



Acroischemia in a Patient with Tracheostomy in COVID-19: A Case Report

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Authors' contributions

This work was carried out in collaboration among all authors. Author BS designed the study, performed the statistical analysis, wrote the protocol managed the literature searches and wrote the first draft of the manuscript. Authors SD and YGD managed the analyses of the study. All authors read and approved the final manuscript.

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Case Study

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ABSTRACT

As a part of global health care system we are now facing an unprecedented increase in the number of COVID positive patients. While the SARS-CoV2 continues to expand its reach, newer information gets reported every day. The phenomenon of acro-ischemia in patients testing positive for SARS-CoV2 has started gathering attention within the medical community. Also, with increased need for tracheostomy HCWs (health care workers) are constantly at a high risk of aerosol exposure. We report a case of a critically ill, late detected, COVID positive male, with dermatological signs who landed in a tracheostomy. We aim to highlight the importance of high index of suspicion and early detection that would make a significant difference.

Keywords: ACE 2; acro-ischemia; coronavirus; COVID-19; otolaryngologist; pandemic; tracheostomy; SARS-CoV2

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1. INTRODUCTION

From its contained origin in rural China in the December of 2019 to a medical calamity in a matter of few months, COVID-19 had infected over seventy thousand and more than eighteen hundred individuals had succumbed to the disease within the first fifty days of the epidemic. The emergence of SARS-CoV2 heralded the global authorities and health care systems alike with around 13.9 million cases worldwide as of July 2020 as per the latest WHO (World Health Organisation) situation report [1]. The presentation of SARS-CoV2 has grabbed attention for studies which continue extensively till today's date and time given its constantly changing nature. With the announcement of COVID 19 as pandemic by WHO in February 2020, awareness regarding the symptomatology, transmission, management and the need for containment of the situation remains the foremost concern. While mortality rate remains slightly lesser of an alarm, its high transmissibility and variation in time and nature of presentation poses an insufferable challenge.

The commonly encountered symptoms of COVID-19 include fever (43%-98%), cough (68%-82%), fatigue (38%-44%), sore throat (13.9%-17.4%), dry cough (59.4%), expectoration (28%-33%), nasal congestion (4.8%), rhinorrhoea (4%). Lower respiratory symptoms including shortness of breath start manifesting as the disease progresses. A relatively rarer subset of presentation includes disturbances in taste and smell with or without nasal congestion, eye irritation and redness more or less pointing towards conjunctivitis, mental confusion and headaches and so on. Newer information keeps surfacing all the time as the virus continues its spread across the globe. It is not uncommon of viruses to have dermatological manifestations on humans.

Acro-ischemia is now coming up as a rare presentation of COVID-19. The severity ranges from conservatively manageable lesions in mildly ill to gangrene like form in critically ill patients. With a continual surge in number of critically ill patients the intensive care units are facing challenges due to limited nature of resources. With this, requirement for tracheostomy comes into play to free patients from ventilatory support. However, because of emerging threats from COVID19 for the HCWs involved, there are

concerns regarding workplace safety, risk of nosocomial transmission and compromise in the quality of care. We thus intend to shed light on the importance of early detection and prevention of further transmission.

2. CASE REPORT

A 57year old male, known case of hypertension and diabetes mellitus, was brought to the emergency room with complaints of left sided chest pain radiating to left arm and jaw with palpitations. The patient was admitted and underwent necessary investigations. Coronary angiogram was done which showed coronary artery disease with triple vessel involvement. He was posted for coronary artery bypass graft surgery under general anesthesia. Patient landed up in bilateral supraclavicular surgical emphysema in postoperative period, which was managed by surgical incision with subcutaneous catheterization. Patient was shifted on to a ventilator support (CPAP) and anticipating prolonged intubation an elective tracheostomy was asked for. Tracheostomy under general anesthesia was performed with insertion of portex cuffed tracheostomy tube no: 8.5. All guidelines for tracheostomy in COVID19 pandemic were followed with utmost precautions during the procedure and also in the postoperative period. On postoperative day 9, purple to bluish lesions appeared on the plantar surface of left toe followed by appearance of similar lesions on the right side. The lesions [Fig. 1] were initially bullous, tense with serous fluid and burst. Gradually there was progressive blackish discoloration with loss of sensation over the lesions. Patient had multiple febrile episodes with lymphocytopenia, deranged coagulation profile and gradually started deteriorating into metabolic encephalopathy with septicemia. Considering high index of suspicion, patient was tested for COVID-19 and turned out to be positive. With deterioration of renal function, patient underwent 8 cycles of hemodialysis. Meanwhile at regular intervals tracheostomy tube change was done every 5th day with proper precautions and closed suction circuit was maintained throughout the period of ICU stay. With progressive cardiopulmonary compromise patient was shifted on PRVC ventilation mode as per requirements. Patient ultimately succumbed to septic shock with multiorgan dysfunction on postoperative day 29. An ENT resident got infected and tested positive during the post-operative care period.



Fig. 1. Acro-ischemic lesions

3. DISCUSSION

There are emerging reports of patients with dermatological signs in the current pandemic. With however scarcity of literature, a new term 'COVID toes' or rarely 'COVID fingers', has emerged recently [2]. This has been used in conjugation with patients positive for COVID-19 virus presenting with acro-ischemic extremity symptoms. These include appearance of red to purplish lesions on one or more toes, often painful and found primarily in younger age group with or without respiratory involvement. However, studies show similar manifestation including bullous lesions and dry gangrene, in older age group averaging around 59 years along with severe respiratory symptoms and comorbidities of other systems. Prolonged prothrombin time (PT), elevated D-dimer levels and disseminated intravascular coagulation (DIC) were observed in these patients and associated with a high mortality rate [3]. A definitive cause is still unknown. Involvement of an underrecognized vascular component to the disease has been theorized [4].

