The buccinator muscle and the orbicularis oris muscle, which are innervated by other branches of the facial nerve, function in cheek-puffing movements. aberrant nerve regeneration associated with cheek puffing after Bell palsy is usually thought to result from three possible pathogenetic mechanisms: aberrant axonal regeneration, abberant nerve impulse transmission, and hyperexcitability of the nucleus of the facial nerve. The buccinator muscle is located deep to the skin and is mostly covered by the masseter and more superficial facial muscles. Early EMG evaluation of the buccinator in humans indicated that it is strong and active during most oral functions, including sucking, blowing, swallowing, smiling, and speech, and the buccinator was generally associated with the orbicularis oris muscle. Because of this close relationship between the buccinator with orbicularis oris muscle, EMG of this muscle was examined as well. Similarly, the patient in the present case underwent EMG to confirm the diagnosis, and the test demonstrated synkinesis of the orbicularis oculi and oris because twitching of the orbicularis oris is caused by attempting eyelid closure. However, it was technically difficult to exactly locate the aberrant nerve fiber.

Aberrant facial nerve regeneration is a long-term complication after facial nerve palsy and may cause ptosis. The variable ptosis is due to increased muscle tone in the orbicularis oculi on the affected side and is exacerbated by synkinesis. In AFR, both the upper and lower MRD are usually significantly reduced on the affected side. Both of these indices decreased in the patient in the present case demonstrating that signs of AFR include a reduced a palpebral aperture secondary to increased OOM tone.

Facial synkinesis is defined as any involuntary movement observed in a facial region other than that which is voluntarily moved. Marin-Amat syndrome is a type of AFR, but this syndrome involves synkinesis of the orbicularis oculi and jaw movements. It is caused by acquired aberrant anastomosis of the trigeminal (CN V) and facial (CN VII) nerves. Inverse Marcus-Gunn syndrome is characterized as a congenital involuntary closure of the eyelid on jaw opening. Oh et al demonstrated an EMG that showed the cocontraction of the ipsilateral pterygoid muscle (innervated by CN V) and OOM (CN VII) in a patient with inverse Marcus-Gunn syndrome. Many authors supported this hypothesis. However, the precise mechanism remains uncertain. Low-dose Botulinum toxin A (BTXA) has been used to treat synkinetic eyelids. It is a useful treatment option for patients who suffer the motor and autonomic effects of AFR. Unfortunately, one study showed that the facial synkinesis usually recurred 2 to 3 months after treatment, and patients will need repeat injections.

In conclusion, it is very important to recognize AFR and to identify the causes of ptosis. The diagnosis can be made by the presence of an increase in ptosis with cheek puffing and a decrease in the palpebral aperture with upper and lower MRD reduction. Levator advancement combined with OOM resection of the involved eyelid is affective technique to treat synkinetic eyelid closure in patients with AFR.

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Subjective Smell Assessment as An Office-based Rapid Procedure In COVID-19 Era

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Abstract: A recent history of smell disorder may be a potential predictor for COVID-19. The authors used a subjective olfaction score that was demonstrated on a hard paper-bar. The authors examined 480 patients who were attending the outpatient clinic. Ninety-seven patients (20.2%) demonstrated variable degrees of recent smell disorder. For those patients, lab testing including nasopharyngeal swab for real-time polymerase chain reaction (RT-PCR) was performed. Eighty-eight of them (90.7%) have been confirmed to be COVID-19 positive. Although psycho-physical testing is more reliable, subjective assessment of smell is a rapid procedure and can be used as an office-based method for patients’ screening in COVID-19 era. Smell disorder could be
an alarming sign for COVID-19 even with absent characteristic symptoms.

