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Teledentistry: Our experience during the Covid pandemic at a tertiary care hospital

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Abstract

The coronavirus disease (COVID-19) has imposed severe restrictions where all healthcare facilities except emergency services were either curtailed or suspended. Teleconsultation at that point time was the only mode to get in touch with the consultant for health care needs. Further teledentistry can enhance access to oral health care, increase the provision of oral health care, and reduce cost. This paper gives an insight into teledentistry practice at the Department of Dentistry, All India Institute of Medical Sciences, Bhubaneswar, India, a tertiary care hospital during the covid pandemic and subsequent lockdowns.

Keywords: teledentistry, covid-19, pandemic, telehealth

Introduction

The fourth quarter of the year 2019 saw the emergence of one of the worst human health crises, which has jolted the world. Cases with pneumonia were noted in the Wuhan of Hubei province of the People's Republic of China. Soon after that, on January 12, 2020, a virus of the novel coronavirus family was isolated, and a complete genome of the virus was shared and was considered as the etiological factor of the condition. The World Health Organization (WHO) named this virus as *2019 coronavirus (2019-nCoV)*. Later it was renamed by the Coronavirus Study Group of the International Committee as severe acute respiratory syndrome coronavirus-2 (*SARS-CoV-2*). The *SARS-CoV-2* virus is assumed to be zoonotic in origin [1]. On the genetic front, it possesses a very close resemblance to the Beta coronavirus of subgenus lineage B of SarbeCo virus. It has a genomic similarity of over 96% to that of other bat coronavirus samples (*BatCoV RaTG13*)¹; however, it differs in the region that defines infectivity and host range. Therefore, there is a possibility that the virus may have mutated and adapted to the human body, making it more infectious and quickly spreading [2].

Within a short span of time, the SARS-CoV-2 virus has spread rapidly to all countries worldwide. As of January 2022, COVID-19 infection has been reported across 222 countries and infected close to three hundred thirty-four million population and more than five million deaths [3]. Due to the rapid geographical spread, WHO has declared it a pandemic in March 2020 [4]. The main mode of transmission of COVID-19 is considered to be aerosols and droplets. On the surface, the virus may remain viable for 3 days; therefore, fomite transmission also plays an important role in spreading the pandemic [5-7]. This has forced various health regulatory authorities to enforce the traveling restrictions, and lockdowns were enforced to prevent humanitarian movement, hence the spread of infection [8-10]. These lockdowns adversely affected the quality of life as repeated lockdowns have restricted access to basic healthcare facilities. Most hospitals and healthcare centers were converted into COVID-19 centers to cope with the increased demand for COVID-related health issues [11, 12]. Recently, an Omicron variant of SARS-CoV-2 is a probable threat. As of December 15, 2021, the Omicron variant has infected around 108 countries and over 150000 patients. India has also observed omicron-positive cases [13].

Usually, the close proximity of the dentist and patient is required for proper examination, diagnosis, and treatment. Many dental procedures are aerosol-generating (such as oral prophylaxis, cavity preparation, debonding of orthodontics), making the COVID-19 infection susceptible to transmission [14]. These aerosols usually get settled inside the clinical environment leading to the risk of cross-contamination.

With this reference, American Dental Association (ADA) and the Iowa Dental Board advised all the dentists to suspend all the dental procedures except only emergency dental services from March 16, 2020 [15]. Such advisory from oral health regulatory authorities have hugely affected the patient-oral health care provider relationship during the pandemic and in the post-pandemic phases. Therefore, many oral healthcare providers struggled to adapt their practices accordingly, as accessibility to the healthcare system was a concern [16]. It created the necessity for the execution of a healthcare delivery system that can be accessed from homes.

The world has been made a smaller place due to the internet and information technology evolution. Although people are physically far away, they are well linked through social media and other applications, operated anytime and anywhere. A telehealth model was practiced worldwide to manage patients with oral health-related problems. In oral health care, this approach has been proven beneficial for patients and dentists, as this allowed the patient to consult a specialist [17]. It also permitted teletriaging and telemonitoring of the follow-up patients [18]. This model was defined by Cook in 1997 as "the practice of using video-conferencing technologies to diagnose and advice about treatment over a distance" [19]. The teledentistry has been proven a boon to dentistry. It is widely used in all the oral health care delivery system branches. It is mainly aimed at relieving the symptoms of acute conditions such as pain and swelling [20]. Also, it is used for guiding patients with emergencies that can be managed at home [21]. It had the ease of referral and limited physical contact between patient and oral healthcare provider.

