

“ We need to find ways to treat patients who need our help in this **time of world-crisis**. We need to think out of the box and devise **new ways to delay the spread of disease** as our handpieces are taken from our armamentarium. “

ART

Atraumatic Resorative Technique

Modified technique for dental clinics during the SARS-CoV-2 pandemic

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ART (Atraumatic Restorative Treatment)

Modified for dental clinics during the SARS-CoV-2 pandemic and beyond...

Using Biodentine

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Introduction:

December 31, 2019 Chinese medical authorities announced a cluster of pneumonia cases of unknown etiology. January 9th the Chinese Center for Disease Control reported that a novel coronavirus was the causative agent. February 10th the WHO named the disease COVID-19 and the virus was named SARS-CoV-2. Since the disease was named it has spread around the world creating a dangerous pandemic. The novel nature of the virus assures that there is no “herd immunity” and virtually everyone is susceptible. Patients who are symptomatic are the main source of transmission, but it has been clear for some time that asymptomatic infected patients can also transmit the disease. It is believed that transmission occurs mainly via respiratory droplets and contact transmission. Additionally, there may be a risk of fecal-oral transmission. These facts have changed the way we all live and work. Social distancing has become the norm and major metropolitan centers look like “ghost towns”. Dentists work at the outer end of the airway, and the airway is SARS-CoV-2 path of entry to the human body. The virus enters a host cell via the ACE 2 receptors which are abundant in the cells of the respiratory system. The virus is found in the oral cavity, saliva and conjunctival secretions. Dentists, otolaryngologists and ophthalmologists do most of their work in the Danger Zone.

Transmission of SARS-CoV-2 in the dental clinic: SARS-CoV-2 can be passed directly from person to person by respiratory droplets, but the virus can also be transmitted through contact and fomites. Dental clinics invariably carry the risk of COVID-19 infection due to the normal procedures performed, which involve face to face communication with patients and frequent exposure to blood, saliva and other body fluids.

Airborne spread: Many dental procedures (handpieces and cavitrons) produce aerosols and droplets that may be contaminated with the virus. Virus particles suspended in the air by aerosols, can remain suspended for long periods of time, perhaps up to an hour.

Contaminated surface spread: SARS- CoV-2 can persist of hard surfaces such as metals, glass or plastic for up to a couple of days. Surfaces in the operatory are potential sources of virus transmission. After treatment in an operatory the room should be isolated from all personnel for a minimum of 69 minutes before it is thoroughly cleaned. This allows the droplets and aerosols to settle before disinfecting the room.

PPE: Any procedure that produces aerosols should be avoided. If a handpiece is required for any reason the operators and operatory personnel **MUST** have appropriate PPE. This includes hair covering, face shield or goggles, an N-95 mask, contact isolation gown, appropriate gloves and shoe covers.

A pandemic which is currently uncontrolled poses an existential threat to the way we practice dentistry. This is likely to last for some time. We need to find ways to treat patients who need our help in this time of world-wide crisis. We need to think out of the box and devise new ways to delay the spread of dental

disease as our handpieces are taken from our armamentarium. This piece is written to help you save teeth and stabilize them until we can again use all of our instruments when it is safe to do so.

ART: Atraumatic Restorative Technique (modified for pandemic): Or ITR Interim Therapeutic Restoration. These two techniques are very similar, in fact, they may be different without a distinction. We need procedures that allow us to conservatively treat dental disease without transmitting the SARS-CoV-2 virus. ART was designed to be done without using a handpiece, so it is useful to consider this technique in our current state of dental practice. By definition, ART is a strategy for caries management that does not use a handpiece. The use of the term ITR should be discontinued as it is redundant and confusing

Goals ART

1. Remove diseased tooth structure without a dental handpiece
2. Preserve tooth structure
3. Save teeth
4. Reduce the chance of odontogenic infection
5. Manage odontogenic pain (especially reversible pulpitis)
6. In SARS-CoV-2 pandemic buy time for teeth that can be saved

Disadvantages of ART

1. Life span of about 2 years for ART restorations
2. Low wear resistance of glass ionomers and IRM materials

Overcoming disadvantages of ART (for clinics during pandemic)

1. Use local anesthetic
2. After adequate caries excavation, use a restorative material that seals effectively and has wear resistance.
3. This restorative material is **Biodentine**. Biodentine is a tricalcium silicate material that was designed to be a permanent dentin substitute. Biodentine has a pH of 12 which has a bactericidal effect on bacteria in a carious lesion so it can arrest active lesions in a tooth. Biodentine is also biocompatible and is not cytotoxic to pulp cells even when in direct contact. Finally, Biodentine is bioactive creating dentin bridges over exposures of the pulp tissue and also will precipitate into dentinal tubules during the setting reaction, creating restoration “tags” into the dentinal tubules thereby sealing the margins and creating retention. This makes Biodentine the ideal restorative to overcome the disadvantages of ART.

