

ORAL MANIFESTATIONS OF SEVERE ACUTE RESPIRATORY SYNDROME (SARS) VIRUS IN HUMAN BEINGS AND IMPLICATIONS FOR SAFE DENTAL PRACTICES -A REVIEW

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ABSTRACT

Severe Acute Respiratory Syndrome, commonly referred to as SARS, is a highly contagious infection caused by the SARS Corona Virus that can affect people of all age groups, particularly those patients in the age group 60 years or above. It is spread by droplets and can be easily mistaken for a common cold. Oral manifestations occur within the inaugural stage of the virus. They include the presence of erythematous lesions over the soft palate, inflammation of the lymphoid tissues on the tongue, xerostomia and bluish discolouration of the lips. Some challenges faced in dentistry are the spread of infection via the aerosols released due to usage of dental instruments. This review article brings out the oral manifestations of SARS along with standard protocols and necessary safe practices that must be followed by dental professionals while dealing with patients suffering from SARS.

KEYWORDS: SARS; Clinical Features; Oral Manifestations; Patient Selection; Preventive Measures

Article History

Received: 02 Sep 2020 | Revised: 03 Sep 2020 | Accepted: 15 Oct 2020

INTRODUCTION

Pathogenic microorganisms, over many years, have made as much progress as any other creature. As soon as a disease agent enters our body and resulting in clinical manifestations of the infection, the human body develops immunity by producing antibodies to resist the pathogen. These antibodies remain in the body even after the elimination of the pathogen and thus prevent recurrence of the infection. Viruses are pathogenic microorganisms that consist of a single or double strand of either ribonucleic acid (RNA) or deoxyribonucleic acid (DNA). They rapidly mutate and pose challenge in mass prevention, hence requiring new immunity, resulting in potential hazard to other organisms. A host organism is infected by a virus in four steps: entering the body from a site, rapid replication locally, spread to other parts of the body, and reach the sites from where it can be spread to the environment(1). The last stage is a potential threat to the population and thus care should be taken to minimise the spread by adopting simple yet important preventive measures and employ safe procedures in our practice. These measures can play an important role in maintaining the public health and protecting the community.

SEVERE ACUTE RESPIRATORY SYNDROME (SARS)

One of the more recent family of viruses causing severe disease in humans is the SARS CoV virus belonging to the corona virus family. These viruses, consisting of a single strand of RNA, were first diagnosed in humans in the early 2000s during the first outbreak of the virus. (2) Spread of the infection occurs by droplets which are released in the air when a person coughs or sneezes. The virus then enters the body and releases a protein called Angiotensin Converting Enzyme -2 (ACE-2) when it attaches to the lining of the respiratory tract epithelial cells. (3) Incubation period of the virus is 2-7 days, though in some cases it can extend up to 10-14 days (4). The incubation period of the virus is believed to depend on the amount of humidity in the environment. It has also been observed that males are twice more prone to getting infected by this virus than females, which is attributed to presence of oestrogen in females having the ability to stimulate the immune system. (5,6) Aerosols and fomite transmission of SARS is possible because the virus can remain viable and infectious in aerosols for hours and on surfaces up to 4 days, plastic and stainless steel for 72 hours, copper for 4 hours and cardboard up to 8 hours. (7)

CLINICAL AND RADIOLOGICAL FEATURES

The patients reporting with SARS show symptoms of severe cough, sneezing, difficulty in breathing or dyspnoea, fever with chills and fatigue. (8). Early stages show milder symptoms such as cough and fever, which people mistake for a common flu since both show similar signs and symptoms. Advanced stages show more acute symptoms like dyspnoea, or difficulty in breathing, and pneumonia, which require hospitalisation and may be possibly fatal. (9). Recently anosmia, and or loss of taste, has also been noticed in some SARS positive patients. (10) Possibility of decreased oxygen in the blood may lead to complications such as central cyanosis. (11) Prognosis is usually not good with geriatric patients over the age of 60, mainly those with cardiac or liver complications. (9). Though chest X ray can detect the presence of the disease; it is generally advised in patients who show severe symptoms and not a routine diagnostic test for SARS positive patients. The radiographic findings in chest X ray includes patchy focal infiltrates or consolidation often with a peripheral distribution, which may progress to diffuse infiltrates (12)