Of recent, several studies have linked the causation to angiotensin converting enzyme 2 (ACE2). SARS-CoV-2 is known to attack and bind to the transmembrane homologue- ACE2 protein to enter various cells in the body. The physiological function of this enzyme remains anti-inflammatory by mitigation of pathological effects of angiotensin II. Occupancy of the ACE2 receptors by the virus leads to decrease in

ACE2, thus resulting in higher Ang-II mediated insult and susceptibility to inflammation, cell death and organ failure. The ACE2 receptor is found within, and not limited to, lungs, heart, kidney, intestines and entire circulatory system including small blood vessels. Along with its expression in type II alveolar epithelial cells, its particular high content in pericytes has been stated as one of the major causes for development of microvascular dysfunction [4,5]. This is responsible for increased infectivity, multisystem involvement and higher propensity for clinical degradation in patients with comorbidities, also explained by the phenomenon of cytokine storm. Some data also suggests participation of low activities of natural anticoagulants, elevated factor VIII level and the presence of antiphospholipid antibodies, together in the etiopathogenesis [6]. For the management of lesions in mild to moderate cases nitroglycerin paste and topical steroids were used with observable improvement.

As the situation escalates, the health care systems are constantly strained and on the verge of getting overwhelmed. Learning from the past experiences of SARS in 2003 and from the ongoing extensive study and observation of the current pandemic, the focus is devoted to limiting the transmission of the virus. As an occupational hazard Otolaryngologists run a great risk of becoming infected with SARS-CoV-2 as they deal with the upper respiratory tract both in outpatient and operative room basis [7]. With an increasing number of critically ill patients in the ICUs the need for tracheostomies for patients with prolonged ventilation increases. HCWs operating on COVID positive patients and those involved in intra and post-operative care are at an increased risk of contracting the disease. It thus becomes imperative to pay attention to their physical and mental wellbeing [8,9]. ICU setups demand Tracheostomy as a measure to extend period of ventilatory support or weaning from ventilation. This requires a closed system to deliver pressure to the lungs. The need for tracheostomy should be balanced and appropriately weighed against the safety of HCWs especially in a constantly constrained pandemic situation. The choice of performing tracheostomy depends on the patient. In patients with trauma related injuries, especially the ones with traumatic brain injury many guidelines favor early tracheostomy as opposed to those showing signs of reduced inflammation and progress in the cardiorespiratory functioning, the decision to delay tracheostomy alleviates the risk of HCW

exposure [10]. Trials to wean off and extubate should be carefully undertaken under clinical expertise in those with high chances of recovery. It should be kept in mind that undue, premature extubation has its cons in exposing patients and staff during reintubation and rescue activities that highly generate aerosols like high-flow oxygenation, continuous positive airway pressure or non-invasive ventilation [10,11]. Adequate time for education and rehearsal with staff prior to donning necessary PPE should be allowed as communication becomes difficult. Team members should be limited to only essential and thoroughly experienced staff. While performing tracheostomies becomes imperative, preventive measures are of critical importance. Additionally, reduced intra-op exposure to aerosols can be attained by complete intra-op paralysis of the patient throughout the procedure to prevent coughing, stoppage of mechanical ventilation just before entry into the trachea, reduced use of diathermy and suction or using one with a closed viral filter system, preferring open tracheostomy over percutaneous [10]. As measures for preventing tube occlusion, we recommend a simple heat and moisture exchange filter for humidification, disposable inner cannulae to decrease the need for suctioning, less frequent tube change and reviewing the situation daily. In patients showing signs of improvement gradual reduction in pressure support, intervals of cuff deflation, vocalization training, swallowing rehabilitation based on clinical expertise rather than instrumentation, should be practiced to wean off from mechanical ventilation [10,11]. Associations of ENT surgeons like the British Laryngological Association and American Academy of Otolaryngology-Head & Neck Surgery have come up with safety guidelines for tracheostomy in COVID-19 pandemic. These guidelines advocate use of standard personal protective equipment including but not limited to disposable gowns, masks, face shields, N95 masks or air purifying respirators and their proper donning and doffing [12,13].

Even with a relatively lower fatality rate (2.5%), concerns over transmissibility of the virus still linger, particularly within the medical fraternity. The incubation period of SARS-CoV2 varies from 4 to 14 days, with a mean of 5 days. The viral load is maximum around the time of symptom onset with a tendency to drop in following 3-4 days. However, studies have reported that the samples have been found to be positive for RT PCR for almost 39 days from the lower respiratory tract after consecutive samples from

the upper respiratory tract have tested negative. In critically ill patients, the viral load has been found to be significantly higher with a slower decreasing rate. After day 7 almost 50 % of people have been detected with serum antibodies and 100% after 14 days [14,15]. This should be borne in mind while engaging in care of especially COVID positive patients.

4. CONCLUSION

COVID-19 exists ranging from an asymptomatic disease to multiorgan dysfunction syndrome. Appearance of digital ischemic lesions in the today's scenario should be looked at with strong suspicion and patients should be thoroughly evaluated. HCWs including Otorhinolaryngologists, should be thoroughly trained regarding care of the patients in a peritracheostomy scenario. The importance of barrier precautions, knowledge concerning instrumentation, handling and management of the patients with tracheostomy and clinical expertise should not be underestimated and should be kept up to date with the latest guidelines.

CONSENT

As per international standard informed and written participant consent has been collected and preserved by the authors.

ETHICAL APPROVAL

As per international standard written ethical permission has been collected and preserved by the authors.

COMPETING INTERESTS

Authors have declared that no competing interests exist.

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