

Use of a mouth stick appliance to rehabilitate a quadriplegic patient

Khurshid A Mattoo*¹ Shalabh Kumar², Lakshya Yadav³

¹Department of prosthodontics, College of dental sciences, Gizan (KSA)

²Department of prosthodontics, College of dentistry, King Khalid university (KSA)

³Department of prosthodontics, King George medical college and university, Lucknow, India

ABSTRACT

This article describes a clinical case report of a young male with a clinical condition of quadriplegia. The patient was functionally handicapped as his arms and hands were underdeveloped, weak and completely disfigured. The article describes the clinical and laboratory procedure of fabricating a simple and inexpensive device which will use the patient's dentition to perform daily work. The requirements of such a mouthstick appliance have been mentioned and the necessary care that has to be taken during design of such an appliance has been outlined. The patient was highly satisfied with the result and was able to improve his lifestyle by writing, painting and even type with the appliance. The patient's confidence and social acceptance grew tremendously after using the mouthstick appliance.

Keywords: quadriplegia and paraplegia, mouthstick appliance, adjustable arm, device.

Introduction

According to the theory of evolution, a definite and pronounced transformation that took place in the human being was obtaining a vertical posture and modifying the front legs into the arms. With this transformation, the hand formerly the front legs started playing an important role in his survival. Development of arms allowed a human being to perform many functions which other animals can hardly do. The hands give one the mean of protection, expression, skill and many other innumerable functions. Though they perform a variety of functions they in turn are controlled by the spinal cord and brain. Injuries or tumors of the brain and/ or spinal cord can result in catastrophic events which may result in death or paralysis. Depending upon the site and extent of injury a person may develop paraplegia or quadriplegia (tetraplegia)[1].

Self-esteem and confidence. Psychologists describe the self fulfilling nature of social stereotypes: appearance forms the basis for responses and impressions by others, which then influence individual behavior[3-4].

The treatment of patients with such conditions presents psychosocial as well as technical challenges. In the general population, physical attractiveness contributes to a positive self-concept and social wellbeing[1]. The research of social psychologists emphasizes the cultural importance of physical appearance, particularly in the development of interpersonal relationships[2]. Face is not the only aspect which develops a self-perception of one's own appearance. The presence of normal limbs, overall weight, height, gait and personality combined together give us an image, which is inextricably linked to the level of our Research has shown that global self-esteem in children and adolescents is highly determined by assessment of one's own physical presentation, as well as comparisons with the attractiveness, ability, intellectual skills, and social acceptance of other people [5]. Unusual facial features exacerbate the social challenges of meeting new people and getting along with others, [6] particularly when the deformity is compounded with deformity elsewhere in the body. Lowered self-esteem, speech defects, decreased academic performance, and social isolation may result from merely "looking different" from one's peers. These factors can contribute to inappropriate acting out and impaired social interactions [7]. The patients suffering from such abnormalities where faces as well as limbs are affected must contend with stereotypes that

*Correspondence

Dr Khurshid A Mattoo

Assistant professor, college of dental sciences,
Gizan university (Kingdom of Saudi Arabia)

E mail: drkamattoo@rediffmail.com

correlate decreased intelligence with facial abnormalities. As a result, such patients become less confident in actual ability and question self-worth, which can become a self-fulfilling prophesy of failure. Besides these mentioned psychosocial factors, these patients are totally dependent on others for their day to day normal activities. Spending each day of life without any activity leads to depression and further deterioration of self-esteem.

With the help of this report an attempt has been made to allow these patients to engage themselves in some activities. This was achieved by the fabrication of a mouth stick appliance. Tasks that can be accomplished with a mouthstick include writing, turning pages, pushing elevator buttons, painting, drawing, participation in table games, and operation of desk-to-tabletop devices such as a telephone, electric typewriter, computer terminal, dictaphone, calculator and environmental control unit. Fabrication of various types of mouthstick has been reported in the literature; however, these appliances require professional expertise, time, and laboratory expense [8-10].

Clinical report

A male patient aged 24 years reported to the outpatient department of Prosthodontics with a history of paralysis of limbs. The patient's history revealed that the condition developed soon after illness during childhood. The patient had sought treatment only after the limbs were affected. Patient's upper limbs were weak, short, deformed, and atrophied with hands twisted medially at the origin of wrists. Patient's dental history was nonsignificant. The patient was facing all of the problems that a person without hands can face. Facial features included unilateral exophthalmos, non-working muscles of the eye and incoordination

between the movements of two eyes. Intraorally patient had generalized gingivitis with localized periodontitis. The treatment plan included oral prophylaxis followed by a mouthstick appliance which could hold as many accessories as possible so that he could perform daily functions of routine life.

Fabrication of the device

Primary impressions of the natural dentition were made (CA 37; Cavex, Haarlem, Holland) from which two set of diagnostic casts were obtained. On one cast was fabricated a special tray and the other cast was mounted on an articulator (Waterpik, Ft Collins, CO, USA) using patients centric interocclusal record. This was followed by a secondary impression with addition polyvinyl siloxane material (Reprosil, Dentsply/Caulk; Milford, DE, USA). The final casts were duplicated and then mounted on a semi adjustable articulator which was programmed according to the patient's mandibular movements. After necessary evaluation of the dynamic occlusion, all the undercuts were relieved. Two layers of thin base plate wax were adapted over the occlusal and facial surfaces. This was then processed using heat cure denture base resin. Meanwhile necessary accessories that could be attached to the appliance were designed individually. The oral appliance included an attachment in the form of a screw in its anterior part. To this screw the accessories could be attached with the use of an intermediate arm, which in turn was adjustable in terms of its length by incorporating a hollow cylinder design (**Fig. 1**). After the mouthstick appliance was fabricated, all the accessories were tried for retention and stability (**Fig.2**). The patient was recalled and the fit of the mouthstick appliance was checked.



Fig. 1: Mouthstick appliance along with different detachable components (color coded)



Fig. 2: Accessories incorporated in mouth stick appliance

Discussion

An appliance is a device that is developed by the application of ideas or principles that are designed to serve a special purpose or perform a special function. The existing appliance design allows incorporation of the various accessories that allowed the patient to carry out some functions particularly painting and typing. Like any other appliance the patients using a mouthstick appliance have to first get adapted to the wearing of the appliance. Excessive salivation in the initial phases is a problem which is overcome over a period of time to use. Learning to use the appliance is dependent on individual's zeal and understanding of the working of the prosthesis. Amount of pressure to be applied on the accessory while writing or painting comes with practice. Problems like holding the

appliance firmly were encountered in the initial phases of adaptation. With proper education and experience the patient was able to apply the required amount of pressure while holding the appliance during its function.

Conclusion

Mouthstick appliance proved to be an excellent adjunct to the patient as it allowed him to operate devices like telephone, laptop, mobiles and calculators. With time and practice the patient was able to overcome the odds that were associated with his condition. During his learning phase, he claimed that he was happy as his mind used to be occupied with the thoughts of using the appliance. At times the patient would spend eight to ten hours during the day trying to learn using the

appliance. Six months post wearing the appliance the patient had learned typing and painting with the appliance. Further improvements in designs are required so that the adaptation and working with the appliance is easy.

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