CASE REPORT

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Skeletal Class III Surgical-Orthodontic Treatment and Remote Digital Monitoring during COVID-19 Pandemic: A Case Report

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ABSTRACT

Moderate to severe cases of skeletal Class III malocclusion, where residual growth is no longer present and orthodontic camouflage would not achieve satisfactory outcomes, are good candidates for a combined surgical-orthodontic approach. We present the case of a 34-year-old healthy male with skeletal Class III malocclusion, where aesthetics and masticatory function were further worsened by maxillary and mandibular transverse discrepancy, hyperdivergent pattern, moderate dental crowding, occlusal contacts present only on molars, negative overjet and overbite. The management of the case included a pre-surgical phase of surgically assisted rapid palatal expansion (SARPE) and an orthodontic treatment with fixed multi-bracket appliance, a surgical phase consisting in Le Fort I osteotomy and bilateral sagittal split osteotomy (BSSO), and a myofunctional physical therapy targeting orofacial muscles following the orthognathic surgery. The pre-surgical phase was additionally integrated with a system of remote digital monitoring, such as Dental Monitoring®, to early detect any orthodontic emergency. As in-office visits were abruptly interrupted because of COVID-19 pandemic, the remote digital system also permitted to regularly monitor the patient at long-distance. In conclusion, a case of skeletal Class III malocclusion was successfully managed with a multidisciplinary approach which involved orthognathic surgery, orthodontic treatment, and myofunctional physical therapy. The additional integration of remote digital technologies, such as Dental Monitoring®, may provide a continuity of care to orthodontic patients in times of COVID-19 pandemic, when the regularity of non-urgent chairside appointments might be disrupted.

Keywords: *COVID-19; Dental Monitoring®; malocclusion Angle Class III; orthognathic surgical procedures; remote monitoring system*

INTRODUCTION

Class III malocclusion constitutes a growth-related dentofacial deformity characterised by a mandibular prognathism, a maxillary deficiency, and/or a combination of thereof (Staudt & Kiliaridis, 2009). Most of these cases also display a degree of asymmetry, which often compromises the aesthetic facial harmony (Severt & Proffit, 1997; Pedersoli *et al.*, 2022). The prevalence of Class III malocclusion accounts for approximately 0% to 26.7% (Hardy *et al.*, 2012), according to ethnicity (Emrich *et al.*, 1965) and geographic location (Zere *et al.*, 2018). Genetic and familial transmission has been demonstrated in literature (Hartsfield *et al.*, 2013). Orthodontic management of Class III cases is one of the most challenging, especially when long-term outcomes are expected (Proffit *et al.*, 1991). For those adults where the treatment cannot influence any residual growth, a combination of surgical-orthodontic approach is recommended (Stellzig-Eisenhauer *et al.*, 2002).

Traditionally, a combined surgical-orthodontic approach involves a pre-surgical phase constituted by an orthodontic preparation, whether with fixed buccal (Proffit & White, 1991) or lingual (Paik *et al.*, 2002) multi-bracket appliances, or more recently with clear aligners (Boyd, 2005; Marcuzzi *et al.*, 2010; Pagani *et al.*, 2016; Kook *et al.*, 2019; Kau *et al.*, 2020). Such phase aims at removing any dental compensation in all three planes of space, leveling and aligning the dentition, and coordinating the archforms, with the objective of achieving maximum intercuspal interdigitation when the two bones will be surgically repositioned (Jamilian *et al.*, 2015). Next, a one-jaw or two-jaw surgical intervention is performed to correct the skeletal deformities, targeting the mandible and/or the maxilla antero-posteriorly, vertically or transversally, according to the specific case (Spalj *et al.*, 2008). Lastly, final orthodontic detailing allows to stabilise the new intercuspation, fostering occlusal stability and function.

One of the challenges of a combined surgical-orthodontic management is the request for a close monitoring of the ongoing orthodontic treatment, especially when the time of the surgical procedure approaches. The patient is considered ready to undergo the orthognathic surgery when the dental arches appear leveled, well-aligned and coordinated, dental compensations are no longer present, the teeth are properly positioned relative to the jaws, and the two casts of upper and lower arches virtually placed in the new position fit each other in all the three planes of space (Jamilian *et al.*, 2015). Digital planning with dedicated software helps both the orthodontist and the maxillofacial surgeon to visualise hard and soft tissue changes that would occur after the surgery, and to efficiently communicate those outcomes to the patient (Peterman *et al.*, 2016). If any orthodontic emergency occurred and was left untreated during this delicate timeframe prior to the intervention, the surgical procedure would need to be postponed, and thus, the treatment time would unnecessarily increase, with unsatisfaction and frustration of the patient. Hence, systems of remote monitoring appear particularly useful in Class III cases treated with a surgical-orthodontic approach. One of such systems is Dental Monitoring® (DM, Dental Monitoring SAS, Paris, France), a software-based programme that allows the clinician to remotely monitor the patient through a mobile app for the user, an internet-based Doctor Dashboard®, and a movement-tracking algorithm. Among other advantages, this system has been demonstrated to help the clinician check the orthodontic evolution of the patient at long-distance and to early detect any undesirable orthodontic emergency (Roisin *et al.*, 2016; Dalessandri *et al.*, 2021). Recently, other tele-monitoring systems have been introduced in the market (e.g., Grin® digital teleorthodontic platform, FDA listed medical device and certified through Health Canada;

