Long Standing Intra Oral Acid Burn

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Abstract Oral burn due to ingestion of corrosive substances can bring about debilitating consequences. It often brings mortality, and the survivors can have severe impairment of functions, especially in relation to the stomatognathic and gastrointestinal systems. This article presents a long-standing case (21 years) of an oral burn caused by a corrosive substance, its manifestation on growth and development of the face and its treatment. The patient was accidentally given acid orally when he was 4 months of age. He was treated at 21 years of age: the time he reported to us. This seems to be the first case report that describes the effects of long standing oral contracture secondary to burns on the growth and development of the maxillofacial structures and its treatment with a novel approach.

Keyword Acid ingestion · Acid burn · Craniofacial growth · Coronoidectomy · Buccal pad of fat

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Introduction

Intra-oral burns due to ingestion of corrosive substances can cause severe injuries to the stomatognathic system. These include restricted mouth opening, microstomia, fusion of the tongue to the floor of the mouth or lingual vestibule, obliteration of the buccal and lingual vestibular space, multiple carious and exfoliated teeth, malocclusion and severe scarring. Functionally, this results in speech difficulties, improper nutrition, inability in facial expression as well as severe psychological handicap.

Although the management of microstomia [1], esophageal strictures and other gastrointestinal complications secondary to acid ingestion have been well discussed in the literature [2], there are very few reports that deal with the correction of intra-oral scar contracture and tongue fusion [3–5]. There has been no report that describes the effects of long-standing oral contracture secondary to burns on the growth and development of the maxillofacial structures.

This paper describes the unfortunate case of a young man, accidentally fed with acid as a baby. Throughout his growth period, he had a severely restricted mouth opening and fusion of his tongue. The aim of this paper is to discuss the effect of this condition on growth and development of the maxillofacial unit, as well as to describe a novel treatment of this condition.

Case Report

A 21 year old male was referred to the Department of Maxillofacial and Plastic Surgery, Silver Oaks Hospital, Mohali, Punjab, India for the correction of restricted mouth opening due to accidental acid (sulfuric acid in the form of acid cleaning solution) ingestion. The patient revealed that

he was fed acid accidentally, at 4 months of age. Realizing the mistake, the boy was upturned preventing it from entering the esophagus. He developed severe intra-oral scarring and as a result, a decreased mouth opening. The patient had been previously operated several times for the correction of restricted mouth opening (probably by scar excision, exact details of the procedures done were not available), but to no improvement.

Psychologically, the patient was extremely depressed and was suffering from extreme loss of self esteem, not preferring social gatherings and events. Daily oral activities like drinking, swallowing, talking, smiling, yawning and eating were all affected negatively and his speech was incomprehensible.

Upon examination, patient had a maximal mouth opening of 13 mm (Fig. 1). The opening pattern was straight, with no increase of opening even after assistance. There was 2 mm vertical overlap and about 1.5 mm horizontal overlap, no midline deviation, lateral extrusive movements of 15 mm to both sides with no joint sounds. Upon palpation, the masseter and the temporalis muscles were bulky and hypertrophic on clenching. No muscle weakness noted. No masticatory muscle pain or temporomandibular joint pain. Upon dynamic and static testing, no pain was provoked in the masticatory system. Patient gave a positive history about clenching.

Scars were present on and around his lips with microstomia, characterized by an abnormally small mouth opening. Intra-oral inspection was difficult, but it was

evident that the patient had scar contracture of bilateral buccal mucosae, lateral oro-pharynx (around the palatoglossal and palatopharyngeal arches), no vestibular space (labially, buccally and lingually), fusion of the tongue upon itself and to the floor of the mouth and lingual gingiva and multiple grossly carious teeth with malocclusion.

Of particular interest on radiographic examination (Orthopantomogram, CT scan and lateral cephalogram), bilateral elongation of the coronoid process was noted, along with prominent antgonial notches (Fig. 1). There was decreased height of the alveolar process of the maxilla and the mandible with the mandibular nerve very close to the apex of the erupted teeth, reduced height of the body of the mandible and sinus pneumatization in the maxilla, covering the roots of the teeth and extending up to the alveolar crest. The glenoid fossa was deep, with a prominent articular eminence, but there was no abnormality noted in the temporomandibular joints. A lateral cephalogram revealed a hypoplastic mandible, with decreased vertical and sagittal dimensions.

Patient was prepared for surgical release of the contracture of the buccal mucosa. Fiber-optic bronchoscope was used for nasotracheal intubation. Bilateral incisions were given to the depth of the submucosal connective tissue layer on the inner side of the cheek at the mid-occlusal plane. Incisions extended posteriorly up to the ascending border of the ramus of the mandible. Temporalis muscles were detached from the anterior border of the ascending ramus, and bilateral coronoidectomy done. Patient's mouth

Fig. 1 (Top left). Initial presentation of the patient. Extra-oral photograph showing scarring of lower lip and chin, with scarring at right corner of the mouth. (bottom left) Intra-oral photograph showing multiple decayed teeth, scarring at oropharynx. (top right)

Orthopantomogram revealing elongation of the coronoid processes and prominent antgonial notches, decreased alveolar bone height. (bottom right) 3D reconstruction of CT scan images

Fig. 2 (top) Surgical release procedure. Photo showing midbuccal incision and defect after undermining inner cheek flaps. Buccal pad of fat seen at the posterior corner of the mouth. (bottom) Diagrammatic

representation of the surgical procedure- scar release and development of a superior and inferior cheek flap and lining of the resultant defect with buccal pad of fat

was then easily opened using Heister mouth gags. The mucosal incisions were extended posteriorly up to the soft palate to release scarring of this region.