Key Words: Anosmia, COVID-19, olfaction, smell assessment, smell disorder

Coronavirus disease 2019 (COVID-19) is a highly infectious illness of the respiratory tract caused by the severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2). The disease caused a major health impact all over the world as large number of patients needed hospitalization and mechanical ventilation. The spread of infection occurs through respiratory droplets inhaled by a healthy individual from an infected patient. However, infection may result from touching surfaces or objects where the virus is present, which can be transmitted by the hands to the nose, mouth or eyes. SARS-CoV-2 can persist in an infectious state on surfaces for several days, so surface disinfectant such as 0.1% sodium hypochlorite or 62% to 71% ethanol for 1 minute could be used to prevent dissemination of the disease.

The commonest clinical manifestations of COVID-19 are fever, fatigue, cough, and expectoration, other symptoms including myalgia, anosmia, chest tightness, shortness of breath, and dyspnea. However, smell disorder with or without taste impairment is a well-known feature of the disease. In a USA study carried out on patients with influenza-like symptoms, loss of smell was found in 68% of COVID-19-positive patients compared to 16% of COVID-19 negative subjects. A multicenter study carried out in 4 European countries showed smell disorder in 85.6% of COVID-19 patients. Furthermore, a case control study that was conducted on 60 COVID-19 Iranian patients showed the disorder with variable degrees in 98% of patients. However, those patients might be unaware of their smell problem. Some authors reported that most of the persons who contacted COVID-19 patients may develop some degree of smell disorder without nasal congestion or inflammation, they also found that only 35% of positive patients who had olfactory dysfunction were aware of their smell problem before objective testing. Psychophysical testing of smell such as the Sniffin Sticks test (Burghart; Wedel, Germany) and the University of Pennsylvania Smell Identification test (Sensonics Inc., Haddon Heights, NJ) are valuable methods for evaluation of smell disorder, however, they are not usually available during the general medical examination, as well as being time consuming and costly. So, we used a rapid office-based subjective smell assessment method in an attempt to screen patients who may have COVID-19 without typical symptoms.

MATERIALS AND METHODS

Subjective smell assessment was done for 480 patients who attended our outpatient clinic for medical service, in the period from 1st of April to the end of July 2020. They were 266 males and 214 females; their ages ranged between 18 and 60 years with a mean age of 36 years. Pediatric patients and those who had past history of smell disorder were excluded. Also, patients with symptoms suggestive of COVID-19 such as fever, cough and/or dyspnea were excluded. We obtained a written informed consent from all patients, and we followed the items outlined in the Declaration of Helsinki. Also, we obtained approval for the study protocol from the Research Ethics Committee of our institute.

We demonstrated the subjective olfaction score that was used by Yan et al on a hard paper-bar. The score was graded from 0 to 10 (Fig. 1), where the patient was asked to answer a question “How would you estimate your sense of smell.” In the waiting room, the assistant staff gave patients the hard paper-bar, and the patients were requested to rate his smell score exactly by checking opposite the appropriate grade, where 0: complete loss of smell, 10: normal smell, and scores from 1 to 9 mean progressive increase of smell towards normal. Nasopharyngeal swab was performed for patients with smell dysfunction, using real-time polymerase chain reaction (RT-PCR) as a diagnostic criterion for COVID-19. Also, fifty of our patients who had normal smell, and they were age and sex matched to the affected patients (28 males and 22 females, with a mean age 39 years) were taken as a control group, and they were tested for COVID-19 by nasopharyngeal swab.

Statistical Method

We compared the results of COVID-19 testing in patients with smell disorder and in normal control subjects using Chi square test. Also, by using Mann-Whitney U test, the association of COVID-19 positive results and the grade of smell affection reported by the patients was investigated. A P value of ≤0.05 was considered significant.

RESULTS

Along a period of four months, we evaluated 480 patients for smell disorder using the subjective olfaction score. Ninety-seven patients (20.2%) demonstrated variable degrees of recent smell disorder, with more than two-thirds of them showed smell scores 0 to 5 (Supplementary Digital Content, Table 1, http://links.lww.com/SCS/C73). Eighty-eight (90.7%) of those patients who demonstrated smell disorder have been confirmed to be COVID-19 positive on lab testing. Whereas, only 3 (6%) of the control subjects were COVID-19 positive. The comparison between both groups was statistically significant.

