CASE REPORT

Scar Management After Surgical Repair of Lateral Facial Clefts

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Received: 19 July 2016 / Accepted: 31 May 2017 / Published online: 5 June 2017
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Abstract The prevention of scar contracture after surgery is an important aspect of lateral facial cleft repair. Maintaining adequate mouth opening is essential for speech, expression, chewing, oral hygiene and psychosocial well-being. Although there have been extensive reviews of non-surgical microstomia management in patients with oral electrical burns, there have been no reports on the use of oral commissure splints to manage the surgical scar in patients with lateral facial clefts. The case study presented here will demonstrate the clinical use of cheek retractors to provide physical resistance to scar contracture. We recommend early rehabilitation with cheek retractors to minimize scar contracture and the negative sequelae of scarred tissues on the dentition after lateral facial cleft repair.

Keywords Lateral facial cleft repair · Scar contracture · Oral commissure · Cheek retractor

Introduction

Lateral facial clefts (Tessier type 7) are rare disorders that result from the failure of the embryonic mandibular and maxillary processes of the first branchial arch to fuse and form the corners of the mouth [1]. A dysfunctional

orbicularis oris muscle results in a disruption in the maintenance of the oral sphincter for feeding, speech and facial expression. Early repair of the lateral facial cleft can restore oral sphincter function and prevent problems with control of food during mastication, swallowing, distortion of speech and sialorrhea [2]. The ultimate goals of surgical correction include accurate commissure positioning, reconstruction of the oral musculature and a tension-free skin closure with minimally visible scar. Successful post-operative management with early splint therapy can prevent scar contraction and lateral migration [3].

The early management of microstomia with dental orthopedic appliances has received widespread acceptance for patients with electrical burns of the oral commissure [4, 5]. The oral commissure splint is an effective treatment modality to provide physical resistance to scar contracture [6]. Pressure, positioning and exercises oppose the shortening and contracting properties of scar maturation [7].

This paper presents a case of a lateral facial cleft patient who used a dental orthopedic appliance to prevent the development of scar contracture and achieve a favorable outcome after surgical cleft repair. The report will present the use of a commercially available cheek retractor. Additionally, we will present the long-term outcome of an oral electrical burn patient, who did not undergo early splint therapy after surgical management, to demonstrate the negative effects of scar contracture from not receiving such scar management.

Case Report

A 9-year old boy was referred after a unilateral lateral facial cleft revision of the right commissure. The child had initial repair of the lateral facial cleft in infancy. After the

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revision, he complained of repeatedly biting the inside of his right cheek and associated pain and irritation. Oral examination revealed normal maxillary and mandibular dental arch dimensions and occlusion. An excess of oral mucosal tissue from scarring at the repaired site was noted; the patient reported frequently biting the excess tissue.

The patient was given a commercially available extraoral cheek retractor to prevent scar contracture and strengthen function. Upon first using the appliance, he reported some discomfort with the larger size. By starting with the smaller size and graduating to the larger size, the patient reported no further discomfort. The patient was able to easily place, adjust and remove the appliance without assistance or lip lubrication. He used the appliance every night and was instructed to open and close his mouth periodically to improve his mouth opening, soften the scarred tissue and strengthen his oral commissural muscles.

At both the 8-week and 2-year follow-up examinations, the patient reported no contracture or tightening (Fig. 1). He also reported that he no longer bit the inside of his mouth; the excess mucosa folds have flattened and decreased in size and were no longer palpable. The patient was recommended to continue this splint regimen for 6 months; thereafter, it will be reduced to every other night on a long-term basis.

Discussion

A number of surgical repairs for transverse facial clefts have been reported, but there is always reconstruction of the orbicularis oris muscle. Makhija et al. reviewed 17 cases of patients with transverse facial clefts operated by the z-plasty technique; complications of the repair included restriction of the patient's mouth opening due to excessive overlapping of the orbicularis oris and repeated biting of the excess mucosa folds at the repaired site. Additional surgical interventions, including dividing the neo-modiolus and excisions, were required to resolve the microstomia secondary to scar contracture and excess scar tissue [8].

Scar tissue is dynamic in the early stages of scar maturation and can shorten and lead to scar contracture [7]. The sphincter-like quality of the orbicularis oris decreases the vertical and horizontal opening of the mouth, leading to contraction of the oral commissure [9]. An abnormally small oral aperture is defined as microstomia, a condition that can be congenital, such as in scleroderma, holoprosencephaly or Freeman-Sheldon syndrome, or acquired through trauma, including infections, electrical burns or surgery [10]. The small and usually tight oral aperture's can affect the shape of the dental arches and lead to difficulties in chewing, speech disorders, malocclusion, oral hygiene problems, impairment in facial expression and social interactions. Additionally, scar contracture substantially affects the patient's quality of life and psychosocial well-being.

