

Reversing treatment from surgical orthodontics to camouflage therapy: a four-year follow-up

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Patients in active treatment and transferred to another orthodontic clinic may present a difficult challenge for the receiving orthodontist. The purpose of this case report is to illustrate and discuss the orthodontic therapy of a 35-year-old male who had been prepared for orthognathic surgery, transferred to a different clinic and whose treatment was revised to involve orthodontic camouflage. A reflection of the difficulties in managing transferred patients is offered, and the consequences of changing the original treatment plan and handling the patient's expectations are explained.

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Introduction

The incidence of transferred patients in active treatment presenting in orthodontic clinics may be more frequent than once thought.¹⁻³ A survey conducted in the USA revealed that 58% of the interviewed orthodontists reported receiving five or more transferred patients per year, 35% mentioned that they annually received one to four individuals who started treatment with another professional, but only 7% indicated that they did not receive any transferred cases in a typical year.²

The management of transferred patients may represent a difficult challenge for the receiving orthodontist.¹⁻³ There might be a knowledge difference between the clinician who started treatment and the person who is charged with finishing the case.^{4,5} There may be a disagreement regarding the diagnosis of the malocclusion or the aetiology of the problem, the treatment philosophies might differ or the appliances might vary.¹⁻³

The correction of a skeletal Class III malocclusion

often poses clinical difficulty^{6,7} and the treatment plan must consider the severity of the malocclusion, the level of imbalance in the patient's facial aesthetics, the impact on self-esteem and the patient's willingness to accept orthognathic surgical correction.⁸⁻¹¹ This challenge may be even greater in transfer patients, when professionals may adopt different clinical approaches.^{1-3,5}

The purpose of the present paper is to illustrate and discuss the orthodontic management of a 35-year-old male who was initially prepared for orthognathic surgery, but who transferred to a different clinic and had treatment reversed to involve an orthodontic camouflage approach. A reflection of the difficulties in managing transferred patients, the consequences of changing the original treatment plan and the handling of high patient expectations are discussed.

Diagnosis and aetiology

A 35-year-old male had been wearing orthodontic appliances for approximately one year, but had to



Figure 1. Pretreatment photographs.

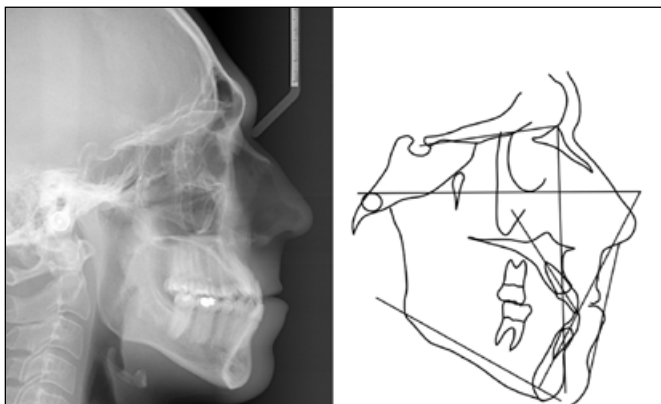


Figure 2. Pretreatment cephalometric radiograph and tracing.



Figure 3. Pretreatment panoramic radiograph.

relocate to another city due to personal reasons and therefore sought a replacement orthodontist to finish treatment. At the initial consultation, the patient presented with a transfer letter, which indicated that he had been prepared for surgical correction of a Class III malocclusion and transferred shortly before preoperative surgical consultation. During anamnesis, the patient explained that he was reconsidering orthognathic surgery and asked if there were alternative treatment options to correct his

malocclusion. Both his medical and dental histories were non-contributory.

Before being transferred, the patient received his initial records, except the dental casts. The pretreatment extra-oral images (Figure 1) showed a slightly concave profile with a moderate midface deficiency and retrusive upper and protrusive lower lips. Facial symmetry was acceptable, the lips achieved passive sealing and there was 100% display of the maxillary incisors upon smiling. The intraoral images (Figure 1)



Figure 4. Intermediary photographs.

