A METHOD FOR MAXILLARY MOBILIZATION IN LARGEADVANCEMENTS: TECHNIQUE AND CASE REPORT

Abstract

The BlairCleftPalateElevator (BCPE)wasinitiallydevelopedattheCraniofacialAnomaliesRehabilitationHospitalinBauru ,Brazil1995.

Orthognathicsurgeryisatypeofsurgerythatinvolvescorrectingjawandfacialirregularities to avoid problems (speaking,chewing,breathing,andaesthetics). One of the most critical steps in this surgery is maxillary mobilization,which involves moving the upper jaw into a new position to improve facial symmetryandfunction.Traditionally,surgeonshaveusedforcepsofRoweormobilizerofTessiertoperformmaxillarymobilization.This paper aims to describe maxillary mobilization using the BCPE instrument in orthognathic surgery in detail and demonstrate the use of BCPE in maxillary mobilization asanewandinnovative technique in orthognathicsurgery. In cleft palate surgeries, we mobilize a bipartite maxilla without a palatal bone to avoiddamagetothemaxillarymucosa. UsingBCPE in maxillary mobilization in orthognathic surgery does not damagethemaxillarymucosa, either. Themethodprovedhighly efficient and can be used in patients without cleft palate. With itssimplicity, efficiency, and success, BCPE has become a widelyacceptedandtrustedtechniqueinmaxillarymobilizationfororthognathicsurgery.

Keywords:LeFortOsteotomy;OrthognathicSurgery;Maxilla.

Introduction

Aims

This paper aims to describe maxillary mobilization using the BCPE instrument in orthognathic surgery in detail and demonstrate its use as a new and innovative technique.

Presentation of case

Conventionalsurgicalprocedurestoperformmaxillaryadvancementoftenin volveaLe FortIcompleteosteotomywithpterygomaxillarydisjunction,septaldisjunction, and careful

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medial sinus wall separation followed by an intraoperativedownfracturetoachievethecompletemobilizationofthemaxilla[1,2]. Effectivemobilization allows the passive repositioning of the maxilla, reducing the incidenceofmuscularforcesandinstabilityofthefixationsystem.

Mobilizing the maxilla to the new position is often difficult,especiallywhensignificantmaxillaryadvancesareplanned.Thismaneuvermustbeperformedwithcaution,astheuseofinappropriateinstrumentsor aninadvertentforceapplicationmayresultinseriouscomplications,suchasfracture,dentalavulsion,vascularinjuries,palatinefibro mucosacompression,maxillarynecrosis,and,insomecases,maxillaryavulsion[3,4,5].

Thus,wepresentatechniqueinwhichaninstrument,notinitiallydesignated forthispurpose,butwithaminormodification,isusedasanauxiliarytoolinmaxillarymobilization,especiallyincasesofsignificantadvancements.

The present work was carried out in model – 12254 – Nacional Ossos, complete skullwith all the teeth, and the osteotomies, in a patient,were performed with surgical drills nº 701 andthereleaseofmaxillausingtheBCPEinstrument.

Surgicalcase procedure:

The surgical procedure was performed under general anesthesia with nasotrachealintubation. The oral cavity was entered, and the buccal soft tissue from the maxilla wasinfiltratedwith1%lidocainewith1:100,000epinephrine.

Ahorizontalincisionwasmadeapproximately5mmabovethemucogingivaljunction of the premolar region, and the mucoperiosteal flap was elevated. Le Fort Iosteotomy is commonly used, including pterygomaxillary and septal disjunction,andcarefully separating the zygomaticomaxillary and nasomaxillary pillars.Once the osteotomies are completed, the down fracture with the support of the thumb,index,andmiddlefingersonthelabialmucosaofthesuperiorincisorswasperformed.

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In rare cases, when the lower mobilization does not happen, a Smith's spreader is placedbilaterallywithitsactivetipintheosteotomyinthenasomaxillarybuttress to finish maxillary mobilization.

With the maxilla mobilized inferiorly, bone spicules of the lateral nasal walls wereremoved using osteotomes to avoid perforating the nasal mucosaduringthemaxillaryanterolateralmobilization.

Completedmobilization of the maxilla was obtained with BCPEmodified by the author. Its modification consists of establishing a right angle between the rod and the tip (Figure 1) and creating grooves in the inner portion ofthis active tip (Figure1). The grooved surface promotes a more excellent friction zone with theposteriorboneofthemaxilla,increasingstabilityandminimizingtheriskofslippingandsoftt issuelaceration.

