferate. The chips then act as sites for inflammation and abscess formation.

The uninfected chips can become a problem as well, as they can become the sites of pulp stone and/or osteodentin formation. If these mineralized areas grow sufficiently and even join up they can entrap pulp tissue depriving it of a blood supply. In time the entire pulp may become non-vital.

In my opinion direct pulp capping “total etch” or Dycal must be regarded as being purely experimental and our patients need to be informed of this.

I lean more toward the RCT for a carious exposure. I know a lot of dentists are capping them then restoring, but I have had to do some of the RCT 10 years down the road. And the canals are calcified as all get out. I still do some direct capping, always due to money, but deep down I know that the tooth will fail and be extracted later. At least they keep their tooth a little longer I guess.
I do a fair number of “pulp caps” I have been doing them for about 8 years with great success. Very few fail with the cases I select. Here is my anecdotal criteria and technique. The tooth has to be free from spontaneous pain and negative to heat and percussion. The caries must be removed with a dam in place and sometime adjunctive sealer used like Oraseal. The exposure must be small and bleeding easily stopped with Copper Sulfate. The preparation is disinfected with NaOCl and then rinsed followed by total-etch bonding using flowable in small increments. The tooth is restored with direct composite. If structural deficiency dictates a crown or onlay I do not do the pulp cap procedure and advise endodontic treatment. I follow these teeth at recall with PA radiographs and test them with ice. Certainly a few have failed but the majority are still vital and asymptomatic. The incidence of “calcification” is way exaggerated in my observation. My patients are given the option and informed that this procedure may not be successful. Only once was a patient upset when the tooth needed endo. Reading the results of a study where the procedures were performed by dental students is HIGHLY SUSPECT IMHO.

Thanks all for the input. Perhaps we should list criteria and circumstances for pulp capping:
1. Extent of caries exposure; does size relate to prognosis?
2. Planned final restoration; should it be done on a tooth that will be getting full coverage or will be a distal abutment for a bridge?
3. Rubber dam isolation; does the use of a rubber dam enhance the degree of clinical success?
4. Pe-op symptoms; should it be done if there are pre-op symptoms such as discomfort to temperature or biting/chewing or percussion?
5. Control of bleeding; what constitutes control and how long do you wait? Perhaps bleeding may relate to the degree of underlying pulp inflammation which may then affect prognosis.
An endodontist in another thread said he sees a lot of nightmare endodontic cases referred to him in which the canal spaces are obliterated subsequent to these pulp capping procedures. These aren’t endodontic cases needing re-treatment, rather they are cases in which symptoms develop months or years after a pulp capping procedure in which tertiary dentin obliteration of the canal spaces is so extreme as to make the initial endodontics a nightmare. I think this is very important information for you all to consider when you are recommending pulp capping. Likely, you aren’t aware of the failures as the patients move away, or the endodontists that end up with the cases don’t necessarily give you feedback on this canal obliteration problem. Certainly in certain situations, such as patients that are hard up financially, pulp capping could be a valuable means to save a tooth. However, what is gained in general by trying to routinely avoid endo on teeth that will probably need tx in the future, and such tx will be much more difficult and less likely to succeed as opposed to completing tx when the pulp is vital and the canals are patent? One thing I look at is canal calcifications of a tooth in question as compared to an adjacent tooth. If the adjacent tooth has no pulp stones, and the tooth in question has a lot of stones along with deep caries/current restoration, this is valuable information in dxing need for endo.

BTW, while I’m limited to endo now, I did restorative for over 10 years, and did my share of pulp capping with good success. I’m not trying to say it’s not a valid approach, I’m just trying to show a different side to the story which I can see better now that I am limited to endo.