Invisalign Virtual Care AI, Align technology, San Jose, CA), although their scientific validation remains to be demonstrated with clinical trials.

We present a case of Class III malocclusion in a healthy 34-year-old male, managed with a surgical-orthodontic treatment and with the concomitant remote monitoring by DM, during the COVID-19 pandemic. To the best of our knowledge, this is the first case that reported the integration of a remote monitoring system and surgical-orthodontic management with fixed orthodontic appliance in a patient scheduled for orthognathic surgery.

CASE REPORT

Diagnosis and Etiology

An informed consent for publication of this case report with accompanying images was obtained from the patient (Niola *et al.*, 2018).

A 34-year-old Caucasian healthy male visited his general dentist with a chief complaint of substituting the aesthetic composite filling on the upper left central incisor. Due to the evident malocclusion, the general dentist referred him to the orthodontist for an evaluation before replacing the filling with a permanent crown.

The general medical history was negative for systemic conditions and allergies. He reported a familiarity for Class III malocclusion on his father's side. The patient denied any parafunctional activities nor any previous orthodontic treatment.

On extraoral examination, the lateral view revealed a concave high-angle facial profile, with a mandibular prognathism and a slight deficiency of the middle third of the face, competent lip closure and depressed paranasal area. The frontal view displayed a dolichocephalic face, and an asymmetry of the lower third of the face, with a deviation of the chin to the left by 2 mm. An asymmetry of the upper lip was noticed; when smiling, gingival exposure by 4 mm on the posterior maxillary teeth was seen (Fig. 1A).

On intraoral examination, a complete permanent dentition was present. From a sagittal view, a Class III molar and canine malocclusion, an edge-to-edge anterior occlusion, and overjet of 0 mm were noticed. Vertically, the curve of Spee was flat and the overbite was –1 mm. From a transverse standpoint, a bilateral cross bite, an ovoid-shaped upper arch, a moderate dental crowding and a significant negative bucco-lingual inclination of the lower posterior teeth denoted an important transverse skeletal discrepancy. Frontally, the midlines were not coincident, with the lower dental midline shifted towards the left by 3 mm (Fig. 1B). No signs or symptoms of temporomandibular disorders were reported by the patient. Shim-stock revealed occlusal contacts on right and left molars. The periodontal status of the patient revealed generalised gingivitis and calculus deposit lingually to the lower anterior teeth. No pocket depths greater than 3 mm was detected.

A panoramic radiograph showed radiopaque intracanal material in the upper left central incisor and in the upper left second molar, consistent with previous root canal treatments; well-corticated and rounded condyles, with no sign of erosion nor osteoarthritic degenerative changes (Fig. 1C). The pre-treatment cephalometric analysis revealed a Class III skeletal malocclusion (ANB = 1°) secondary to maxillary deficiency (SNA = 77°) and mandibular prognathism (SNB = 82°), and a hyperdivergent skeletal pattern (MM = 37°, SN-MP = 39°). Proclined maxillary and retroclined mandibular incisors (U1 to SN = 117°, IMPA = 84°) confirmed the dentoalveolar compensation (Table 1). A diagnosis of skeletal Class III malocclusion was made.