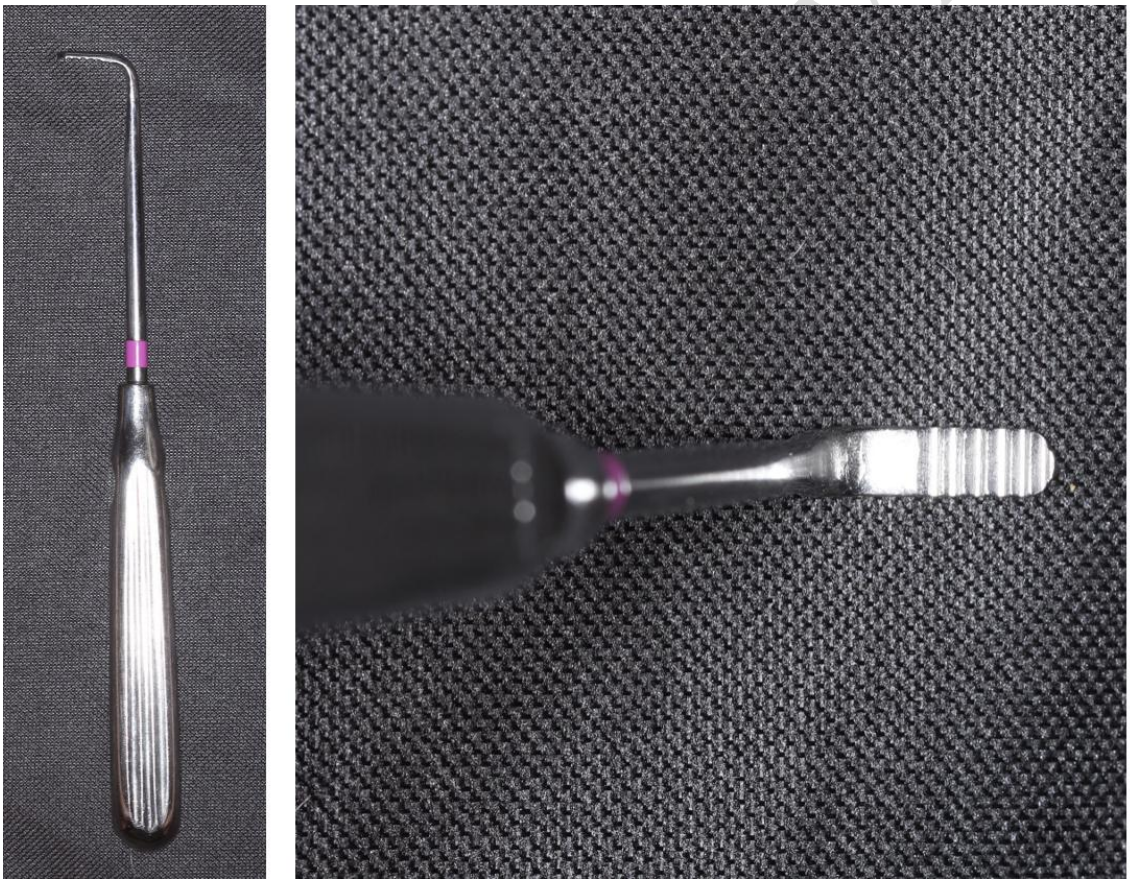

Figure 1: BCPE with a right angle between the rod and the tip. BCPE active point.

Theactivetipoftheinstrumentwaspositionedintheregionbetweenthepterygoidplates and the maxillary tuberosity, with the handle and the rod accompanied by thecurvatureofthe maxilla,precedingthefollowingmaneuvers, in this case, was executed:

1. The instrument was held firmly, so that the forearm was opposedtotheactivetipandtheelbow,supportedlaterallywiththesurgeon'schesttomobilizeth emaxilla bilaterally;

2. With the opposite hand, passing behind the patient's head, the anterior portionofthemaxillawas held in the opposite side's labial and palatal region;

3. Theauxiliarysurgeonwas locatedposteriortothe patient's head to firm the sides of the skull and avoid the mobility of the complex head/neck. In this way, the displacement of themaxillaisapendulummovementofthesurgeon'sbody,notrequiringtheapplicationofa powerfulforce;

4. The maxilla was moved in the anterolateral direction, that is, towards the left and anterior,onthesamesidewheretheinstrument's tipissupported(Figure2).

