

Implant Handpiece With Adapted Drills in Orthognathic Surgery: Preventing Facial Scars

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Abstract: The attachment of bilateral sagittal-split osteotomy of the mandibular ramus with bicortical screws or the combination of miniplates and a bicortical screw is complicated through the intraoral approach because of the angle required for insertion of screws, so it is necessary to use a trocater. This article aimed to report a technique developed and used in 60 patients, wherein an implant handpiece with adapted drills was used in the intraoral attachment. The setting was performed intraorally to prevent scarring and extraoral facial nerve damage, which may be caused by extraoral and transbuccal approaches routinely performed when using the trocater. The versatility of the handpiece implant allows for the insertion of monocortical and bicortical screws and rigid internal fixation of mandibular sagittal-split osteotomy, as well as surgical time reduction, decreasing postoperative morbidity.

Key Words: Maxillomandibular fixation, orthognathic surgery, hypertrophic scar

Historically, orthognathic surgery had 3 distinct phases, regarding the surgeon's technical expectations. The first phase was concerned with making mandibular osteotomies that would provide the largest possible bone contact for proper stability and better bone healing; for this, bilateral sagittal-split osteotomy of the mandibular ramus (BSSO) was developed. The second phase was focused on the knowledge concerning bone attachment with metallic materials that should be the most biocompatible, so the studies started using the rigid internal fixation (RIF) system with titanium alloys. Nowadays, the third phase is concerned with patient's aesthetics and the impact on soft tissue after orthognathic surgery.¹

To obtain a favorable aesthetic response in orthognathic surgery, all surgical procedures and steps must be performed through the intraoral approach, abolishing the skin incision and, consequently, avoiding a cosmetically unfavorable scar.¹

However, attaching the system of plates and screws in the posterior mandibular region is difficult because of the angle required for inserting the screws, especially when located in a more basal

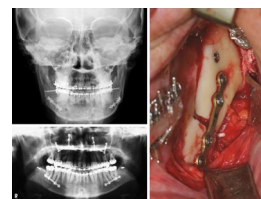


FIGURE 1. Attachment technique performed with a 4-hole intermediate straight miniplate (NeoOrtho), 4 screws of 2.0 × 5.0 mm (NeoOrtho), and a variation of bicortical screw of 2.0 × 11 to 2.0 × 17 mm, depending on the case need.

and retromolar region, requiring considerable experience.² Thus, for adequate attachment, the transcuteaneous approach with trocater has been used in the attachment of sagittal ramus osteotomy in orthognathic surgery as well as in the attachment of mandibular angle fractures.^{3,4}

Nevertheless, the use of the trocater has been associated with an incidence of 18% of scars face due to the transcuteaneous approach necessary for the use of this surgical instrument.³ This is because the use of the trocater in a position that is useful for fixing the system of plates and screws and this position is often aesthetically unfavorable. Moreover, the mobility of the trocater in the region of the mandibular ramus and of the mandibular angle is often restricted because of the masseteric musculature, so in some procedures, more than 1 transcuteaneous approach is required to fix the system of plates and screws, which increases the possibility of having an undesirable postoperative scar.⁴

Therefore, in the aesthetic concept that orthognathic surgery currently is, any kind of scarring should be considered a surgical sequelae, because what is sought in this surgical procedure is the aesthetic and functional improvement of the patient.¹ On the basis of the sequel rate using the trocater, this article aimed to describe a technique developed and used in 60 patients, wherein an implant handpiece was used with adapted drills to fix the system of plates and screws in the posterior mandible.

TECHNIQUE

The implant handpiece with adapted drills was used in 60 patients with facial deformities (20 Angle class II and 40 Angle class III), who were treated with bimaxillary surgery (see Video, Supplementary Digital Content 1, <http://links.lww.com/SCS/A31>). The intraoral approach to regular BSSO was used in all cases, and the attachment technique was performed with a straight 4-hole miniplate with intermediate (NeoOrtho, Curitiba, Brazil) and four 2.0 × 5.0-mm screws (NeoOrtho) associated to a bicortical 2.0 × 11.0- to 2.0 × 17.0-mm screw depending on the case needs (Fig. 1). For internal fixation with the implant handpiece, a key pad (handpiece cross drive) and a 5-mm-long drill (Fig. 2) were developed.

This study used the motor NSK IntraSurgic XT (Nakanishi, Inc, Tokyo, Japan) and the implant handpiece 20:1 SG-20 (Nakanishi, Inc) with their own irrigation during drilling. The drilling speed and torque were defined according to Table 1 for the insertion of monocortical and bicortical screws (Figs. 3 and 4).