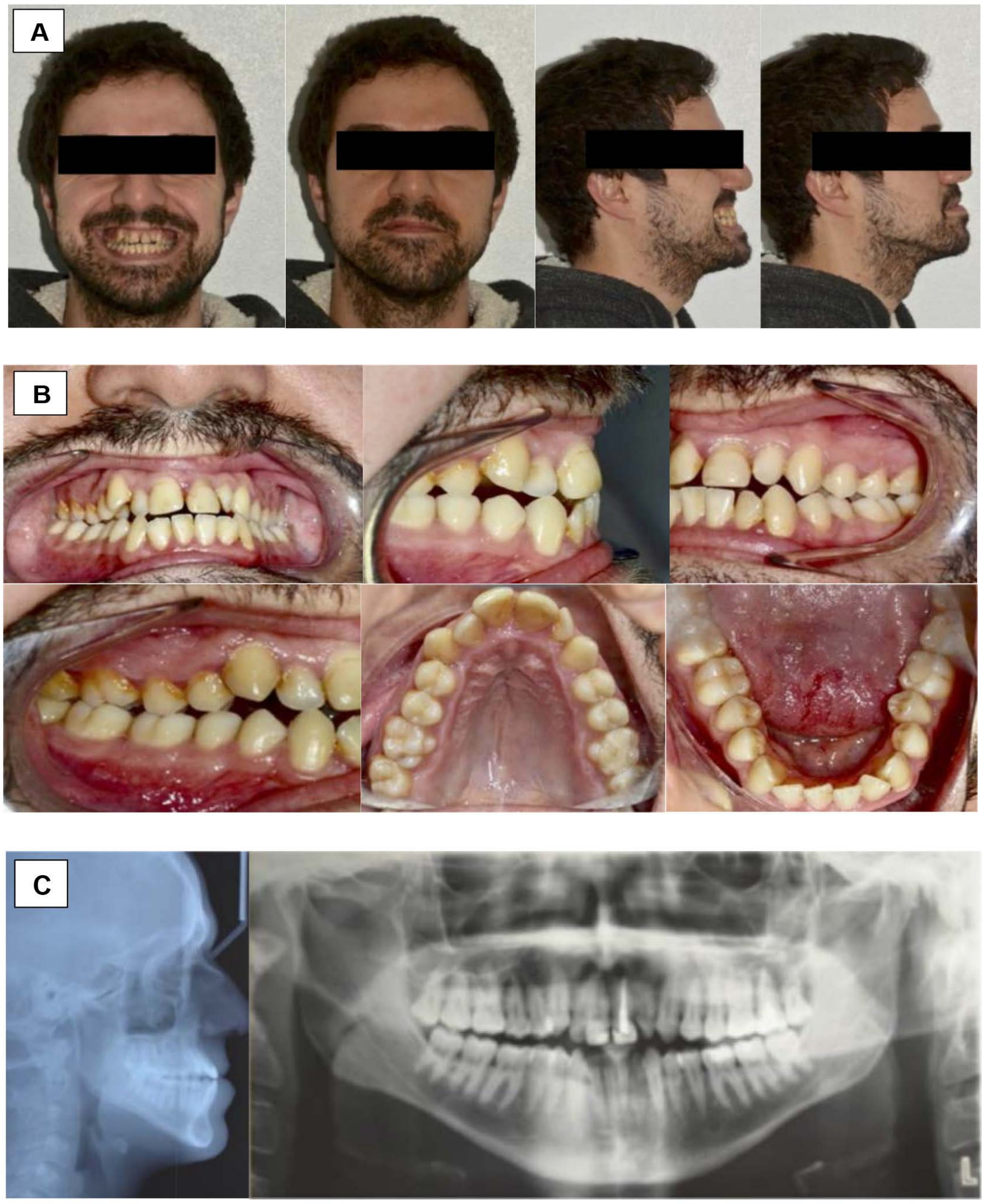

Fig. 1 Pre-treatment of (A) extraoral and (B) intraoral photographs, and (C) radiographic examination.

Table 1 Comparison of cephalometric values before and after orthognathic surgery

Values	Case patient		Norm	
	Pre-treatment	Post-treatment	Mean	SD
Skeletal measurements				
SNA (°)	77.0	80.0	82.0	± 2.0
SNB (°)	82.0	79.0	80.0	± 2.0
ANB (°)	1.0	1.0	2.0	± 2.0
Wits (mm)	–9.2	0.0	2.0	± 2.0
SN-MP	39.0	41.0	31.7	± 5.2
FMA (°)	25.0	25.0	25.0	± 5.0
MM (°)	37.0	37.0	28.0	± 6.0
Dental measurements				
U1-SN (°)	117.0	108.0	103.0	± 5.0
IMPA (°)	84.0	94.0	90.0	± 5.0
U1/A-Pog (mm)	7.8	6.4	2.7	± 1.8
L1/A-Pog (mm)	8.1	5.9	2.0	± 2.0

Notes: SNA = Sella-nasion-subspinale angle; SNB = Sella-nasion-supramentale angle; ANB = Subspinale-nasion-supramentale angle; Wits = Wits appraisal; SN-MP = Sella-nasion to mandibular plane (facial divergence angle); FMA = Frankfort mandibular plane angle; MM = Maxilla-mandibular plane angle; U1-SN = Upper incisor to sella-nasion angle; IMPA = Incisor mandibular plane angle; U1/A-Pog = Upper incisor to A-Pog line (upper incisor compensation); L1/A-Pog = Lower incisor to A-Pog line (lower incisor compensation).