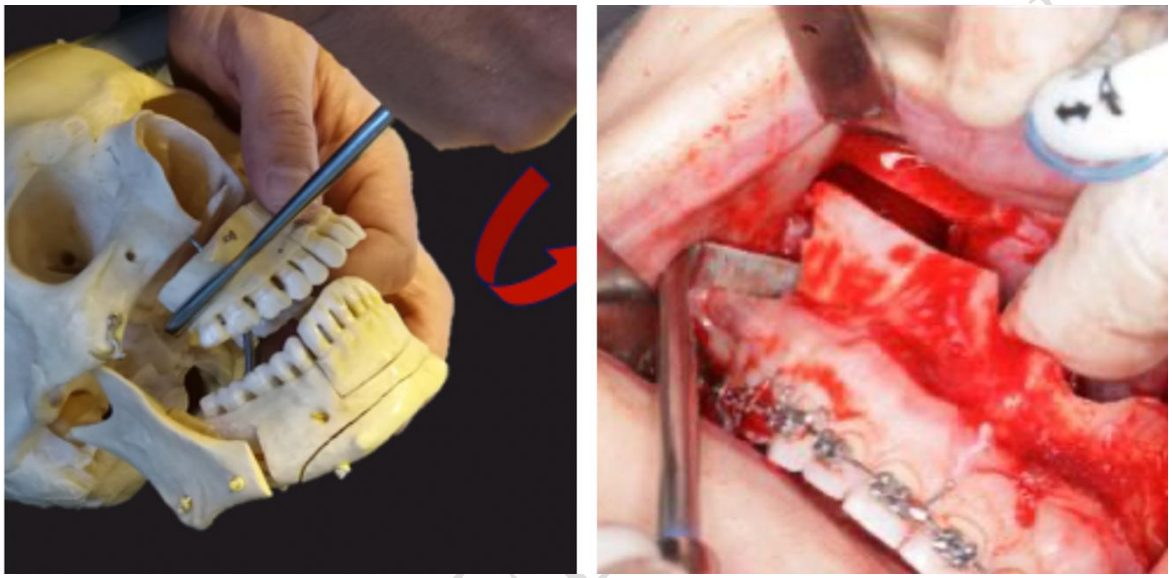

Figure 2. Movement of the maxilla in anterolateral direction (left side).

5. For left-hand mobilization, the instrument was handled the same way as previouslydescribedbut with the active tip pointing in the same direction as the forearm. Carefully,themaxilla was tracedinthedirectionofthesurgeon(Figure3);

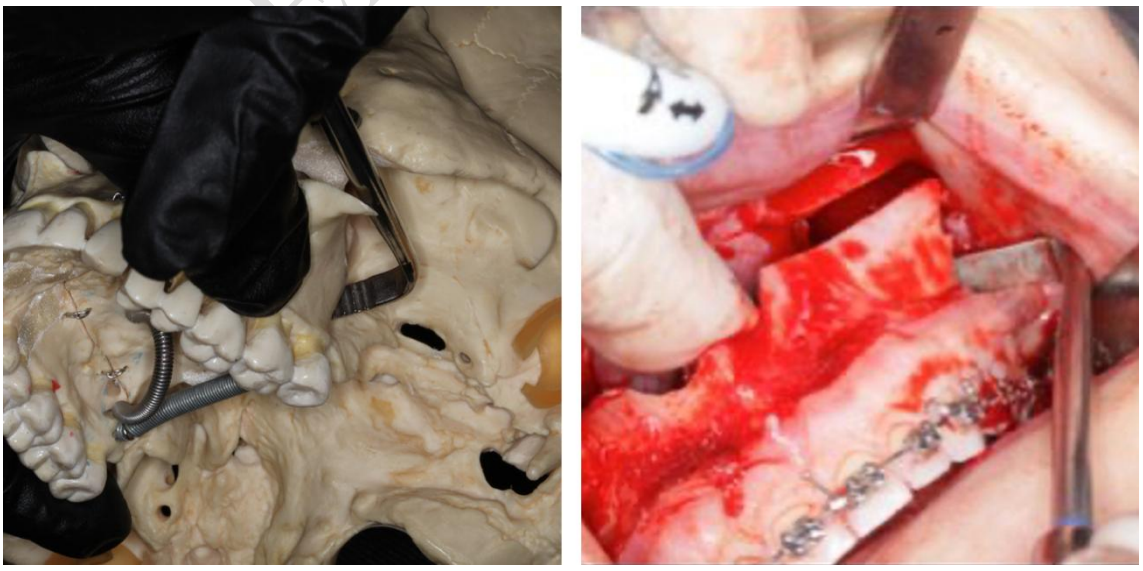

Figure 3. Movement of the maxilla in anterolateral direction (right side).

6. The bone segment was maneuvered bilaterally until has been thoroughlymobilized;

7. At the end of the mobilization, it was observed that the maxilla and maxilla teeth were passively in the lower dental arch. The mobilization was repeated if the occlusion was not wholly passive, even with overcorrection. In this way, the advancement of the maxilla can exceed 15 mm relatively easily.

