

University of Jordan

Faculty of Dentistry

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Conservative 3





Hand Out

Sheet

Slides



 \*lec 14 (lec#2 From 2’nd sem.)

Doctor:

Date:

Lecture No.

Done by:

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Today’s lec is a sequel for the previous one which was about(( treatment of immature teeth with open apexes )) ,,, we gonna focus on teeth with non vital pulp mainly ( as tooth with open apex + pulp necrosis , tooth with apical periodontitis ..etc)

**#back to biologic dilemma ..my question is; what would be your options for these permanent immature teeth with open apexes ,pulp necrosis ,and periapical lesion or apical periodontitis ??**

🡪Would be pulpectomy ,, if so ..is pulpectomy the only good issue for pulp disease (we talked about it previous lec in case the pulp is vital ,,,

**what about in cases of non vital tooth ?!**

🡪would it be extraction and replacement with implant !

🡪 in v. young patient!! Would it conceder endodontic treatment RCT or a more sophisticated tissue engineering therapy that will promote healing and better closure in these cases .

Reports in the literature from as early as the sixties has demonstrated that the endodontium constitute an appropriate environment that’s able to form anew dentin in the absence of the normal developmental conditions .

Automatically this means that the apex should be viewed as adynamic region capable of self regeneration

 Open apex does not mean that there’s an end to the physician of hard tissue in the region of root apex(referring ) (in another words that does not mean that the root can not precipitate sold particle and regenerate itself or close it’s open apex).

Like all human tissues ,,if given the right conditions ..they are programmed for self regeneration to restore the lost part ….and here we apply the same concept .

On aRadiograph viewed in the lec;

After debridement of this tooth and placing anon-setting calcium hydroxide.after the case was postponed for some resions the pt. came back with temporarly filling still in place , surprisingly what was impressing is that the depridment alone yielded this excellent closure .of the apex .

Further factor responsible for apical closure and healing in this case was debridement which is the commen factor in all techniques we used to clean the canals to debride the root canal system.

As no MTA was available in the market the debridment time for these teeth is long ..dr’s used non setting calcium hydroxide to keep these diseased immature teeth …the result was apical wound healing and radiographic singes of complete root development of these teeth (maturogenisis ) , or apical closure.

 **These cases summaries and signified the importance of ;**

1. The dynamic rule of debridment

2-the healing and repair potential of the pulp-dentine complex .

Treatment approaches of these cases are the traditional non setting calcium hydroxide apexification which’s now part of the past …..recently the MTA root apexification , wound healing apexification , the apical barrier technique or the apical block technique…… and alternatively the most sophisticated,most novel technique which’s the regeneration revascularization technique.

There is along list of materials and techniques were suggested ,recommended ,and used to facilitate the induction of the apical barrier at the root end in cases of open apexes starting from no nutrient ….ending recently with placement of apical block of  Mineral **trioxide aggregate** of MTA at the apex of the tooth

**What is apexcification ?**

It’s the induction of the calcified barrier in the root of an open apex or the continued apical development of an incompletely formed root in teeth with necrotic pulp .

Calcium hydroxid has been used in dentistry sense it’s introduction by herman in 1920..it was used for many decades and widly indicated for ashort or long term intracanal antibacterial , dressing material and usually associated with periradicular healing …it helps a lot despite we- till now- don’t know how it’s work (it’s mechanism )and this is what we count.

This technique was used in ant. Teeth. it’s involved the apexification traditional technique using the calcium hydroxide which involve debridment and injection of calcium hydroxide in the canal ..we recall for the pt. we reinject the calcium hydroxide past till elongation of the root or calcific barrier at the root end occurs … also it can be used in post. Teeth .

Historic case (the case where theres no root ) was done successfully by dr. ibraheem as the radiograph shown…(root apex was closed ^\_\_^) …

Thoughts has been raised that the long term use of calcium hydroxide therapy might ulter the mechanical properties of the dentine and increase the potential to the risk factor in these teeth (as incease the risk of fracture because of the length of treatment and the numbers of dressing used ) …which’s take from 3-24 months …to 4 years !! …this will lead to pt attrition due to fatigue and poor compliance of the patient .

On the other hand the use of MTA now as apical barrier technique ..the shorter treatment time with MTA root barrier …

1-it just needs one visit …comparable with calcium hydroxide which takes 2-4 years

2-the independent compliance success of treatment .