The attachment system of plates and screws using the implant handpiece started with drilling and insertion of 2 screws in the



FIGURE 2. Adapted drill of 1.6 × 5.0 mm and adapter for key pad.

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TABLE 1. Speed and Torque Used for the Insertion of Monocortical and Bicortical Screws

	Drill, rpm	Insertion of Screws
Monocortical screw: drill 1.6 × 5.0 mm*	2000	60 rpm/50 N Handpiece cross drive*
Bicortical screw: drill 1.6 × 17.0 mm†	2000	60 rpm/50 N Handpiece cross drive*

*NeoOrtho.

†Neodent.

distal segment of a 4-hole plate with intermediate. Afterward, it was followed by repositioning of the condylar segment and the drilling and insertion of 2 screws in this segment. The bicortical screw was positioned in the retromolar region ending the BSSO attachment.

DISCUSSION

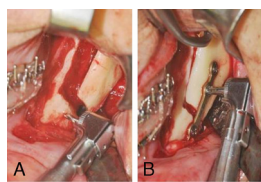
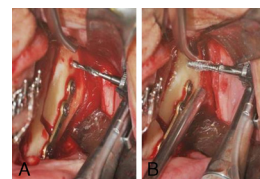
Rigid internal fixation with miniplates and screws in maxillofacial surgery was introduced during the 1980s and soon became usual in orthognathic surgery. It is considered an important factor in its development. The advantages of RIF are attributed to the early return of the jaw mobilization and include a decreased risk of recurrence or condylar atrophy, better airway control, improved oral hygiene, and better postoperative feeding.⁵

The biggest advantage of using a miniplate in osteosynthesis is the elimination or reduction of the use of an intermaxillary block.⁶ Several aspects should be taken into consideration when the RIF is used, such as the experience of the surgeon for modeling the miniplate and the proper surgical technique. One of the RIF complications is the drilling of tooth roots, especially in the mandible, when using the drill bit inadvertently. However, using the implant handpiece and the adapted drills with 5 mm in length, the iatrogenic drilling is avoided in the posterior mandible.

Introduction of the intraoral approach improved the aesthetic results while minimizing the incidence of facial nerve damage. However, intraoral techniques are fairly complicated by the difficult angle that is required for precise placement of screws.⁴

Total intraoral setting is performed to prevent scarring on the face and facial nerve damage, which may be caused by the previously used extraoral and transcortaneous approaches regularly performed when using the trocator. However, the totally intraoral manipulation of the instrument is technically challenging. Hence, some surgeons avoid such procedure for fixing the BSSO. The proper positioning of bone segments, the late adaptation, and the screw insertion are difficult steps. The intraoral attachment is considered complicated by a number of maxillofacial surgeons and plastic surgeons, depending on their level of experience.²

As an alternative to these difficulties, the trocator is commonly applied in the posterior mandible. However, full access to the posterior site in the surgical field is substantially limited by the inherent nature of the masseteric fascia. The correct placement of the screws requires a perpendicular angle to drill and to insert them; so

**FIGURE 3.** A, Drilling monocortical screw with adapted drill 5 mm in length. B, Insertion of monocortical screw with adapter for key pad.**FIGURE 4.** A, Bicortical drilling with a 1.6 × 17-mm drill (Neodent). B, Insertion of the bicortical screw with adapter for key pad.

if placed in a very acute angle, the screws will fail to adapt to the miniplate and to the bone surface.⁴

Another alternative to the difficulties of fixing the totally intraoral BSSO is to use the implant handpiece, which allows the insertion of screws in the correct angle and keep the region regardless of the absence of any extraoral approach. When the periosteum detachment of the mandibular ramus is performed correctly, the presence of the masseter muscle does not prevent the implant handpiece access, thus making this extremely versatile instrument for fixing monocortical and bicortical screws at right angles. Hence, this instrument feature decreases the operative time, reduces the postoperative morbidity, and increases the stability of the RIF.

One of the intraoral attachment advantages is to avoid the hypertrophic skin scar and the damage to the mandibular branch of the facial nerve; it becomes particularly important for patients with a high degree of aesthetic requirements.^{7–9} For them, absence of scar on the face is essential to the surgical success.

Because of the need for minimizing scars on the face and the possible facial nerve damage while providing maximum segment stabilization, setting the BSSO entirely with the intraoral approach has become the routine procedure by using the implant handpiece. In the 60 patients in whom it was used, there were no postoperative complications, and the results remained stable functionally and aesthetically.

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