There are benefits to utilizing this new technique. By correctly applying thissimplified method, we can reduce the direct risk of trauma, as well as the risk ofcompromisingmaxillarymucosairritationthatoccurswhenusingforcepsofRowe. We are causing lacerations through the dynamic movements of the mobilizers of Tessier. Themobilizationprocessisstraightforwardandcontrolled,involvinganchoringtheinstrument in the posterior region of the maxilla, significantly reducingsurgical time. Unlike the excessive force required by forceps Rowe, this proposedtechniqueemployslessforce,which,whenusedinconjunctionwiththebodyofsurgeo ns, arm, and forearm (attached to the body), provides greater control over themovement. When properly applied, this technique can achieve substantial maxillary advances in a single movement. Additionally, the instrumentation is simple,allowingformoreefficientuseofspaceinthesurgicalbox.

Although we did not encounter any complications in using this method, potential risks may be due to the incorrect application of the force vector,resulting in the sliding of the instrument and soft tissue lesions with compromisedmaxillary vascularization. Assuming that these complications can be disastrous for thepatient,thesurgeonmustbeawareofthecorrectpositioningoftheinstrumentandtheapplicat ionofmovementstomobilizethemaxilla,asdescribed.

We have routinely used this technique for more than 15 years withoutadverse results related to 14 Brazilian surgeons' use of it in Brazilian hospitals.

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Discussion

TheLeFortIosteotomyformaxillaryadvancementisastandardand safe procedure in orthognathic surgery. Combined with thetrilogy of down fracture, mobilization, and repositioning, it can be used to correct three-dimensional maxillary deformity[6] surgically.Thedegreeofdifficultyencounteredinreaching the point of down fracture and the process of down fracture itselfmay underpin the likelihood of direct or indirect neurovascular damage. UntowardfracturesmaybepropagatedfromaLeFortIprocedure,notablyresultingfrompteryg

omaxillarydysfunctionandmaxillarydown fracture.Suchfracture patternshavebeenextensivelyevaluatedinradiological,cadaveric,anddryskullstudies[7,8,9].

The development of unwaryranted fractures involving the pterygoid plates(exceptionally high level), or fine fissure fractures may extend to contiguous osseous structures. Those unfavorable fractures that extend to the pterygopalatine fossa, skull base (foramina), and orbit may beresponsiblefortheoccurrenceofsignificantneurovascularmorbidity[10].

Furthermore,oneoftheleadinglatecomplicationsassociatedwiththisprocedure is unexpected relapse, which may cause malocclusion and, in some cases,requiresurgicalreintervention[11,12].Completebonemobilization,withouttension,preservationofthetissueviabilityduringtheincisions/osteotomies,andpropersynthesisareessential forachievingstabilityinorthognathicsurgeries[13,14].

Despite the procedural simplicity of Le Fort I osteotomy, there is a considerable mobilization of the maxilla (advancement) (>10 mm of advancement in the sagittal plane of the upperjaw). Few studies have addressed this issue, and very few techniques havebeendescribedtosupportmobilizationoftheupperjawaftercompletingLeFortI osteotomy[15,17,18].

Revascularization and bone healing occur after the Le Fort I osteotomy. One of the most common methods used to mobilize the maxilla is through Rowe's forceps, which allows a significant amount of force to mobilize the maxilla through movements up and down to the sides. In this way, it is possible to reposition the maxilla. Still, with support through the mechanism of action of the Rowe forceps, the descending palatine vessels can be ruptured, and serious complications can occur, such as oronasal fistula and trauma to the oral, nasal, or palatal mucosa. Fracture of the alveolar bone or palate, disruption of the palatal blood supply, or damage to the dentoalveolar and adjacent structures[19].

The Rowe maxillary forceps can be used for this purpose. However,the application of this instrument may cause compression or injury of the palatalfibro mucosaandpromotethevascularizationcompromiseofthemaxilla.Aninstrument slip during handling may result in inadvertent anterior teeth or maxillafracture[16].

Another related technique is using Tessier mobilizers to facilitate the releaseof all bone contacts and gently stretch the posterior maxillary soft tissues until thenecessaryadvanceisachieved[17].However,itsactivetipislongandserrated,associatedwith an extensive and curved rod, which requires a more significant force applied by thesurgeon,facilitatingtheslideoftheinstrumentandinjurytoadjacenttissues.

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Conclusion

The modified BCPE promoted a controlled mobilization with low bonefracture risk and lesser force expended by the surgeon. In addition, a simple instrument was used to perform this method, which, when adequately adapted and applied, doesnot traumatize the soft tissues of the nasal floor, palate, or anterior teeth and promotes thepassiverepositioningofthemaxilla,aspreviouslyplanned.

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