ORAL MANIFESTATIONS

Apart from the routine symptoms and signs, oral manifestations have also been observed in SARS positive patients. The common oral manifestations include presence of small, round erythematous lesions over the region of the soft palate. (13). These lesions may sometimes be associated with pain, extra oral swelling with concurrent occurrence in other parts of the body such as the toes. Chaux- Bodard et al reported a case of a 45-year-old patient who presented with an irregular ulcer on the dorsal side of the tongue that evolved from an erythematous painful macule and healed completely within 10 days. The patient had also reported a simultaneous presentation of a tender reddish macule on the toe, which also underwent complete healing in 10 days. (14). An acute increase in size of lymphoid tissue has been observed at the lateral borders of the tongue, mainly in patients with excess of tonsillar tissues. (13). A common complication of tonsillar stones is observed due to food accumulation in the tonsillar crevices, which may harbour bacteria leading to halitosis and infections. Xerostomia, has been reported in some patients under medications such as antihistamines and decongestants, thus resulting in reduced cleansing and antibacterial activity of saliva, making these patients more prone to oral candidiasis and other infections (13, 15). The cases reported by Chaux-Bodard et al and Carreras- Presas et al who presented with an irregular ulcer on the tongue, tested positive for SARS Cov-2 on day 8 and hence oral manifestations could be considered as one of the initial signs of SARS (14, 16). Due to decreased oxygen saturation in the blood, cyanotic changes, such as bluish discolouration of the lips,

tongue and nail beds were observed. (17). The recent reports of loss of taste in many patients with SARS infection could be related to increased expression of ACE- 2 receptors in the epithelial cells of the tongue, where the taste receptors are widely distributed. (18). There is also a high risk of secondary complications including opportunistic infections such as candidiasis and herpes simplex that predominantly occur in immune-compromised patients leading to added morbidity (19). Thorough oral examination should become an integral part of clinical examination to identify the SARS positive patients at an early stage.

CHALLENGES FACED DUE TO SARS

A huge number of challenges are faced by the health professionals during patient care of SARS positive patients. Especially dentists and ENT specialists are at a relatively higher risk since they deal at close proximity with the oral cavity. When the patient coughs or sneezes, the dentist is directly exposed to the virus present in the projectile droplets causing a major risk for getting infected by the virus. Airtor hand pieces used by the dentist generally gives a jet of water directly at the bur to prevent heating up of the bur during dental procedures. In this process, water mixes with the debris in the oral cavity and gets contaminated, which is usually suctioned out. However some amount also is sprayed out since it hits the tooth surface at high speeds and is deflected in the following three ways. Firstly, spatter, which is the water droplets mixed with air and solid particles of size more than 50 micrometres and are visible to the human eye. Secondly, aerosols, which are the droplets, are too small for the eye to see, around 50 micrometres or less. Thirdly, droplet nuclei, which are of 10 micrometres or less and can enter and affect the lungs. (20). In a patient infected with SARS, the water is also contaminated by virus present in the oral cavity, resulting in the aerosol getting sprayed and contaminating the area.

INVESTIGATIONS

Laboratory investigations usually done for SARS includes Polymerase Chain Reaction (PCR) test, Enzyme Linked Immuno Sorbant Assay (ELISA) test, Immuno Fluorescent Assay test, antibody tests and cell culture. Due to the similarity of SARS to other diseases like flu, one test alone may not be sufficient and two or more tests are generally conducted to confirm the diagnosis. (21). The PCR which is used currently in the detection of SARS is RT-PCR (Real Time PCR) assay, which is more sensitive, accurate and relatively faster than traditional PCR. (22). The ELISA test is used to detect the virus in the urine, nasal fluids and faeces of patients by identifying the nucleocapsid protein present in the virus. The ELISA test is generally performed instead of PCR in laboratories for mass screening since this test is more economical and convenient. (23) The Immuno Fluorescent Assay test is one of the most easily available and economical diagnostic tests. This test uses the sample cells taken from the throat of the patient using a cotton swab to analyse the presence of infection. (24) Antibody tests are serum based tests that use cultured antigens and are the most reliable source of indicators of the infection. They can detect a previous infection even if samples are collected a month after the onset of the disease; however in some patients the antibodies may develop as early as within 10 days of the infection by the virus. (22)