Teledentistry is one of the rapidly evolving branches of the oral healthcare system. However, it has certain limitations. Internet and smartphone facilities are not easily accessible in developing countries like India. Sometimes it is difficult to detect an oral healthcare problem from a telephonic conversation without any clinical and radiographic examination [22]. The clinician might not be able to correlate with the condition because of poor-quality photos and videos [23].

This article highlights our experiences with teledentistry at the Dental Unit of All India Institute of Medical Sciences, Bhubaneswar, a tertiary care health Centre in Eastern India, during the COVID-19 pandemic.

History

NASA first used telemedicine in the 1970s, and then the US military adopted it. Initially, the concept of teledentistry was used for informatics in 1989. The US Army initiated the Total Dental Access (TDA) project in 1994. It permitted the US armed forces dentists to have a consultation at a medical center, which resulted in the rapid evolution of teledentistry [24]. This health care delivery technique has been proven beneficial in the amid crises of COVID-19 pandemic. The American Dental Association (ADA) has proposed four modalities for effective teledentistry, such as synchronous model, asynchronous model, remote patient monitoring, and mobile health. A synchronous model is a two-way communication modality with a live conversation between patient and tele-dentist using audio-visual telecommunication. In an asynchronous model, recorded radiographs and clinical information are sent to an oral health care provider by secure telecommunication. In remote patient monitoring, patient-related data is transferred to a different location for the examination. Mobile health (m-health) uses the mobile for patient education and treatment [25-27].

Teledentistry: The beginning at All India Institute of Medical Sciences, Bhubaneswar

Electronic tablets were provided to every department at All India Institute of Medical Sciences Bhubaneswar for telecommunication with the patient. Along with this, a comprehensive dedicated mobile-based application, the "AIIMS Bhubaneswar Swasthya app" was designed and developed by the Centre for Development of Advanced Computing (CDAC) Noida, India (Fig 1). The Information Technology (IT) department of AIIMS, Bhubaneswar, conducted various online training modules for faculty, residents, and other health care providers to make them aware of the hassle-free use of the app and the tablet for getting in touch with patients, i.e., telemedicine.²⁸ The Department of Hospital Administration, AIIMS-Bhubaneswar, has widely circulated the department-wise telemedicine contact number through various media channels and was put the same on the web page of the AIIMS, Bhubaneswar (Fig 2). All the desired information on how to use the AIIMS Swasthya app and overall workflow for the patient were made available on the AIIMS, Bhubaneswar webpage (Fig 3). This app has allowed the users to view department-wise consultant schedules, availability of consultants, and other related information. It also provides online registration of new patients using an Aadhaar card to collect basic demographic details. This application has the provision to prepare and send the prescription to the patient based on the information provided by the patient after the approval from the consultant.

The teledentistry number was available in the various public forums for wider reach. Using the WhatsApp video call or message, patients directly contacted the oral health care provider through their smartphone. This has been proven effective in limiting the number of OPD consultations. Patients were screened for the urgency of treatment needed, and if it was found to be urgent, they were given the appointment for a dental OPD visit after having proper triage and details of the vaccination and other related pieces of information [29].

Teledentistry: Our experience

Tele dentistry facility was made available at AIIMS, Bhubaneswar, from August 2020. Due to the restrictions on the movement of humans by the various authorities coupled with the closure of OPD facilities at AIIMS, Bhubaneswar forced the needy people to utilize teledentistry facilities. The COVID-19 pandemic has created mental and psychological effects for the patients. When the lockdown was relaxed, and the OPDs at the institute started to serve the patients, many of them preferred to first consult through teledentistry, and if required, they visited the department for comprehensive oral care. We have received 2125 tele dentistry-based queries from August 2020 till December 2021.

The patient's concerns were mainly related to dental pain, decayed teeth, ulcer, and swelling in the oral cavity. For undergoing orthodontic patients, their main concerns were broken appliances, impinging wire or the bracket, and oral ulcers (Fig 4, 5, 6, 7). An oral care provider received all the teleconsultation calls and triaged them as per the oral care need. They were prescribed medicines for minor oral health-related issues, and verbal instructions about using the same were given. Patients were advised for regular follow-up for their oral concerns. For patients with oral health concerns and requirements were urgent, they were asked for the COVID vaccination status and related pieces of information. They were advised to visit the dental OPD for an initial check-up,

and if needed, only emergency oral health care was provided to them, and they were asked to be on regular follow-up. The overall satisfaction among the patients who used teleconsultation was high.