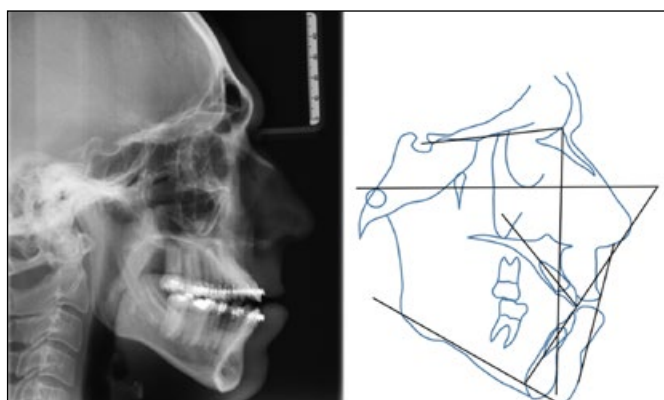


Figure 5. Intermediary cephalometric radiograph and tracing.

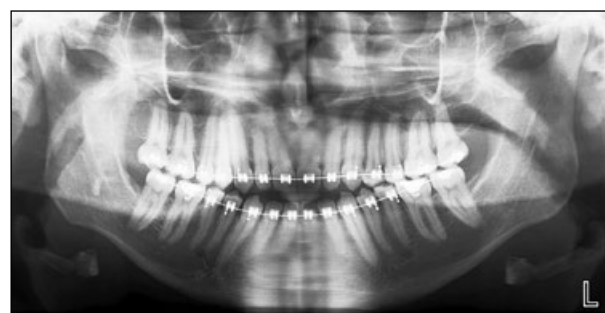


Figure 6. Intermediary panoramic radiograph.

revealed that the maxillary right canine, first and second premolars as well as the maxillary left first premolar were in crossbite, while the maxillary first molars were in an edge-to-edge occlusal relationship. The molars and canines were bilaterally Class III, while the incisors presented a minimal overbite but a negative overjet. The occlusal photographs showed a constricted maxillary dentition in relationship to the mandibular arch along with moderate maxillary and mild mandibular crowding. The attached gingiva

in the anterior region presented good height and width, but there was gingival recession visible on the maxillary first molars.

A cephalometric radiographic evaluation (Figure 2 and Table I) confirmed a skeletal Class III ($ANB = 0^\circ$, $SNA = 82^\circ$, $SNB = 82^\circ$, $Wits = -7$ mm) and a normal vertical dimension of the face ($SN-GoGn = 34^\circ$, $FMA = 27^\circ$). The maxillary incisors were proclined ($1-SN = 117^\circ$, $1.NA = 27^\circ$) and the position of the mandibular incisors was within normal limits

Table I. Cephalometric measurements.

Measurement	Normal	Initial	Transfer	Final
Age		33 y 4 mo	35 y 9 mo	38 y 11 mo
<i>Skeletal pattern</i>				
SNA (°)	82	82	82	82
SNB (°)	80	82	82	82
ANB (°)	2	0	0	0
Facial convexity (°)	0	1	0	0
Y-axis (°)	59	65	65	65
Facial angle (°)	87	87	88	88
SN.GoGn (°)	32	34	35	35
FMA (°)	25	27	30	28
AO-BO (mm)	-1	-7	-5	-5
<i>Dental pattern</i>				
I.SN (°)	103	107	117	105
I.NA (°)	22	27	36	25
I-NA (mm)	4	6	9	7
I.NB (°)	25	25	27	23
I-NB (mm)	4	7	8	6
IMPA (°)	90	88	91	85
<i>Profile</i>				
Upper lip, S line (mm)	0	-3	-2	-2
Lower lip, S line (mm)	0	1	3	1

(IMPA = 88°). A panoramic radiograph revealed the absence of all 3rd molars, adequate alveolar bone levels and no endodontic problems (Figure 3).

Records were obtained prior to the re-start of treatment and a diagnostic analysis was performed to evaluate the changes that occurred before the transfer. An extra-oral evaluation (Figure 4) showed that the profile was less concave due to an increase in the vertical dimension of the face. In addition, both lips were more protrusive in relation to the initial records, and there was less maxillary incisor display upon smiling.

