

## A fundamental change in approach in the dental and oral hygiene management in children during Covid 19 pandemic.

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### Abstract

**Background:** In the present situation of the pandemic COVID -19, the chief objective of the dentist is not only the proper management of the dental health problems in children but also ensure safety of the staff and also prevention of the transmission of the disease, following various protocols.

**Aim:** Implementation of the minimally invasive dental treatment among 373 children with the thorough infection control protocols in the Government dental hospital, Vijayawada, Andhra Pradesh.

**COVID-19 and Dental treatment:** Non-invasive and minimally invasive dental restorative procedures were done by using the Fluoride Varnishes, Silver Diamine Fluoride, Casein Phosphopeptide—Amorphous Calcium Phosphate (CPP-ACP), High Viscosity Glass Ionomer Cements, Interim Therapeutic Restoration (ITR), Atraumatic Restorative Treatment (ART), Chemo-Mechanical Techniques, Preformed Crown (Hall Technique, Orthodontic treatments like myobrases and removable appliances among 373 children during the pandemic period

**Conclusions:** There is a paradigm shift in the dental practice due to the pandemic COVID -19. Our study addresses multiple dental procedures that can be done in children that ensure safety and oral health.

**Keywords:** COVID-19 pandemic; oral hygiene management; aerosol free dentistry; Minimal invasive dentistry.

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### I. Introduction

Severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) causes Coronavirus disease 2019 (COVID-19).<sup>1</sup> COVID -19 was declared a public health emergency by WHO.<sup>2</sup> The routes of transmission of COVID -19 are through direct and contact transmission. Paediatric population are also at high risk of getting the disease due to various reasons and may show various levels of presentations. The gold standard in the paediatric dentistry is Prevention of oral health, which has become more significant during this time of pandemic and a Public Health Emergency. Hence it is at such times that the efficient management is important of the oral health among the children. The key objective is to prevent the disease spread and the cross-infections while attending the need for the treatment. The present study provides an insight into relevant safety measures to protect dental care professionals as well as the child patient, whilst providing clinical care for the obviously affected children and those potential carriers of the disease.<sup>3</sup>

### II. Covid-19, Safety Concern And Dental Treatment

#### Oral Health Prevention

##### Common oral health prevention techniques

Periodic check-up and dental health education helps in the establishment of the oral health in children. Due to the pandemic of the COVID-19 many dentists have restricted the dental treatments to only emergencies. The same trend has been followed in various countries.<sup>4</sup> However till a further protocol of treatments is given by the WHO, the dental check-ups should be focused on the prevention of disease, through education, interventions that are minimally invasive or noninvasive.<sup>3</sup> After the pandemic the tele-consultation services have gained much importance and this trend is being more appreciated by both the public and practitioners. Hence the main goal of these guides would be to circumvent, or at least lessen, the onset of dental diseases, thus improving the dental and general health of the child and deferring the need for the definitive intervention.<sup>5</sup>

***Practice of oral hygiene measure at home for the prevention of caries.***

Proper home oral hygiene measures, helps in the establishing oral and dental health. This has to be monitored by the parent of the child. The focus on the home practices has gained more significance after the COVID-19, when kids were made to stay home. Dietary counselling is advised to the patient. Also, the Parents are guided to monitor the play areas of the children to prevent them from any trauma. Mouth-guards are advised to be used at the home when they indulge in contact sports.<sup>6</sup>

### **III. Specific Dental Treatment**

***Assessing the need for treatment***

In the pandemic of the COVID-19, the focus has shifted to the telemedicine. The need to formulate the criteria to prioritize the procedures that need to be done in the safety of the clinic have to be formulated. Priority should be given to thorough prevention of the disease. In the present study the following steps were taken. All safety protocols were followed. The first step was to select child patient remotely who urgently need the treatment. We utilized the telemedicine for the same with efficiency. We talked with the parent of the child, and gave them advice regarding the oral health service facilities.<sup>7</sup> An early and continuous association with parents has given an encouraging oral health outcome and denotes the first interventions a dentist does.<sup>8</sup> We also enquired the overall condition of the child along with the family members to verify for any signs and symptoms related to the SARS-CoV-2. We directed the parents to the concerned medical authorities whenever they elicited the positive contact and medical history.

We performed all the sanitization works through the treatment of the patient. The time interval between usage of the dental chair was restricted to one hour. Also, the seating in the waiting hall was according to the COVID-19 protocol.