Limitations of telemedicine

Although teledentistry has been proven a boon to dentistry, it has several limitations that cannot be overlooked. The accuracy of clinical and radiographic examination certainly cannot be matched. Actual clinical representation might be different from the sent photographs or video recordings [24]. Even though the technology is continuously improving, the main focus of teledentistry is still on diagnosis, prevention, and patient education. If the patient requires any dental

treatment like restoration, extraction, endodontics, or orthodontic treatment, he has to visit the clinic. Internet and telephonic facilities might not be accessible for some patients. There is also a concern of confidentiality of dental records such as medical histories and photographs as data is stored in computers [30]. Care should be taken to prevent the privacy breach of the patient. The patient should be made aware that there is the possibility of a breach even with maximum security. Also, informed consent should be obtained from the patient as there is an inherent risk of improper diagnosis due to the inadequacy of technology. Lack of standards may also lead to medicolegal and copyright issues in teledentistry [31]. Many legal issues such as malpractice, jurisdiction, licensure have not yet been decided [32].

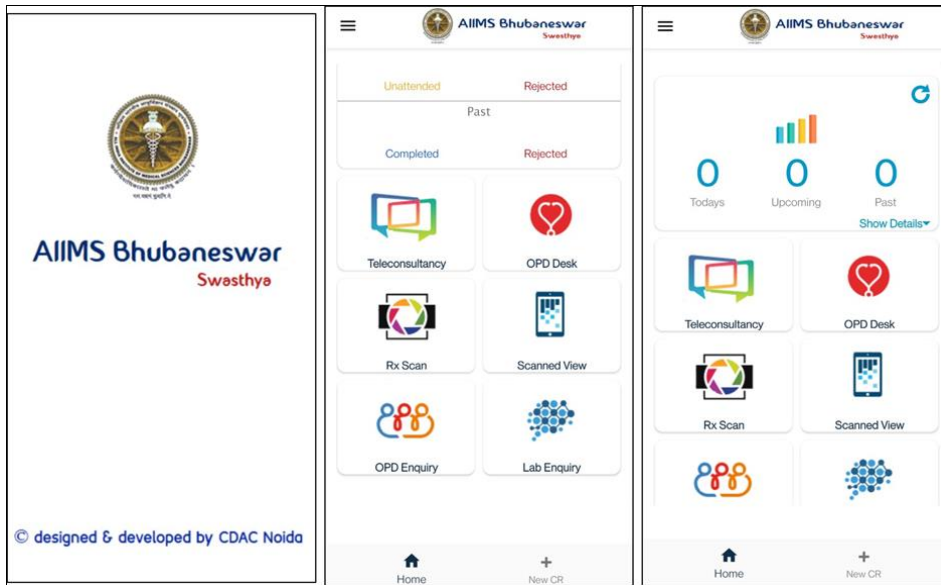


Fig 1: AIIMS Swasthya app interphase

ଆମ୍ଭ ଆପଣଙ୍କୁ ଭିଡ଼ିଓ କଲ୍ ମାଧ୍ୟମରେ ସମ୍ପର୍କ କରିବାକୁ
Consult through WhatsApp Video calls

ଟେଲି ମେଡିସିନ୍ ସେବା ଏମ୍. ଭୁବନେଶ୍ୱର **Telemedicine AIIMS, Bhubaneswar**
 ସୋମବାର ରୁ ଶୁକ୍ରବାର ସକାଳ ୯ଟାଠାରୁ ସନ୍ଧ୍ୟା ୫ଟା ପର୍ଯ୍ୟନ୍ତ **Monday to Friday 9am to 5pm**
 ଶେକିବାର ସକାଳ ୯ଟାଠାରୁ ସନ୍ଧ୍ୟା ୧ଟା ପର୍ଯ୍ୟନ୍ତ **Saturday 9am to 1pm**