The intraoral examination (Figure 4) revealed full fixed appliances bonded on both arches, except for the maxillary left second molar. The transfer letter mentioned that the brackets were 0.022 × 0.028", but there was no mention if interproximal enamel reduction (IPR) to create space for crowding correction had been conducted. Based on the comparison between the initial and transfer records, it was assumed that levelling and alignment were carried out by transverse and AP expansion without

IPR. Although the posterior crossbite was corrected, a significant anterior open bite had developed. The lower midline had mildly shifted to the left but no important changes on molar and canine relationships were noted.

An analysis of a new lateral cephalometric radiograph (Figure 5 and Table I) showed a mildly increased vertical dimension (FMA = 30°; SN-GoGn = 35°) and the same skeletal Class III measurements (ANB = 0°; SNA = 82°; SNB = 82°). It also confirmed the significant flaring of the maxillary and mandibular incisors observed clinically (I-NA = 9 mm; I-NB = 8 mm) and the consequent protrusion of upper and lower lips. The transfer panoramic radiograph showed the maintenance of appropriate bone levels, and lack of root parallelism of some teeth (Figure 6).

Treatment objectives

The objectives to adequately finish the transferred case were (1) to achieve molar and canine Class I relationships; (2) to obtain satisfactory overjet and



Figure 7. Treatment progress intraoral photographs: five months posttransfer.

overbite, thereby correcting the developing anterior open bite; (3) to improve the aesthetics of the smile; (4) to correct the dental midlines discrepancies; (5) to improve the AP position of the lips; and (6) to improve the patient's ability to swallow and speak properly.

Treatment alternatives

Five treatment alternatives using maxillary and mandibular fixed appliances were proposed, starting from the most idealistic approach involving the least amount of patient cooperation to the minimally invasive, which would require excellent patient compliance. The alternatives presented were:

- 1) Surgical
 - 1.1: To maintain the original surgical-orthodontic treatment plan by continuing the orthodontic decompensation of the dentition in preparation for the orthognathic surgery to correct the skeletal dysplasia;
- 2) Camouflage
 - 2.1: Extractions of the maxillary second premolars to facilitate anchorage loss, and extractions of both mandibular first premolars to allow distal movement of the mandibular incisors and canines;
 - 2.2: Extraction of the mandibular left central incisor to increase overbite and overjet, thus achieving correct anterior relationships;
 - 2.3: Non-extraction therapy using temporary anchorage devices (TADs) in the mandible to support the distal movement of all teeth;
 - 2.4: Non-extraction with mandibular sliding jigs (SJs) and intermaxillary elastics to distally move the mandibular teeth.

The anterior open bite that had developed during pre-surgical orthodontic preparation would be corrected by the use of intermaxillary elastics if treatment

options 2.1, 2.2, 2.3 or 2.4 were chosen. Tongue spurs to increase the stability of the open bite correction were suggested to the patient; however, this was vehemently rejected. Myofunctional therapy after treatment was considered necessary to correct tongue position at rest and during function so that post-treatment stability might be enhanced.^{12,13}

Treatment progress

After weighing the advantages and disadvantages of each treatment option, the patient decided that Class III camouflage with SJs and elastics to move the mandibular dentition posteriorly was the treatment alternative that better suited his objectives. The treatment alternatives involving surgery, independently of its extension, from the insertion of TADs, dental extractions or orthognathic surgery, would not be a valid option. This was the most challenging treatment alternative presented to the patient because success would depend heavily on Class III elastics wear attached to the SJs to distalise each lower posterior tooth to obtain a Class I molar relationship.

The treatment was initiated after informed consent was signed authorising the removal of the previous fixed appliances because the bracket prescription was incompatible. Four weeks later, maxillary and mandibular stainless steel brackets were placed on all teeth (0.022 × 0.028 inch, Mini-Master Series, American Orthodontics, WI, USA). The incisor brackets presented an MBT prescription and from the canines to the second molars, the bonded attachments were standard edgewise. Orthodontic re-levelling and re-aligning of the maxillary and mandibular arches were performed using 0.014 inch and 0.018 inch heat-activated nickel-titanium wires in both arches, followed by 0.018 inch, 0.017 × 0.025 inch and 0.019 × 0.025 inch stainless-steel (SS) wires placed in the upper arch and 0.016 × 0.022 inch SS in the lower arch.