The association of COVID-19 positive results and the grade of smell affection reported by the patients was statistically insignificant. Therapeutic measures were supplied for the patients, in parallel with olfactory training procedures.

DISCUSSION

Head and neck surgeons, oral and maxillofacial surgeons, and Dentists are at a high risk of infection with SARS-CoV2 as they are usually in a close contact with their patients during examination

FIGURE 1. A hard paper-bar demonstrating the subjective olfaction score.
and therapeutic interventions. So, during the current pandemic, most routine procedures have been suspended, and only emergency procedures and surgeries are being performed. Chigurupati et al reported that oral and maxillofacial surgeons in different medical centers have made schedule changes to manage medical emergencies with taking special precautions such as using airborne infection isolation rooms / negative pressure rooms, telemedicine triage, and appropriate personal protective equipment (PPE) for aerosol generating procedures (including eye protection and filtered face respirators (N-95), face shields, powered air-purifying respirators).

The screening of COVID-19 patients and the detection of asymptomatic patients still represent a challenge for health care providers. Medical triage method may give clinicians the possibility for detecting infected patients before attending medical examination. Cervino and Oteri described 2 phases for triage, initially by telephone then in-office. Triage by telephone includes a questionnaire about the patient’s general health, common symptoms of COVID-19, as well as patient’s contact with infected subjects. As the telephone triage may be carried out during the asymptomatic incubation period of the disease, a second in-office triage should be performed and signed. Also, Barca et al recommended the same method of triage before surgical intervention. Triage could decrease the transmission of infection to health care providers. Since olfactory affection may occur at the initial stage of COVID-19 usually with mild clinical symptoms and even in asymptomatic patients, a recent history of smell disorder may be a potential predictor for the disease and can be used as screening method.

In this study, we evaluated smell affection among 480 patients who attended the outpatient clinic without the typical known symptoms of COVID-19. Subjective smell assessment was used as psychophysical assessments were not available in our center. Ninety-seven patients (20.2%) demonstrated variable degrees of recent smell disorder, 88 of them (90.7%) have been confirmed COVID-19 positive on lab testing. However, 3 out of 50 (6%) control subjects have been confirmed COVID-19 positive. The comparison between smell disordered cases and normal subjects was statistically significant. Yan et al detected smell affection in 68% of COVID-19 positive patients on influenza like symptoms, subjective assessment of smell is a rapid procedure and can be used as a screening method.

Smell disorder could be an early alarming sign for COVID-19. It can occur in asymptomatic and/or paucisymptomatic patients. Unfortunately, some patients may be unaware of their smell problem especially if it is mild. So, smell assessment may be mandatory especially for contacts of COVID-19 patients, and for people in areas with high infection rate. In our study, we found insignificant association between smell disorder score and the results for COVID-19 nasal swab that may indicate that COVID-19 disease is associated with smell affection irrespective to its degree. Indeed, subjective assessment of smell is a crude procedure, yet it is a simple rapid method that can detect smell affection in COVID-19 era especially in centers providing medical health services. Yan et al stated that self-reported olfactory dysfunction has recently been detected as a hallmark of COVID-19 and could be a diagnostic predictor of the disease. It can be used by the assistant staff as an office-based screening procedure in the waiting area of the patients before medical examination.

It is worth mentioning that quantitative psychophysical tests such as the Sniffin Sticks test (Burghart; Wedel, Germany) are more reliable methods for smell assessment, however, they are not available in our center. Also, it is costly and time consuming, hence we used the subjective assessment of smell that may have debatable accuracy.

CONCLUSION

Subjective assessment of smell is a rapid procedure and can be used as an office-based method for patients’ screening in COVID-19 era. Smell disorder could be an alarming sign for COVID-19 even with absent characteristic symptoms and irrespective to its degree. Early diagnosis of COVID-19 patients who may not have the typical symptoms could decrease disease spread.

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