ଦୟାକରି ଧ୍ୟାନ ଦିଅନ୍ତୁ ଅତି ଜରୁରୀ ନ ହେଲେ, ଦ୍ୱାଦଶଘଣ୍ଟା ଆସବୁ ନାହିଁ । ନିମ୍ନଲିଖିତ
 ଗୋଟାଏକ ନମ୍ବରରେ ଯୋଗାଯୋଗ କରି ଦ୍ୱାଦଶଘଣ୍ଟା ପରାମର୍ଶ ନିଅନ୍ତୁ ।

ବିଭାଗ ଗୁଡିକ	ଫୋନ୍ ନମ୍ବର	DEPARTMENTS	PHONE NO.
ଘେଷକ ବିଭାଗ (ମେଡିସିନ୍)	୮୨୦୩	General Medicine	82803
ଗଣ୍ୟ (ସର୍ଜରୀ)	୮୨୦୩	General Surgery	82803
ଝା ଓ ପ୍ରସୂତି	୮୨୦୩	Obstetrics & Gynaecology	82803
ଶିଶୁ (ପେଡିଆଟ୍ରିକ୍)	୮୨୦୩	Paediatrics	82803
ଚର୍ମ (ଡର୍ମାଟୋଲୋଜି)	୮୨୦୩	Dermatology	82803
କାନ, ନାକ, ଗଳା (ଇ.ଏନ୍.ଟି)	୮୨୦୩	ENT	82803
ହୃଦ୍‌ରୋଗ	୮୨୦୩	Cardiology	82803
ଅଗ୍ନିଶକ୍ତି ବିଭାଗ (ଅର୍ଥୋପେଡିକ୍)	୮୨୦୩	Orthopaedics	82803
ଶ୍ୱାସ ରୋଗ (ପଲ୍ମୋନାରୀ)	୮୨୦୩	Pulmonary Medicine	82803
ମୂତ୍ର ରୋଗ (ୟୁରୋଲୋଜି)	୮୨୦୩	Urology	82803
ନେଫ୍ରୋଲୋଜି (ସୋମବାର ରୁ ଶୁକ୍ରବାର)	୮୨୦୩	Nephrology (Monday to Friday)	82803
ମାନସିକ ରୋଗ	୮୨୦୩	Psychiatry	82803
ନିଗ୍ରାହକ ଫେଲ୍ଡ୍‌ଲାଇନ	୮୨୦୩	De addiction Helpline	82803
ପାକୃଷ୍ଟ ଓ ପେଟରୋଗ (ଗ୍ୟାଷ୍ଟ୍ରୋ)	୮୨୦୩	Gastroenterology	82803
ଗ୍ୟାଷ୍ଟ୍ରୋ ସର୍ଜରୀ	୭୨୫୫୦	Surgical Gastroenterology	76550
ଚକ୍ଷୁ ବିଭାଗ	୮୨୦୩	Ophthalmology	82803
ଏଣ୍ଡୋକ୍ରିନୋଲୋଜି	୮୨୦୩	Endocrinology	82803
ଶିଶୁ (ଶଲ୍ୟ)	୮୨୦୩	Paediatric Surgery	82803
ଦନ୍ତ ବିଭାଗ	୮୨୦୩	Dental	82803
ଦୃଢ଼ (ଶଲ୍ୟ) ସି.ଟି.ଭି.ଏସ	୮୨୦୩	CTVS	82803
ନିଉନାଟୋଲୋଜି (ନେବଜାଟ ଶିଶୁ)	୮୨୦୩	Neonatology	82803
ଜ୍ୱଳନ/ଦଗ୍ଧ ଆଘାତ	୮୨୦୩	Burn and Plastic	82803
ସ୍ନାୟୁ ଶଲ୍ୟ (ନ୍ୟୁରୋ ସର୍ଜରୀ)	୮୨୦୩	Neurosurgery	82803
ସ୍ନାୟୁ (ନ୍ୟୁରୋଲୋଜି)	୮୨୦୩	Neurology	82803
ରକ୍ତ କର୍କଟ (ଟ୍ରେମାଟୋଲୋଜି)	୮୨୦୩	Medical Oncology & Haematology	82803
କର୍କଟ (ଶଲ୍ୟ)	୮୨୦୩	Surgical Oncology	82803
ପି ଏମ୍ ଆର୍	୮୨୦୩	PMR	82803
କରୋନା/କୋଭିଡ୍	୮୨୦୩	COVID Clinic	82803