Treatment Objectives

Primary treatment endpoints were to establish Class I molar and canine relationships, with proper overjet and overbite, realign the teeth, and provide a stable occlusion with homogeneous bilateral contacts on all posterior teeth. Secondary treatment endpoints include establishing a correct transverse skeletal relationship, improving facial asymmetry, and correcting the midline discrepancy.

Due to the skeletal malocclusion, the lack of residual growth, the significant dental crowding, and the facial asymmetry, a combination of orthodontic and surgical approach was proposed to the patient, as followed:

a) Pre-surgical intervention of surgically assisted rapid palatal expansion (SARPE) and rapid palatal expander (RPE) of upper arch, to target the transverse skeletal discrepancy. As the bucco-lingual inclination of the posterior teeth exceeded 4 mm to 6 mm, a bodily movement is recommended rather than an orthodontic buccal inclination (Jamilian *et al.*, 2015), for long-term stability (Chamberland & Proffit, 2011).

b) Extraction of the third molars, to facilitate the following surgical intervention.

c) Pre-surgical orthodontic phase, to level and align the teeth, remove dental compensations, coordinate the archforms. This phase was additionally monitored with DM, with intraoral scans taken monthly by the patient and immediately accessible to the clinician (Sangalli *et al.*, 2021).

d) The surgical phase consisting of bimaxillary orthognathic surgery, to correct antero-posterior, frontal and vertical skeletal discrepancy.

e) Post-surgical phase involving orthodontic detailing, to stabilise the intercuspation, and myofunctional physical therapy, to allow the facial muscles to adapt to the new position (Jung *et al.*, 2015).

Treatment Alternatives

Alternative treatment options with advantages and disadvantages were presented to the patient: no treatment; orthodontic camouflage with dentoalveolar compensation with fixed multibracket appliances or with clear aligners. After multiple discussions between the orthodontist (L.S.), the maxillofacial surgeon (L.F.) and the patient, the option of combined surgical-orthodontic management was favoured.

Treatment Progress

At his first appointment, the patient was provided with a ScanBox© and a dedicated cheek retractor by DM to capture real-time pictures of the occlusion using his smartphone (Fig. 2). As the pictures are taken, they are automatically uploaded on the Doctor Dashboard® and ready to be evaluated by the clinician. DM app was downloaded on the smartphone, and a first set of scans (frontal, lateral and occlusal view) was taken together with the orthodontist to ensure correct use of the device.

Fig. 2 Scan box and dedicated cheek retractor for remote monitoring by Dental Monitoring® with smartphone in place.

Pre-surgical intervention: SARPE and extraction of third molars

A Hyrax RPE was cemented with bands on the upper first molars one week before the surgery and the patient was instructed on how to activate the screw. A SARPE was performed under general anesthesia at the Oral and Maxillofacial Surgery Department at the Hospital Spedali Civili (Brescia, Italy). In the same procedure, all the third molars were extracted. After seven days, the RPE was activated by 0.25 mm twice a day (total of 0.5 mm per day) for 14 consecutive days, and then remained inactive for six months. Weekly follow-ups were scheduled during the first month after the surgery.

Pre-surgical orthodontic phase

Upper and lower multibracket appliance by Empower with MBT prescription and 0.022-inch slot (American Orthodontics, Sheboygan, WI) was applied with direct bonding technique, three months after the pre-surgical SARPE. During the orthodontic treatment, the patient underwent regular oral hygiene appointments every four months. Chairside monthly visits were scheduled to proceed with leveling and aligning the maxillary and mandibular arches up to 0.019” × 0.025” stainless steel wires, with decompensation of mandibular incisors and coordination of the archforms. Similarly, the scans monthly uploaded by the patient to DM were periodically reviewed by the same orthodontist (L.S.) to ensure early detection of orthodontic emergency (i.e., detachment of brackets and bands, rupture of elastic chains, dislodgement of the archwire from the slot of the bracket) (Fig. 3).

Eleven months after the bonding of the appliance, the orthognathic surgery was scheduled following appropriate evaluation of model surgery and virtual surgical digital planning simulation with Dolphin Imaging software version 11.0.03.37 (Patterson Dental Supply, St. Paul, MN) (Fig. 4). However, due to COVID-19 pandemic, both surgery and in-office orthodontic visits were suspended, as considered not elective and not urgent in nature. Thus, for the following six months the only monitoring of the patient was conducted at long-distance with DM. The evaluation of the monthly scans did not detect any orthodontic emergency. The real-time availability of the monthly scans also allowed to reveal the need of an oral hygiene appointment right before the orthognathic surgery.

Fig. 3 Intraoral scans taken by the patient with Dental Monitoring® during the time where in-office visits were suspended due to the COVID-19 pandemic.