In comparison with the lateral facial cleft patient that received scar contracture management, a patient with an oral electrical burn, who did not undergo scar management after surgical reconstruction, presented with contracture of the oral commissure (Fig. 1). Although the pathophysiology of tissue damage from oral commissure electrical burns is different from that of lateral facial cleft repairs, scar contracture from the burn can also result in crowding and malocclusion that can benefit from early and continuous tissue expansion splint therapy [11, 12]. It should be recognized that commissural electrical burns are associated with tissue destruction as opposed to lateral facial clefts, a congenital tissue deficiency associated with scarring from the cleft repair. The electrical burn patient required orthodontic treatment to align his dental arch and correct his crowding and additional orthognathic surgery to advance the position of his retrognathic lower jaw.

The contraction of the oral aperture is caused by the infiltration of the complex perioral musculature during the healing process and scar formation [13]. Splint therapy utilizes external distracting forces to prevent oral and dental deformities and apply the forces to maintain the symmetry of the oral aperture by stabilizing and fixating the orbicularis oris at two points [14]. Both surgical and

Fig. 1 Minimal contracture of the oral commissure after lateral facial cleft repair in the patient with cheek retractor scar contracture management at 8-week follow-up (*left*) and 2-year follow-up (*middle*). Significant contracture is seen in the oral electrical burn patient (*right*)

Fig. 2 Cheek retractor flexibility allows the patient to exercise his oral commissure muscles by closing (*left*) and opening (*right*) his mouth

Fig. 3 Cheek retractor is available in two sizes

non-surgical techniques have been studied and presented to achieve adequate mouth opening. A 30-year review of oral appliances for microstomia management examined the use of the devices for oral electrical burn rehabilitation. Comparison of the devices varied in the length of fabrication time, suitability for children, need for dental arch impressions to fabricate the appliance, and flexibility for adjustments, removal and comfort [15]. However, many devices were expensive, not commercially available, and difficult to fabricate and use.

The long-term compliance of patients wearing the device largely depended on factors of safety, comfort, durability and complexity [14, 15]. Although the infant patient will not be able to tolerate the cheek retractor, the splint therapy should be initiated as soon as the patient is old enough to accept the use of the device in order to achieve an effective and optimal outcome.

The contracture prevention appliance used in this case report is a commercially available one-piece orthodontic cheek retractor made of a durable and flexible plastic material that can be fitted to the patient's mouth.

The flexibility of the omega-shaped retractor allows traction to be achieved for a range of oral aperture sizes.

The cheek retractor is contracted when inserted around the lips and cheeks. It is made of flexible plastic that exerts lateral pressure; the cheek retractor not only expands the soft tissues of the lips and cheeks, but also assists in retention of the device (Fig. 2). Stated advantages are that the device is readily available and accessible, inexpensive and removable; there is no need for fabrication and does not result in intraoral and commissural ulceration. The likelihood of developing pressure sores is decreased because the forces are applied to broad sections of the lips. The cheek retractor is also an effective splint because of good patient acceptance. Poor compliance is a common problem discussed in many past reviews and results in ineffective scar contracture management. The retractor is not anchored to the teeth; thus, dental arch impressions, intraoral measurements and adjustments are not required. Disadvantages may include the device slipping out if the patient's lips are too large, but this problem can be resolved by turning the appliance upside down so the curved edge is facing up instead of down [15].

The appliance is available in two sizes; the smaller size may still not fit some patients with a small oral aperture,

but it is modifiable by selective grinding with an acrylic bur and subsequently smoothing or polishing any rough edges (Fig. 3). A similar orthopedic device was discussed in Shehan and Medford, but the cheek retractor used in our report does not have limiting straps wired to the device [16]. Other orthodontic cheek retractors can also be found in the market and put to similar use based on availability and clinician's preference and familiarity with other devices.

Conclusion

Patients with lateral facial cleft repair would greatly benefit from management of scar contracture by commencing cheek retractor therapy as early as possible. When the retractor is used with good compliance, there is improved mouth opening and decreased scar tissue. The results of early splint therapy can improve a patient's speech, eating and facial expressions and prevent occlusion changes and the need for additional surgical correction of scar contracture and excess scar tissue.

Acknowledgement This project did not receive any grants or other forms of financial support. The authors have no financial, consultant, institutional and other relationships with the manufacturer, The Orthodontic Store, Inc. (Gaithersburg, MD) of the Ortho-Perfect Extra-Oral Retractor reported in this manuscript that might lead to bias or a conflict of interest.

Compliance with Ethical Standards

Conflict of interest Vicky Kang, MD, declares that she has no conflict of interest. Alvaro A. Figueroa, DDS, MS, declares that he has no conflict of interest. Russell R. Reid, MD PhD, declares that he has no conflict of interest.

Ethical Standards This article does not contain any studies with human participants or animals performed by any of the authors.

Informed Consent This article does not contain any studies with human participants by any of the authors.

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