3-higher fracture resistant and strength of the root… comparable with calcium hydroxide which is ulter the mechanical properties of the dentine .

The barrier thechnique is non-surgical condensation of a biocompatible material (we can use MTA for this purpose ) into the apical part of the root to attempt the root end closure .

The rationale for the block visit( one visit) apexification is to attempt to creat root end closure( as MTA) rather than creation of an artificial apical stop(as in calcium hydroxide ) .

Wide gross of materials has been used this purpose ;

\*starting with dentine chips ; (note that in the traditional teaching we don’t bush dentine chips in order not to form dentine barrier but in cases of open apex we need to bush these chips because we want to creat this barrier .

\*use MTA as apical barrier for treatment of open apex ,pulpless tooth .

Pulp free postioning of the MTA cement in the apical 2/3 of the canal providing predictable outcomes

Where using GP in the canal is not predictable …we can not control it ..we have nothing to condense GP against :/ …so its out extruded….

**other factors that can affect it ..are ;**

* Root architecture
* Humidity and moisture contamination at the apical region specifically blood

(blood in case of using MTA will not affect the sealing ability of the MTA Contrast to GP(we need dry canals )..)

\*\*hardening of MTA needs humidity \*\*

Dr showed us aradiograph for acase of pt in the uni. Hospital ; the pt has ahuge lesion resemble maxillary lesion ..open apex of lateral incisor …when starting canine treatment then we place MTA although the pulp is questionable ….the result was complete healing in 6 months in this young pt. following treatment with apical barrier technique using MTA .

 **#** MTA cements are classified as apermanent contact..(it acts as apermanent contact implant device when placed in root canal) ..

**#** scaffolding (we have to read about it ) for the formation of hard tissues with increase the potential of better regeneration and better healing in these difficult clinical situations

 The better biologic heal in these cases attributed into v. important characteristic of the MTA. the sealability (sealing ability)and the biocompatibility …

because of these 2 factors(characteristics )…we have multiple **uses of MTA ;**

* Perforation repair
* Apexification
* Pulp caping
* Root end filling material ….and many others

The procedure for placement of MTA is the same for placement of Gutta Percha (GP)…in debridment and placement of the cement …we can also use the MTA gone to place it in the canal .

In a vedio viewed in the lec for mahmoud torabinejad .. he simply placed and condensed the MTA in the canal by GP points..

The manipulation of MTA was difficult ..coz it’s like a sand and needs humidity to become hard.. but now we have an injectable form of MTA which’s v. easy to manipulate.

@ apexification even if successful and even with the newest technique( as MTA block and apical apexification ) althrough they are faster but they account only for apical seal they don’t address the development of the entire root …they can only induce ahard tissue barrier at the apex (there will be neither vertical nor horizontal root development as in regeneration revascularization )

Note that MTA is a biocompatible material that can not irritate the tissue.

More recent case reports puplished during the last few 15 years showed convincingly in humans that the tissues in the periapical region of anon vital infected tooth( apical periodontitis or even abscess) could regenerate (**apexiogenesis/** **revascularization** **regeneration**…/\*\***revitalization**\*\* ) …that is a major realization in the history of dentistry .

These techniques will result in continued root development , increase dentinal wall thickness (prevents fracture) and apical closure .

Afew cases has reported restoration of +ve responses sensibility testing and normal development readings .

Case was published in 2011 by mahmoud torabinejad :

An 11-year-old boy whose maxillary second premolar tooth had been accidently extracted and immediately replanted developed pulpal necrosis and symptomatic apical periodontitis. After preparing an access cavity, its necrotic pulp was removed. The canal was irrigated with 5.25% NaOCl solution and dried with paper points. A triple antibiotic mixed with distilled water was packed in the canal and left for 22 days. Twenty milliliters of whole blood was drawn from the patient’s forearm for preparation of PRP. After removal of the antibiotic mixture, the PRP was injected into the canal space up to the cementoenamel junction level. Three millimeters of grey mineral trioxide aggregate was placed directly over the PRP clot. Three days later, the tooth was double-sealed with permanent filling materials.