ସ୍ୱାସ୍ଥ୍ୟ ଆପ୍ ଘରେ ରହି ସ୍ୱାସ୍ଥ୍ୟ ଆପ୍ରେ ସେବା ନିଅନ୍ତୁ ଓ କରୋନା ଭୁତାଣୁ ଠାରୁ ସୁରକ୍ଷିତ ରୁହନ୍ତୁ
Stay home, consult using Swasthya App and Stay Safe from Covid-19
 An ABQC initiative. Dept of Hospital Administration, AIIMS Bhubaneswar

Fig 2: Teleconsultation details of AIIMS, Bhubaneswar, India

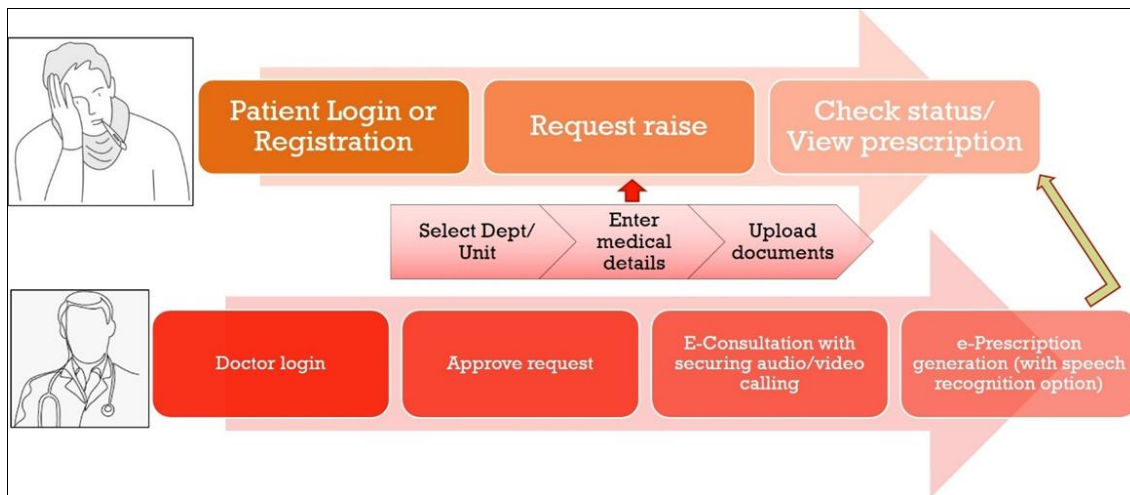


Fig 3: Workflow for the patient and oral health care provider through AIIMS Swasthya app