To create vestibular depth, superior and inferior inner cheek flaps were elevated (Fig. 2). Oblique releasing incisions were given at the anterior and posterior border of the horizontal mid-occlusal plane incision and undermined. The anterior releasing incision was placed at the inner corner of the mouth just behind the vermilion border and the posterior releasing incision was placed on the mucosa anterior to the ascending ramus of the mandible creating superior and an inferior cheek flaps. The submucosa was

undermined superiorly and inferiorly to create greater vestibular depth. The superior and inferior cheek flaps were rotated superiorly and inferiorly respectively, with the free end corresponding to the occlusal plane sutured to the new vestibular depth. This was done bilaterally leaving the whole inner cheek region raw; hence the buccal pad of fat was released, spread out evenly and sutured. A collagen sheet with tulle gras dressing was sutured over the defect as a covering. Intra-operative mouth opening achieved was more than 40 mm.

On the third post operative day, mouth opening exercises and physiotherapy was instituted with Heister mouth

Fig. 3 Post operative follow up of patient. Spontaneous mouth opening of 40 mm

Table 1 A brief representation of the timeline of this case from the accident to the last follow-up along with the clinical and psychological characteristics of the patient

Time	Incident	Procedures	Clinical and psychological characteristics
4 months-of-age	Accidental ingestion of acid	Primary care (DNA)	DNA
2 years, 6 years, 11 years, 15 years and 18 years-of-age	Surgery to correct oral opening	Surgical release of buccal scar contracture (DNA); unsuccessful	DNA
21 years-of-age	Surgery to correct oral opening	Surgical release of buccal scar contracture; Bilateral coronoidectomy; pterygomasseteric sling release; creation of buccal vestibular depth; buccal pad of fat reconstruction	Clinical: maximal oral opening of 13 mm; severe oral functional handicaps Psychological: depression; lack of self esteem
3rd postoperative day	Mouth opening exercises initiated	Active physiotherapy using Heisters mouth gag	Clinical: oral opening of more than 40 mm Psychological: patient highly motivated in doing physiotherapy
12 months post surgery	Patient under follow up	Patient maintains 40 mm of mouth opening; Patient undergoing speech therapy; patient undergoing restorative dental procedures	Clinical: oral opening of 40 mm; Improvement in oral and speech functions Psychological: improvement in self esteem; depression not evident

DNA details not available

gag, and the patient was discharged on the fifth postoperative day. Regular active jaw opening physiotherapy was advised to maintain mouth opening achieved during surgery. The patient was kept on regular follow-up, during which he maintained 40 mm of mouth opening (Fig. 3).

A brief summary of the events is given in Table 1.

Discussion

This is a unique case where the whole period of post-natal development (from 4 months to 21 years-of-age) of the stomatognathic system was altered by scar contracture. The prolonged effects of oral scar contracture on the growth and development of maxillofacial structures have not been previously reported in the literature. In the present case, although the injury was limited to the oral mucosa and immediately deeper tissues, morphologic alterations could be seen in the whole maxillofacial musculo-skeletal system. Erupting teeth reached the occlusal plane within a short distance and hence, there was no vertical development of the alveolar process with resultant decrease in vertical height of the body of the mandible as well as decrease in the height of the maxillary alveolus, permitting the sinus to reach the crestal bone. The elongation of the coronoid process and the increase in the bony area at the angle of mandible, posterior to the antegonial notch (at the region of insertion of the masseter and medial pterygoid muscles) suggest that the elevator muscles of the mandible were hyperactive. The oral history suggested that the patient was a frequent clencher which could be appreciated clinically by palpation, revealing hypertrophic musculature. CT scans also showed well-developed elevator muscles.

Treatment of scar contractures due to exposure to corrosive substances that affect the whole oral cavity is challenging. Literature shows various articles on the management of esophageal and gastric damages due to caustic ingestion [2] but very few on the correction of scar contracture affecting the oral cavity [3–5]. This is probably because that the most common offending chemical agent is concentrated liquid alkali (lye, drain cleaners, and similar readily available household products). These agents are easily swallowed; enter the esophagus and stomach and cause the maximal damage there, sparing the oral cavity [6]. In this case, the offending agent (acid) was cleared

from the mouth before it could be swallowed. Hence this patient presented with severe oral manifestations.

The location of maximal damage within the oral cavity also differs on the type of insult. Oral burn contractures are classified into three types: type I to type III based on increasing severity [3]. The present case is a severe form of a type III injury.

These types of injuries have all been treated surgically by incision, dissection and freeing of the scar. The resultant defects have been covered by skin grafts or vascularized free soft tissue flaps like the radial forearm flap and free jejunum [4]. This is the first report that describes the use of local pedicled flap (buccal pad of fat) as well as coronoidectomy for the treatment of intra-oral burns.

To conclude, this is the first paper describing the effects of prolonged intra-oral scarring on the growth and development of the stomatognathic system in humans. The paper describes a new technique for the rehabilitation of oral function by a new method for creation of buccal vestibular sulcus. The role of coronoidectomy and pterygomasseteric sling release seems to be important for successful treatment of such long-standing cases with masticatory muscle hyperactivity. Post operative physiotherapy also seems to be important. However, definitive recommendations cannot be given based on a single case report.

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