Figure 8. Post-treatment photographs.

Custom made 0.019 × 0.025 inch SS sliding jigs (SJs) were bent at chairside to extend from the mesial of the mandibular second molar tubes to the distal of the mandibular canine brackets. The patient wore Class III ¼ inch heavy elastics to move the second molars distally, for approximately 20 hours per day (Figure 7). After the second molars achieved a Class I relationship, a shorter SJ was bent to move the first molars distally. When the molars were in an ideal molar relationship, the SJ was used as anchorage to support the distalisation of the premolars and canines with elastic chain. Significant spaces for the subsequent retraction of the mandibular incisors were obtained, which was achieved using a 0.018 × 0.025 inch SS archwire with closing loops. Intermaxillary elastics were then changed to ¼ inch heavy Class II triangular elastics to close the anterior open bite. Interproximal composite build-ups were added to the maxillary lateral incisors to achieve adequate anterior occlusal relationships. Total treatment duration was 32 months.

After debonding, a fixed mandibular 3 × 3 and a maxillary, wrap-around Hawley retainer were inserted. The patient was instructed to wear the removable

retainer full-time during the first six months after active treatment and night-time thereafter. A referral for orofacial myofunctional therapy to re-educate tongue posture and increase treatment stability was arranged.

Treatment results

Post-treatment records (Figures 8–11) showed that all treatment goals were achieved. A significant improvement of smile aesthetics as a result of increased maxillary incisor display was achieved. The patient's profile became slightly less concave and an excellent improvement in upper lip posture and lower lip retraction was obtained. Furthermore, the patient was very satisfied with his new smiling appearance.

An intraoral exam showed a molar and canine Class I relationship and excellent posterior tooth interdigitation. The mandibular incisors were retracted and uprighted and the maxillary lateral incisors received interproximal composite build-ups, to achieve adequate overjet and overbite, and to correct the anterior open bite. A minor increase in maxillary first molar gingival recession was seen.



Figure 9. Post-treatment dental casts.

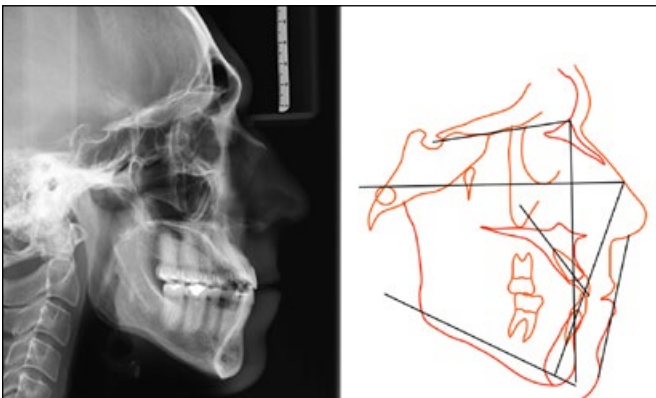


Figure 10. Post-treatment cephalometric radiograph and tracing.



Figure 11. Post-treatment panoramic radiograph.

The cephalometric measurements and superimpositions (Table I and Figures 12–13) showed good overall vertical control when comparing transfer to final records. There was extrusion and uprighting noted of the maxillary and mandibular incisors, and moderate distal movement of the mandibular molars.

Figure 14 shows the patient four years following treatment and displaying stable results of both sagittal and vertical intermaxillary dental relationships. Similarly, the facial profile and smile aesthetics did not change following the conclusion of active treatment.