Results

Clinical examination 5 1/2 half months later revealed no sensitivity to percussion or palpation tests. Radiographic examination of this tooth showed resolution of the periapical lesion, further root development, and continued apical closure. Sensitivity tests with cold and an electric pulp test elicited a positive response similar to those found in the first premolar tooth.

Conclusions

On the basis of short-term results of the present case, it appears that regeneration of vital tissues in a tooth with necrotic pulp and a periapical lesion is possible; PRP is potentially an ideal scaffold for this procedure.

A recent signific finding that may explain in part why apexogenesis can occure in immature permanent teeth with abscess or apical periodontitis is finding that an isolation of anew population of stem cells in the apical region in incompletly developed teeth there apical papilla is aspecific stem cells producing tissue benefited by it’s collateral circulation because it’s position(the papilla) in the most apical resion it has the potential of remaining undamaged and not affected by necrosis ,,so increasing the potential of regeneration and root closure in these cases .

But.. are stem cells delivered in root canal system?

Primarly the answer is yes

How is that?

Recent studies have found 2 hundred times higher stem cells concentration in the root canal system compared to the systemic counter part which render the root canal system a truly deliver system for a stem cells in our case.

Apical papilla is loosely connected to the dental pulp ..this is v. important because if we over instrument the root canal and we lacerate cells in the apical papilla ,,this will provide a very extra opportunity for stem cells to take place in the root canal system .

So we violate the apical constriction to lacerate the tissue and providing the canal with the stem cells ..or another possibility is the organization of blood clot in the apical periodontium and the root canal …this is related to the 1’st stag of wound healing .

The notion for regeneration is v. simple ..this is a raise between bacteria in th root canal space and new tissue .

Whole pulp and dentine healing occure in an environment free from wound infection .

Infection control(debridment ) is the main factor for success …it can affect the stimulation of wound healing in all the cases not only in this case.

If a sterile tissue matrix is provided (if we put ascaffold to form cells) …then pulp vitality can be reestablished .

\*although theres no standardized protocol for endodontic treatment of these cases but the regeneration revascularization involves no or minimal canal instrumentation O\_O .

We mainly rely on copious aggressive irrigation or exposure to different growth factors and medicament (the most important two ; are triple AB and non-setting calcium hydroxide ),, we create blood clot ,, we place MTA then a tight seal …this is the common protocol .

**Potential benefits for the pt. and the profession ;**

- Restoration of a natural function instead of placement of surgical prostheses.

- Shorter treatment time

- Cost effective

- And the main benefit is root lengthening and strengthening with no obturation of the canal required .

-no instrumentation ,,no obturation ….wallah lnkaiiiiif :p

\*biologically based....endodontic therapy has the potential challenges remained (we still have potential challenges).

The self-regeneration do not address the cellular nature of this calcified material ,,although it’s effective but no predictable ability to consistently produce acceptable outcomes in all situations ..each technique has it’s advantages and disadvantages .

\***note**\*\*\*Discoloration because we use AB as cycline or grey MTA (now we use the white one ).

\***note**\*\*\*Calcification prevent us from making post and crown (calcification occurs due to periodontal tissue not pulp tissue ).

The potential approaches are root revascularization….stem cell therapy ,pulp implant ,,,,etc

What concept of tissue engineering are most likely to be available ??

In dentistry regenerative strategies are important because of hard dental tissue damage due to trauma , caries , iatrogenic factors ,,, etc

Regeneration is the ideal healing of the pulp and the best roott filling possible of an injure necrotic pulp … bioregenerate the tooth as a modality of treatment can and should be attempt other different circumstances .

**Where are we??**

We are at a transitional stage of a more effective treatment based on new clinical and knowledge value .

**HOW close we are to close the open apex??**

Most important now is to find a more effective safe and constant method to up ride from the bench to the clinic .

**What about this in Jordan ??**

Unfortunately even in the presence of pulpitis,, symtoms of pulpitis ,,and pulp necrosis ,,,still because of the mean age of these pt . it’s v. Frustrating to do RCT for them (that what we do in Jordan :/ ) ….we can find solution for them because pulp tissue in these pts contains astructure at the developmental stage which is more potent to regenerate in response to damage ,,,,always we should suspect in these cases there will be some viable pulpal tissues in the root canal

So what we need now in Jordan is best practice guidelines and recommendations for pulp therapy performed by dentist ,,,we should update our guidelines .

 Good luck ^\_\_\_\_^