***Pre-treatment protocol***

After checking the body temperature of the child and the parent to be below 37°C, hand sanitization was done. The parent was advised to wear mouth mask when accompanying the child. We followed handwashing protocol before and after dental surgery. The office staff wore masks and gowns, disposable gloves, goggles, respirators, and face protectors, as well as washing hands as indicated above, with each patient.<sup>9</sup> The Work Surface Management was done according to the protocols of “National Health Commission of the People’s Republic of China.”<sup>10</sup>

“Guideline for the Prevention and Control of Novel Coronavirus Pneumonia in Medical Institutes (b) Guideline for the Use of Medical Protective Equipment in the Prevention and Control of Novel Coronavirus-Pneumonia”

According to these guidelines’ ethanol of at least 70% or 0.1% sodium hypochlorite for at least one minute is used to disinfect the surfaces exposed to salivary droplets. By opening doors and windows for up to one hour the Ventilation was maintained.<sup>11</sup>

***ORAL RINSES***

We advised oral rinse with Chlorhexidine, Povidine Iodine mouthwash in the present study. There are studies to support the view that some mouthwashes decrease the infectious load of virus.<sup>12</sup> Combination of both the products is also advised to be effective against Covid.<sup>6</sup>

***RUBBER DAM***

We used rubber dam for all the cases. Literature supports the dam decreases in the work environment by 70%, the presence of suspended particles<sup>13</sup> Instead of the high Speed Drills the hand-instruments were used to prevent the aerosol.

***Dental emergencies***

Due to the inherent attitude to play children are more prone to sustain falls and hence the fracture of teeth may happen. During the three months period i.e., June to Aug 2020, sixty-two patients attended the department for the dental urgencies. Treatment was done based on the level of emergency. Usually they included dental pain, or the oral infections that may reduce size of the upper airways leading to exasperating the respiratory syndrome associated with SARS-CoV-2. The various treatment options include reimplantation, medication to relieve pain etc.

***“Minimally Invasive Treatments (MITs)”***

MITs are the interventions done for the caries treatment with the main motive of tooth conservation. Also, these procedures help in psychological benefits, easy to perform, affordable. They have been employed

due to their ease of use in the treatment of early childhood caries.<sup>14</sup> In the present pandemic condition we applied this technique, suture placement etc.

#### ***“Classification of Minimally Invasive Treatments (MITs)”***

MIT’s remained classified as “*non-invasive*” treatments where the decayed dental tissue was not removed and the “*micro-invasive*” treatments as those where the removal through a hand instrument of the softened tissues was done.

#### ***Non-Invasive Treatments***

A total of 128 procedures were done during the three-month period at our department that included Fluoride Varnishes, Silver Diamine Fluoride (SDF), Casein Phosphopeptide- ‘Amorphous Calcium Phosphate (CPP-ACP) Products’, High Viscosity Glass Ionomer Cements (HVGIC).

##### Fluoride Varnishes

5% sodium fluoride varnish was applied in the present study. Studies have shown that fluoride varnish may be used as a primary prevention tool and to stop early enamel caries when applied every 6 months.<sup>11,10</sup>

##### Silver Diamine Fluoride (SDF)

38% SDF are used in the present study. In the study of Schmoekel et al. the caries prevention effectiveness was between 79% to 91%.<sup>15</sup> A continuous application for six months increased the remineralization by 80%. The remineralization, is done due to an antibacterial effect, inhibiting specific collagenases responsible for the breakdown of demineralized dentine.<sup>15,16</sup>

##### Casein Phosphopeptide- ‘Amorphous Calcium Phosphate (CPP-ACP) Products’

CPP-ACP are milk protein derivatives that have high concentration of calcium and phosphate ions that aid in the remineralization. CPP-ACP paste application can be done by the parent or the child himself at home as directed by the dentist. In the systemic review conducted by Ma et al<sup>17</sup> (2019) the CPP-ACP was more effective for the remineralization of the enamel white spots. In the review study conducted by Tao et al<sup>18</sup> (2018) synergistic effect was seen when fluoride containing material was used along with CPP-ACP.

##### High Viscosity Glass Ionomer Cements (HVGIC)

We used HVGIC in the children with dentin caries after excavation. HVGIC can be quickly applied and are less technique sensitive. They are readily available and don’t need the fresh preparation like the fluoride varnishes. In the study of Mickenautsch et al<sup>19</sup> (2016) alike effectiveness of HVGIC compared to resin sealants at 2 years was shown. In a RCT for 2 years, among 7924 children ages 5–10 years, both resinous and HVGIC materials, a very operational solution in decreasing caries in permanent first molars no definitive results were arrived at in the study of Ahovuo-Saloranta et al<sup>20</sup> (2017).

##### Pit and fissure sealants

Molars and premolars with their deeply placed grooves and fissures should be treated with sealants that aid in preventing the caries.

#### ***Micro-Invasive Treatments***

A total of 134 procedures were done during the three-month period at our department that included Interim Therapeutic Restoration (ITR), Atraumatic Restorative Treatment (ART), Chemo-Mechanical Techniques, Hall Technique.