TREATMENT

Currently many drugs including plasma therapy have been found to be promising modalities of treatment along with supportive care. Treatment of affected patients can be given by symptomatic relief like steroids and decongestants and by supportive care such as artificially supplying oxygen through mechanical devices such as ventilators. (25). Research is currently under progress worldwide in the field of developing vaccine and it is under Phase III trial in few countries including India. Many drugs that are used to treat viral diseases are being used in research and trials. As of today, the drugs

that are being tried include hydroxychloroquine, an antimalarial drug. Kaletra, a combination of ritonavir and lopinavir that is used to treat Human Immunodeficiency Virus (HIV), Interferon alfa-2b, a drug used to treat hepatitis C patients, favipiravir, a drug used to treat patients suffering from influenza and remdesivir, a nucleoside analogue prodrug. The main approach is to prevent multiplication of the virus and stimulating the natural body immune system. (26). Nutritional supplements such as zinc can be given to boost the immune system. Reports of using interferons, intravenous gamma globulin and cyclosporine as a part of medical management have also been documented. (27). Plasma therapy, a technique involving taking the plasma from patients who have recovered from the disease and injecting in an affected patient to generate antibodies, is being employed as well. (28).

CASE SELECTION PROTOCOL FOR DENTISTS

Since dentistry poses a high risk to SARS infection, the dentist has to decide the treatment plan, which patients to treat, prioritise the cases, and perform the appropriate procedure with complete protection at all times. The dentist must only agree to tend to emergency cases and cases of severe infections. Usual dental check-ups, follow ups and procedures such as minor fillings, crowns and scalings must be postponed till the patient is symptom free for at least 10-14 days with a negative test for SARS. A thorough medical history must be taken, including making sure the patient has not been in close proximity with people suffering from or showing signs and symptoms of SARS. The dentist must wear personal protective equipment (PPE) of level 3 at all times which include 2 pairs of sterile gloves, chemical resistant clothing, boots, a well-fitting facemask or a visor and an artificial respirator. (29). Recently, hazmat suits have been issued to dentists, which is a major step in providing protection against such infections as it completely covers the patients thus ensuring maximum protection. While treating patients the dentist must avoid the use of aerosols and preferably use Atraumatic Restorative Treatment (ART) which involves using hand instruments to perform dental procedures in an aseptic manner to prevent the spread of the infection. Isolation is absolutely essential, where rubber dam is the best isolation method as it prevents the saliva from entering and mixing with the materials and dental instruments being used thereby reducing the probability of infectious spread.

PREVENTIVE MEASURES

Though SARS cannot be treated, certain practices can be followed to prevent and control the spread of the virus. Some of the simplest yet efficient methods are maintaining proper hygiene, washing hands regularly, avoid touching the nose or eyes frequently, avoiding close proximity to people infected with SARS and wearing protective masks. Soap has been shown to destroy the virus since the molecules can break through the cell membrane of the virus-infected cell. (3) Masks available are of many types. N-95 masks are the most efficient type of masks to prevent infection. But they can only be used for a certain amount of time at a stretch since the individual will continuously inhale and exhale the same air that could cause hypercapnia and hypooxygenemia over prolonged usage. Surgical masks used in the medical field can block out 80-90% of the infection spread. The Filtering face piece (FFP) and activated carbon masks can protect us from 60-80% of particles. Cloth masks are the easiest to obtain, but they provide the least amount of protection of just 20-30%. If a person is showing signs of SARS or is suspected of being infected, he or she must be quarantined until a minimum of 10-14 days have passed and the patient does not show any signs of infection and 2 PCR tests taken from their throat swabs are tested negative. (30).

CONCLUSIONS

It is important to recognise the signs and symptoms of SARS to aid in early diagnosis and to institute prompt management. The oral manifestations of SARS, apart from systemic clinical manifestations, include erythematous lesions, ulcers, inflammation of lymphoid tissue, xerostomia, and cyanosis of the lip. Oral manifestations play a vital role as they could manifest within the early stage of the infection, aiding diagnosis. A thorough oral and clinical examination is the need of the hour, to identify the patients and subject them for routine tests to detect positivity. The mode of spreading is mainly by droplets and the infection poses a high risk to health care professionals, especially dentists as they work at close proximity to the oral cavity. It is important to use PPE throughout the procedures while treating the patients, drape the patient, use rubber dam and employ adequate recommended protective measures to safeguard themselves and prevent its spread into the community.

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