Surgical phase: Bimaxillary orthognathic surgery

Once the spike of COVID-19 cases decreased and non-elective procedures were resumed, a bimaxillary orthognathic surgery was performed under general anesthesia by the same specialised maxillo-facial surgeon (L.F.) that performed the pre-surgical SARPE. A Le Fort I osteotomy and a bilateral sagittal split osteotomy (BSSO) were conducted in the following way: a mandibular Epker osteotomy was first performed with right rotation by 3 mm; next, the maxilla was advance by 8 mm, with a counterclockwise rotation of the occlusal plane.

Internal fixation of bony segments was achieved using screws and six miniplates in both maxillary and mandibular bones (two plates with three holes for each osteotomy side on the mandible and four plates for the maxilla). The patient was dismissed from the operatory room with intermaxillary elastics attached to Kobayashi hooks (4.5 oz 3/16”) to be kept in place for the following three days, and to be replaced for the following 30 days. No complication was seen after the surgery. Post-treatment panoramic and cephalometric radiographs were taken, although the patient did not completely close his mouth during the cephalometric radiograph (Fig. 5). The panoramic radiographs showed the miniplates in place, a correct dental root parallelism, with no sign of root resorption. Post-treatment cephalometric analysis revealed the correction of the maxillary deficiency (SNA changed from 77° to 80°) and of the mandibular prognathism (SNB changed from 82° to 79°), with a normalisation in Wits value (from –9.18 mm to 0 mm). Dentoalveolar compensations were properly corrected (U1-SN from 117° to 108°, IMPA from 84° to 94°). As a result of the lateral cephalogram not taken with teeth in occlusion, we may expect that some cephalometric parameters (the ones measuring the skeletal divergency between the two maxillary bones, the projection of the mandibular bone and of lower incisor) might slight diverge from the real values.