##### Interim Therapeutic Restoration (ITR)

We removed only the decayed dentine around the caries and restored with the HVGIC with high fluoride. Until a definitive treatment can be done HVGIC is done and monitored. This is advocated to be a preferred technique for high caries index children. However, the ITR is reported to detach more than the conventional filling.<sup>21</sup>

##### “Atraumatic Restorative Treatment (ART)”

ART has been widely used for caries prevention until a definitive treatment is done.<sup>22</sup> It is applied in the developing countries where affording dental treatments is costly. We removed the carious dentine with excavator. Later the cavity was filled with resin-modified glass ionomer cement (RMGIC). ART is less traumatic and is more accepted psychologically. Due to the chances of dislodgment, the definitive treatment in a conventional method should be done with in 2 year.<sup>23</sup> Comparable results were obtained when ART and traditional in post treatment dental pulp complications in the deciduous teeth with medium-deep caries.<sup>24</sup> HVGIC can also be used in combination with silver fluoride diamine application, exploiting the benefits of both treatments. The use of HVGIC with antibacterial additives, in the correct proportions, is shown to increase the effectiveness in caries control without altering the mechanical properties of the cements.<sup>25</sup>

##### “Chemo-Mechanical Techniques”

We removed the carious dentine with an excavator after it has softened chemically with the Cariosolv. Cariosolv has sodium hypochlorite. Similar outcome was seen between the Cariosolv and traditional techniques on permanent and deciduous teeth.<sup>26</sup>

##### Indirect pulp capping:

For the teeth with the carious lesion nearing the pulp, ITR may be used.

#### 'Hall Technique' - Preformed Crown

Stainless steel preformed crowns are placed on the deciduous teeth directly without the preparation usually done for the permanent teeth. Hall technique is usually performed on the primary molars that are extensively damaged by caries and with dental hypoplasia. The Hall technique applies simple biological principles such that it prolongs the life of deciduous teeth. In this method the superficial plaque layer, the biofilm, that is the important layer in for caries progression, is left & sealed with the carious lesion. Later it turns less cariogenic flora. Consequently, this technique may arrest or at least decelerates caries progression in deciduous teeth. Hall technique helps in extending the life of the restorations. In the study of Innes et al<sup>28</sup> (2015) Hall technique is shown to perform better in the long run.

#### ***Orthodontic treatments during Covid-19***

##### "Preventive orthodontic procedures"

Established on effective communication and triage emergency orthodontic treatment can be given. Treatment counsel can be carried out remotely first at whatever point possible and, where fundamental, in-person treatment can be made in a well-prepared operatory ensuring the important safeguards and IPAC convention. Guidelines and practice advisories by government, specialists should be trailed. In our study period we treated 48 patients with the Myo braces, removable orthodontic appliances.

##### "Myo braces"

The Myobrace® System includes series of intra-oral apparatuses that are worn for one hour each day in addition to overnight while sleeping. The appliance helps with altering poor oral habits and expands the arch-form while applying light powers to regulate the teeth and jaws. Separate appliance is utilized dependent on upon the kid's age and orthodontic problems. The Exercises are to be achieved twice every day related to wearing the Myobrace® appliance and consist of a progression of breathing, tongue, swallowing, lip and cheek works out.<sup>27</sup>

##### "Removable orthodontic procedures"

If the child is using a removable orthodontic appliance, the first indication to the guardian is to the correct hand hygiene before placing the device into mouth. This shows the importance of a correct hygiene related with the management of orthodontic devices, which must be cautiously sanitized before each use and stored in the suitable box after use. In the event that the child is utilizing a removable orthodontic appliance, the first thing to the guardians is connected to the proper hand hygiene measures before placing the appliance in mouth. This may likewise underline the significance of a proper cleanliness related with the administration of orthodontic gadgets, which should be carefully sanitized before each utilization and put away in the suitable box after use.<sup>6</sup>

When Schwarz removable plate is used, a broken retention hook, such as the Adams hook that usually fits on the first permanent molar, is common. Even if the entire hook breaks from the resin section of the appliance, the child may wear the device as long as the retention is well-preserved. Alternatively, or in case of doubt, it is advisable to limit the use of the device during the daytime hours only, always under parental supervision, postponing the repair of the device at the end of the epidemic.<sup>29</sup>

#### **IV. Conclusion**

During the COVID 19 pandemic the use of minimally invasive interventions may have many positive characteristics in the caries management. MIT has been shown to be rapid, effective, economic, less technique sensitive. This procedure has also shown to produce low aerosol. The role of Pedodontist dentists is very crucial in this pandemic, as they need to maintain their own safety as well as ensuring the safety of child. The pandemic has helped to bring various new approaches of treatments. Also, when the pandemic ends, everything will return gradually, and protocols that we have proposed for the care of children might be useful for another as yet undefined time in the future. In summary, we advocate the use of the minimally invasive treatment to be followed at the present time to prevent the spread of the caries and prevention from aerosol spread.

#### **Limitation**

We observed two major limitations in this study that could be addressed in future research. First, the study was done among the children routinely attending the department of Pedodontics and preventive dentistry and department of Orthodontics at the college. There were no specific criteria for the selection regarding the age or the caries indices. Secondly there was no longer follow up. Hence a long-term study is advised.

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