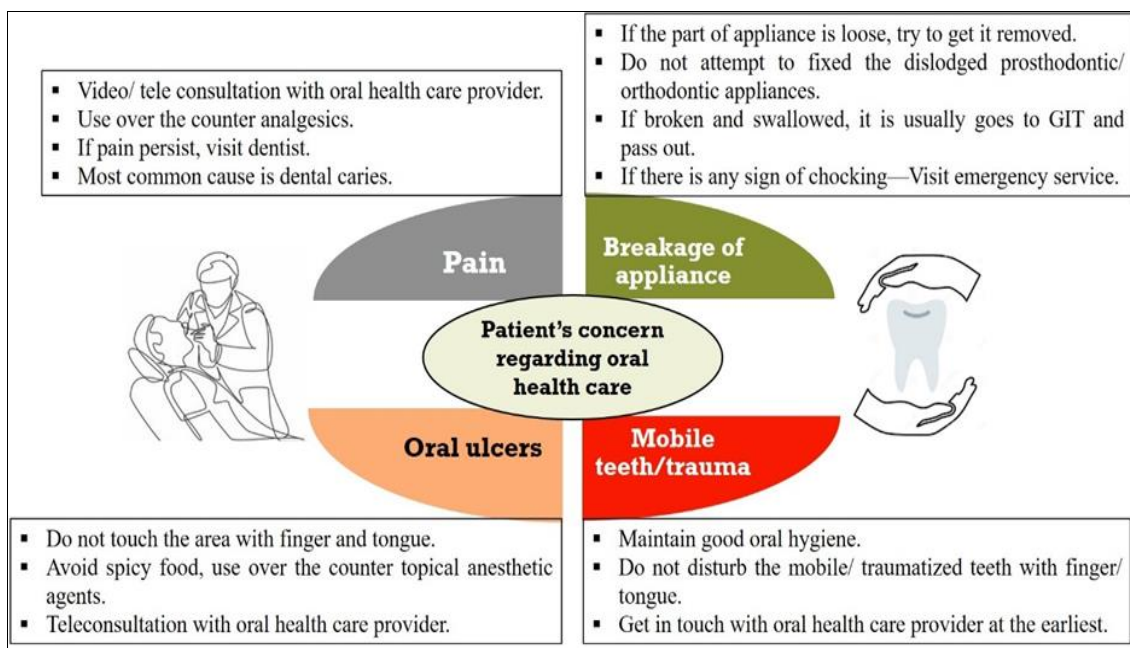


Fig 4: Management of common oral healthcare-related issues of the patient

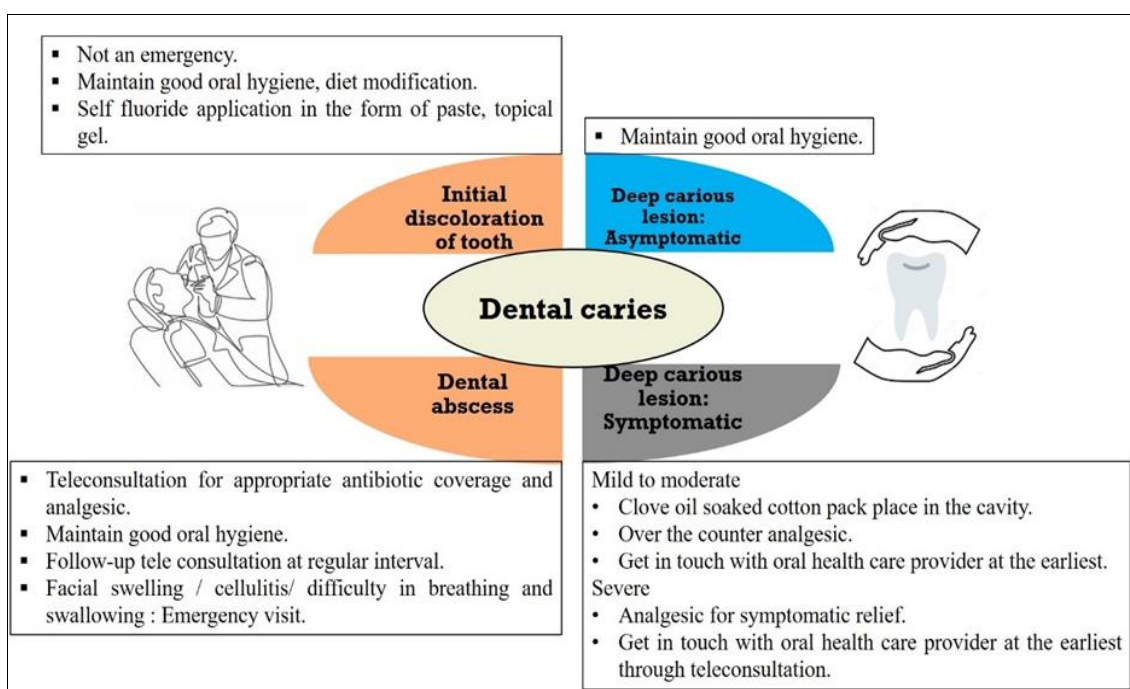


Fig 5: Management of dental caries and its related complications

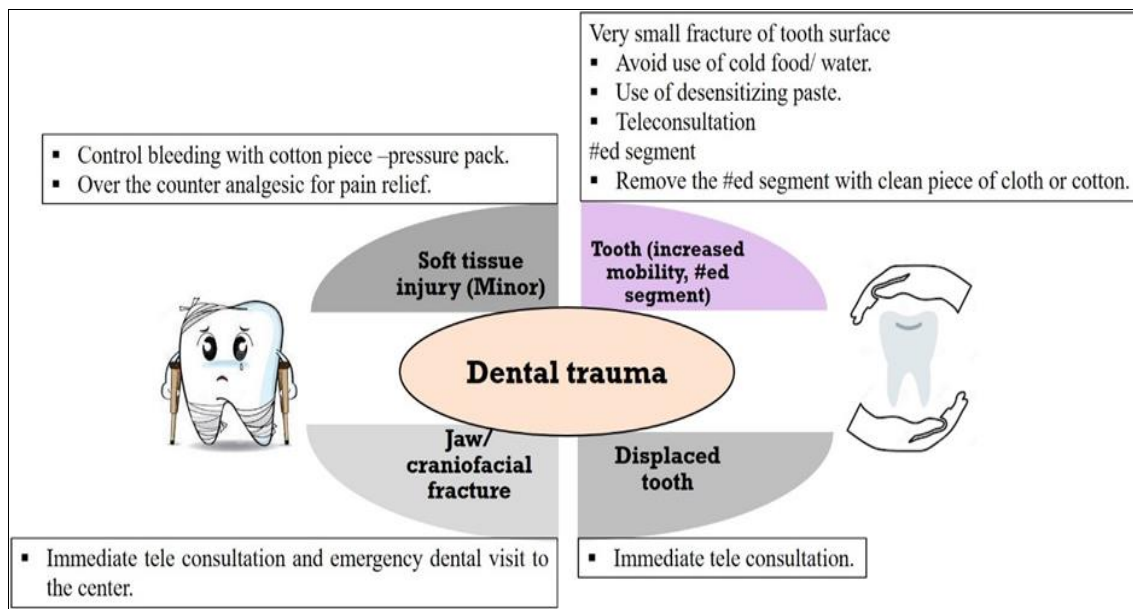


Fig 6: Management of dental trauma and its related issues

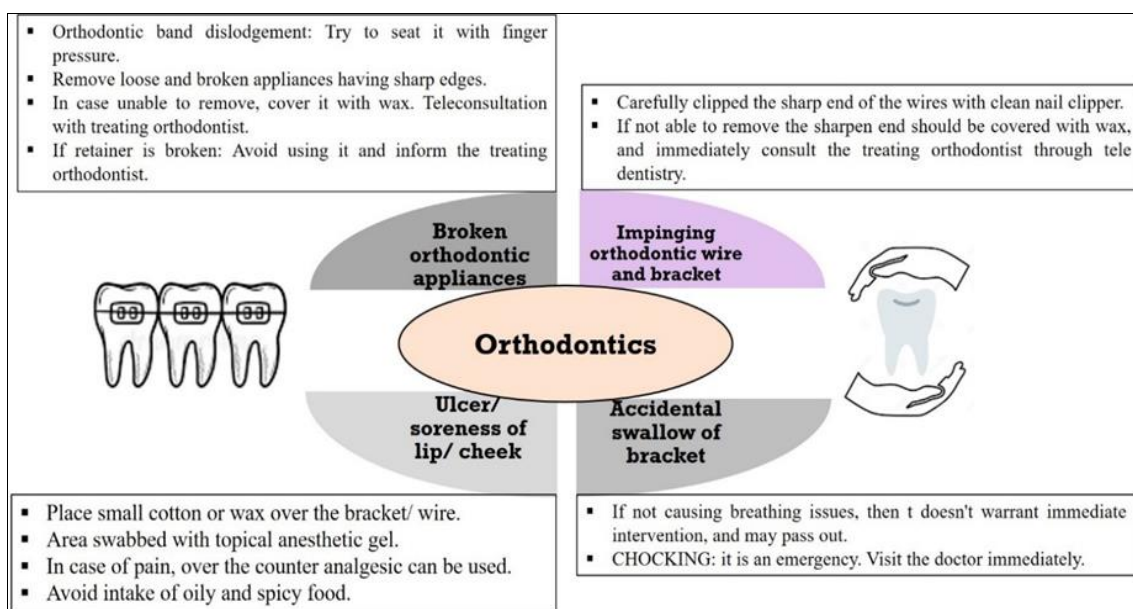


Fig 7: Management of orthodontic and dentofacial orthopedics related issues

Conclusion

People are still in a state of anxiety due to timely mutations of the COVID-19 virus leading to repeated lockdowns. Teledentistry in these times of pandemic has been proven a boon to oral health care practitioners and patients. It has enabled the dentist to provide the necessary care in many situations. Although it mostly relies on prevention and diagnosis, it might be possible to provide dental care using robotics in the near future. So far, the results achieved from telemedicine look promising. However, certain practice require improvement validation in teledentistry.

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