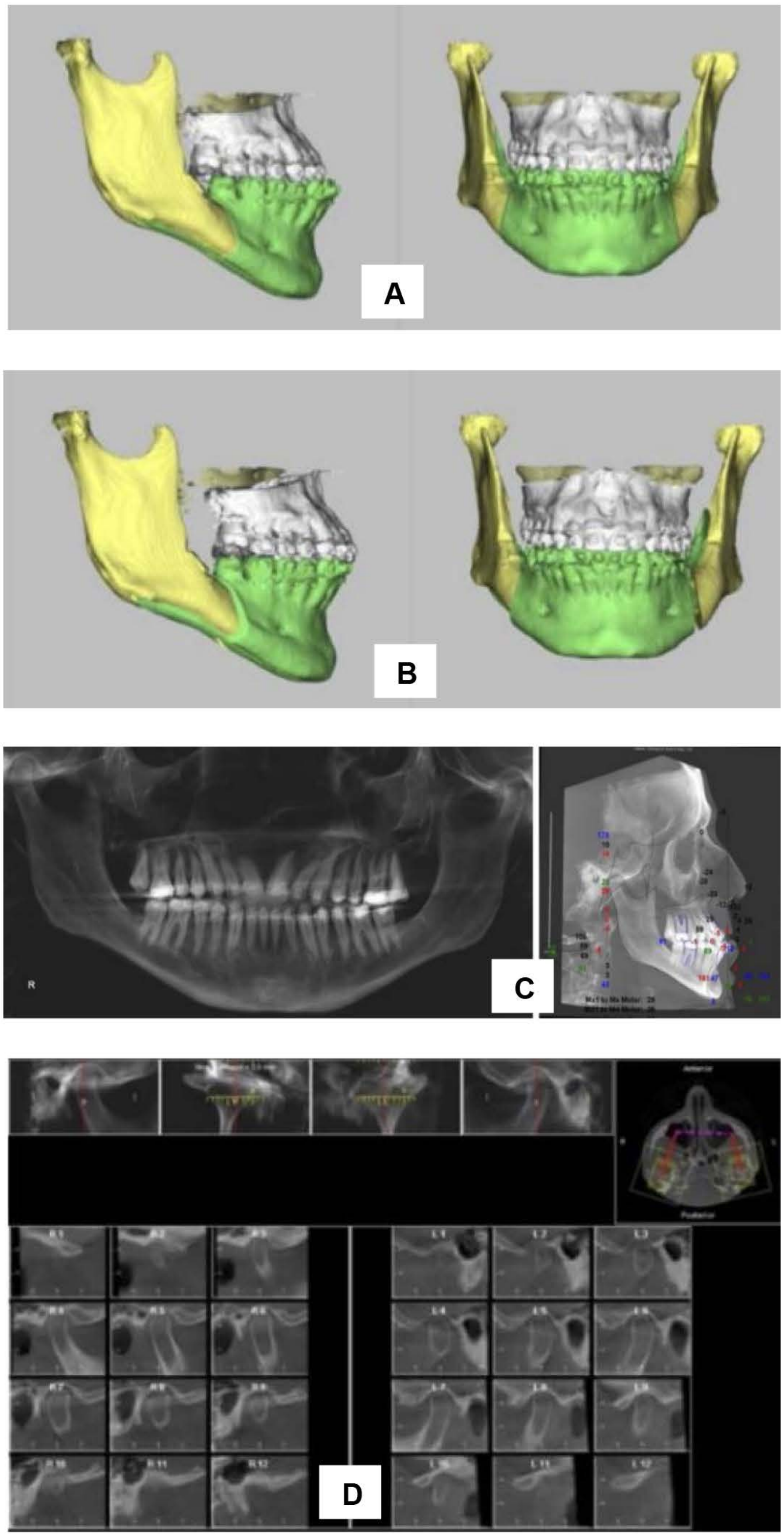

Fig. 4 Virtual surgical digital planning simulation with Dolphin Imaging software: (A) pre-operative position and (B) final position. Radiographic examination before the surgery: (C) panoramic radiograph, lateral cephalogram and (D) CBCT of temporomandibular joint.

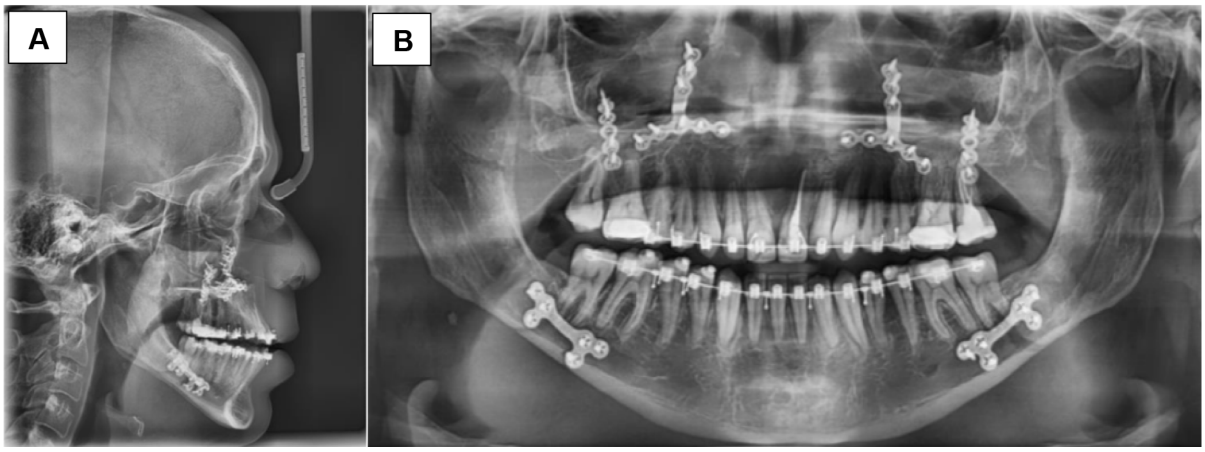

Fig. 5 Post-surgical (A) panoramic radiograph and (B) lateral cephalogram.

Post-surgical phase of orthodontic refinement and myofunctional physical therapy

Orthodontic treatment resumed four weeks later, and the remote monitoring with DM interrupted. The patient was referred to a physical therapist specialised in orofacial post-surgical rehabilitation. The myofunctional therapy consisted of three 1-hour sessions, each of them scheduled two weeks apart. During session 1, muscle conditioning exercises targeting the orofacial muscles were taught to facilitate adaptation to the new working length. These consisted of passive and assisted muscle stretching, by instructing the patient to slowly open the mouth and to perform lateral eccentric and protrusive movements within painless ranges. The patient was directed to repeat these exercises on a daily basis for five repetitions, three times per day, until the following session. Session 2 consisted of speech and swallowing assessment, and breathing performance. During the session, the tongue was re-educated to a new functional position (i.e., tongue pressed on the roof of the mouth with all the teeth contacting during swallowing); speech was assessed and corrected as appropriate; finally, introduction to and practice of diaphragmatic breathing was performed. The patient was instructed to practice swallowing and diaphragmatic breathing exercises three times per day until the next session, resulting in 15 minutes to 30 minutes of commitment per day. Lastly, session 3 consisted of postural assessment and realignment. This session utilised osteopathic techniques, by addressing the lateral asymmetry and improving spinal curvature and antero-posterior barycenter. The adjustment targeted cranial (including the temporomandibular joints), cervical, lumbar, and sacral areas, in relation to the supra- and infra-hyoid muscle connections. This was intended to reduce asymmetric tension on the masticatory system.