Silver Diamine Fluoride:

1. **Indications:** Interim treatment for patients who can't receive traditional restorative treatment for whatever reason: uncooperative patients, special needs, post radiation patients with osteoradionecrosis, delayed treatment, etc...
2. **Contraindications:** Silver allergy, Tooth that is symptomatic or pulpally involved, Presence of stomatitis or ulcerative gingival conditions
3. **Silver:** Antibacterial
4. **Fluoride:** Fluoroapatite
5. Can be effective in arresting active carious lesions
6. Causes dark staining in caries arrested areas.

Dental professional judgement must be used in treatment decisions regarding significant cavitated lesions on teeth symptomatic or asymptomatic. We need at least in the near term, to treat these lesions when necessary, with minimally invasive dental techniques. We need to make attempts to save teeth when it is safe to do so. ART works best when case selection is done carefully. Cavitated carious lesions with a diagnosis of reversible pulpitis have the best prognosis when treated with ART.

Next, we propose a modified ART strategy that does not require use of a handpiece and is meant for a dental clinic to conservatively manage appropriate cavitated lesions.

Detailed modified ART procedure for dental clinics during the pandemic

1. Emergency call comes to your clinic or call phone
2. Ask emergent questions:
 - Do you have uncontrolled bleeding from your mouth?
 - Do you have swelling in your mouth, upper or lower jaw or under your tongue?
 - Do you have difficulty breathing from the swelling in your mouth, neck or jaw?
 - Are you unable to eat or drink due to oral pain to the point where you are ill and physically weak?
 - Do you have new difficulty opening your mouth due to pain and swelling?
 - If no to the above...what is your chief complaint? Dental pain from a cavity
3. If you determine the patient should be seen, then ask COVID-19 screening questions
 - In the past month have you been in contact with someone who is confirmed or suspected to have COVID-19?
 - Do you have any of the following symptoms?
 - Fever or reported chills?
 - Dry cough?
 - Shortness of breath?
 - Rash?
 - Have you traveled domestically or internationally in the last month?
 - If yes, Where? When?
4. If the patient has answered yes to any screening questions refer to primary care MD; If answers are no to all questions and the dentist wants to see the patient and the supply of PPE is adequate, Invite the patient to come to the office and review the screening questions, again if all answers are negative, room the patient in the operatory. Be sure the room is set up as completely as possible to avoid waste of PPE moving in and out of the treatment room.
5. Complete a problem focused examination taking the necessary x-rays. If the dentist believes the tooth can be restored (as in a cavitated lesion with reversible pulpitis), an ART can be considered.
6. Have the patient rinse with 1.5% hydrogen peroxide, as early work shows the virus may be susceptible to damage by hydrogen peroxide. Povidone-iodine oral rinse is also effective in killing the virus and lowering oral viral load.
7. Administer local anesthesia as indicated

8. Place rubber dam for isolation.
9. If there is access to the lesion begin excavation of the caries using surgical currettes or spoon excavators, to remove as much of the lesion as is appropriate from clinical judgement. Place matrix if appropriate in preparation for the restoration.
10. Mix Biodentine according to manufacturer's instruction and bulk fill the cavity with the Biodentine. You will have adequate working time to make sure the cavity is filled properly, possibly leaving the restorative out of the occlusion to avoid occlusal adjustment with a handpiece. The initial set should be in 9-12 minutes.
11. Biodentine with the final set complete will exhibit the same hardness of natural dentin. Deposition of hydroxyapatite on the interface between restorative and dentin should seal the margins of the restoration. This will eliminate some of the shortcomings of these types of restorations (ART).
12. Remove the rubber dam and verify occlusion.
13. Patient can be dismissed with chewing instructions, care and maintenance instructions.
14. Set up appropriate phone follow-up
15. Wait at least 69 minutes before wiping down the room. After treatment, close all doors to the operatory to isolate it from the rest of the clinic. After the wait time a thorough cleaning of the room can take place with staff wearing appropriate PPE. Wait times are a function of room air flow efficiency. The more efficient the room air recycling is, shorter wait times are required prior to room surface disinfection.
16. Consider fogging the clinic with hypochlorous acid once or twice a day as a complete disinfection protocol.



Pre-op radiograph



Prep



Initial layer
Biodentine



Final ART restoration with
Biodentine

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