Sensory (with synthetic brushes) and thermal tests (with warm and cold spatula) on the area of the lower lip bilaterally were performed to investigate potential sensory loss, and were found within normal limits. The orthodontic fixed appliances were removed eight months later, after achieving a stable occlusion with bilateral homogeneous occlusal contacts on posterior teeth in intercuspation and bilateral canine guidance on lateral excursion. A class I molar and canine relationship, with proper overbite and overjet, coincident midline and well-aligned dentition were achieved (Fig. 6B). On extraoral examination, the patient revealed a pleasant profile with a normal convexity; the face appeared symmetric and well-balanced, and the initial facial asymmetry was no longer noticeable (Fig. 6A). A vacuum-formed clear removable appliance for the upper arch was delivered for nocturnal use, and a lingual fixed retainer was bonded from canine to canine on the lower arch. Due to the six months of active treatment interruption because of

COVID-19 pandemic, the total treatment duration from the bonding of the orthodontic fixed appliance was 25 months. The patient was satisfied with the aesthetic and functional outcomes to such an extent that he did not proceed anymore with the replacement of the composite filling on the upper left central incisor. The 12-month follow-up revealed the maintenance of a stable occlusion and facial balance (Fig. 7).

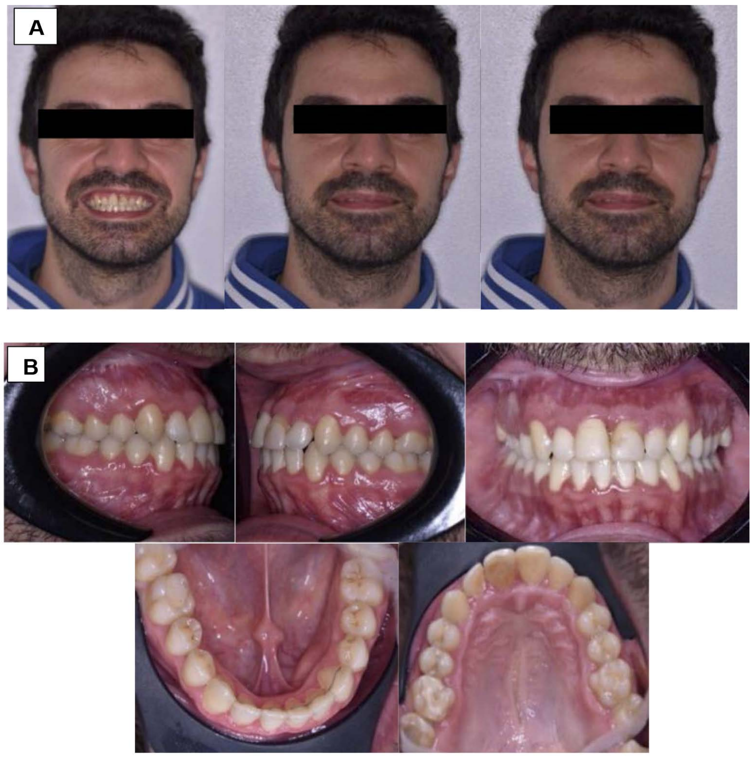

Fig. 6 Post-treatment (A) extraoral and (B) intraoral photographs.

Fig. 7 (A) Extraoral and (B) intraoral photographs at 12-month follow-up.

DISCUSSION

This case report describes the management of a healthy patient with skeletal Class III malocclusion, treated with a combination of orthodontic and surgical treatment, constituted by a pre-surgical SARPE and a bimaxillary approach. The management of the case included the use of remote digital technologies during the preparation phase, such as Dental Monitoring®, and a myofunctional physical therapy in the post-surgical finalisation of the case.

In general, any orthodontic treatments that aim at modifying the antero-posterior relationship of maxillary and mandibular dentition last around 16 months to 24 months. In particular, the combined ortho-surgical management of Class III malocclusion is characterised by a pre-surgical orthodontic phase, surgical intervention, and a final post-surgical orthodontic refinement. The pre-surgical orthodontic phase is specifically difficult for these patients, as the decompensation accentuates the deformity of the face, and the masticatory function and speech may be temporarily impaired (Jamilian *et al.*, 2015). As a result, their self-esteem and oral health-related quality of life (OHRQoL) progressively worsen. At this regard, a study found that the OHRQoL of those patients, assessed with Oral Health Impact Profile (OHIP-14), deteriorated from 14.5 at baseline to 23.4 prior to the surgery, and finally decreased to 5.4 after surgery (with higher scores indicating poorer quality of life, and vice versa) (Rezaei *et al.*, 2019). Recently, an alternative option has been introduced, namely the surgery-first orthognathic approach (SFA), which allows to shorten the treatment period and minimise aesthetic worsening during the pre-surgical decompensation (Kwon & Han, 2019). However, it was not pursued in this case for the high risk of occlusal interferences, due to the dental misalignment at baseline. Moreover, the patient did not express any interest in expediting the time of the surgery to rapidly correct his malocclusion.

The patient's acceptance of a combination of surgical and orthodontic treatment allowed to effectively address the skeletal nature of the malocclusion. The surgical-orthodontic approach to skeletal Class III cases is well recognised in the literature to achieve long-term stability and significant esthetic improvement (Proffit *et al.*, 1991). A first pre-surgical SARPE was incorporated in the treatment management to correct the transverse discrepancy of the two maxillary bones, masked by the negative bucco-lingual inclination of the lower molars and premolars, and by the upper and lower dental crowding. Nevertheless, the literature does not report any significant difference in long-term stability between a two-surgery approach, which involves a pre-surgical SARPE, and a one-surgery approach, constituted by a segmental Le Fort I (Marchetti *et al.*, 2009). The correction of the antero-posterior discrepancy was corrected by a bilateral sagittal split ramus osteotomy in the mandible and by a Le Fort I in the maxilla. The optimal compliance and adherence of the patient to the treatment allowed to achieve the selected primary and secondary endpoints. At this regard, the literature suggests that remote monitoring by digital technology might reinforce the patient motivation and adhesion to instructions (Sangalli *et al.*, 2021). Moreover, the patient reported significant benefit from the myofunctional physical therapy, which also helped realigning his postural imbalance. The literature confirms the effectiveness of an orofacial myofunctional intervention after orthognathic surgery in functional performance, such as breathing, chewing, swallowing and speech (Migliorucci *et al.*, 2017). A multidisciplinary approach that includes a myofunctional physical therapy suggests longer stability of the results (Migliorucci *et al.*, 2017).

To the best of our knowledge, this is the first study in the literature that reported the use of a system of long-distance control for a patient in preparation for orthognathic surgery with fixed orthodontic appliance.

A similar case-report presented the adjuvant use of DM to remotely monitor the surgical-orthodontic management of an adult with Class III malocclusion, treated with corticotomy-accelerated-presurgical decompensation and mandibular sagittal split osteotomy (Hannequin *et al.*, 2020). The patient was treated with Invisalign® system, and DM helped in strictly checking the accuracy of the rapid aligner-mediated tooth movement (Hannequin *et al.*, 2020).

In the present case, DM has played an important role in allowing a regular monitoring of the case when the COVID-19 pandemic abruptly imposed a cancellation of every not-elective surgery, and the suspension of in-office dental appointments, except for emergency reasons (Bianco *et al.*, 2021). Orthodontic visits are rarely considered urgent in nature. However, from an orthodontic standpoint, regular check-ups are crucial for a favourable progression of the treatment. Recently, research on systems of remote digital monitoring has substantially increased, also under the pressure of the COVID-19 pandemic (Sangalli, Fernandez-Vial *et al.*, 2022), thus permitting to highlight further advantages and limitations of these new advances. Specifically, in orthodontics their efficacy has been suggested as following: during the retention period, to monitor potential relapse in dental movements and in fitting of the removable retainers (Sangalli, Savoldi *et al.*, 2022); during the active therapy, to positively influence the oral hygiene of the patients (Sangalli *et al.*, 2021), to replace in-person evaluation (Caruso *et al.*, 2021; Sangalli, Fernandez-Vial *et al.*, 2022), to reduce the number of in-office visits and the treatment duration (Hansa *et al.*, 2021; Hansa *et al.*, 2018), to customise appointment frequency on individual basis (Hansa *et al.*, 2021). In the present case, having a remote system for real-time monitoring allowed to minimise the psychological distress of the patient (Bianco *et al.*, 2021), and permitted to early detect potential orthodontic emergencies, such as disengagement of the archwire from the bracket slot, loss of auxiliaries, detachment of brackets and orthodontic bands. If any of these orthodontic emergencies had occurred and left untreated, the orthognathic surgery would have been necessarily postponed and as such, the treatment time further extended (Maspero *et al.*, 2020). Systems of remote monitoring are not exempt from limitations, which include the need of compliant and motivated patients in regularly taking pictures, the additional commitment of the clinician in periodically monitor the DM Doctor Dashboard®, along with the extra monthly fee charged by DM (Dalessandri *et al.*, 2021).

CONCLUSION

In an adult with skeletal Class III malocclusion, a combined orthodontic-surgical approach permitted to address the skeletal maxillary and mandibular discrepancy. The experience of this case report suggests the encouraging role of remote digital technologies, such as Dental Monitoring®, in maintaining real-time monitoring, especially in times of health emergency crisis, where the regularity of chairside appointments might be abruptly disrupted.

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