Discussion

Changing care providers during active orthodontic treatment may be stressful for the receiving orthodontist and the patient.^{2,3,5} Professional differences in

diagnostic, treatment planning, overall philosophy, and financial-administrative aspects are common.¹⁻³ When a replacement orthodontist proposes a significant change in the original treatment plan, including complete reassembly of the fixed appliances and collection of full-treatment fees, there may be additional discomfort.^{1,5} Because of these issues, many orthodontists decline to accept transfer patients.¹⁴

In the present case report, the transfer patient enquired about changing the original treatment plan. Two major challenges were subsequently identified: (1) the diagnostic determination of the severity of the dental and skeletal malocclusion, the level of facial disharmony, and a perception of the patient's self-image⁸⁻¹¹ that could support an alternative orthodontic camouflage treatment and remove the need for orthognathic surgery; (2) to assess the

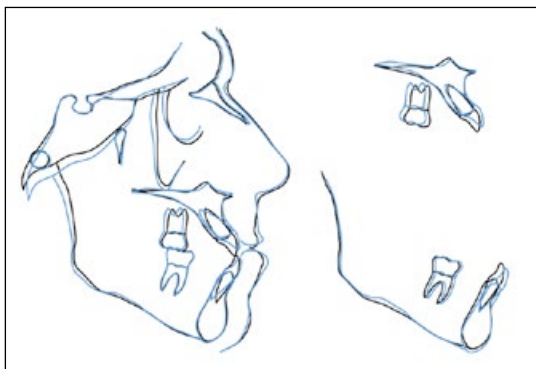


Figure 12. Cephalometric superimpositions: pretreatment vs intermediary

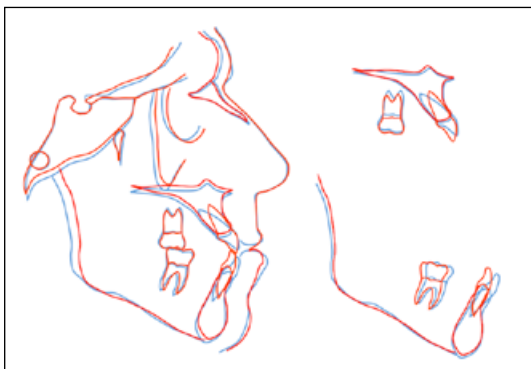


Figure 13. Cephalometric superimpositions: intermediary vs post-treatment



Figure 14. Facial and intraoral photographs at the four-year follow-up.

patient’s real intention and the compliance required for an alternative treatment plan.

An assessment of the severity of the dental and skeletal malocclusion at the time of transfer may be more important than the initial evaluation. An accurate assessment of the patient’s pretreatment records and information related to the original treatment plan, the appliances and mechanics applied, and the patient’s cooperation report from the transfer letter are important requirements to formulate a new treatment

plan.^{3,5} The receiving orthodontist should carefully evaluate the original malocclusion and the changes achieved prior to the transfer to determine the likely prognosis and the level of responsibility required to finish treatment. Obtaining good transfer records and documenting the patient status at the transferring appointment is paramount to minimise the risk of legal exposure.⁵ The use of an appropriate transfer form¹⁵ may be considered a standard procedure for the transfer of patients to others.¹

The comparison between the pretreatment and transfer records showed a significant increase in the anterior open bite, likely due to the transverse and AP expansion generated by the initial levelling and aligning archwires. The facial imbalance was due to the retracted position of the upper lip and lower lip protrusion, without significant deficiency of the middle third of the face or mandibular prognathism. The cephalometric assessment confirmed the moderate skeletal Class III (Wits = -7 mm, ANB = 0°). The patient did not complain about his facial aesthetics, but was unhappy with the anterior open bite.

Considering all issues and his request to avoid surgery, the camouflage orthodontic mechanics to maintain or increase the dental support of the upper lip and to retract the lower lip with SJs and Class III elastics was the treatment alternative chosen. A possible undesirable side effect of Class III elastics is the extrusive vector on the maxillary molars and consequent downward mandibular rotation that would worsen the anterior open bite.¹⁶ Two strategies were directed at minimising this problem. SJ hooks, to which the Class III elastics were attached anteriorly, were bent occlusally to align the force vector exerted by the elastics more parallel to the occlusal plane. Secondly, after Class I molar and canine relationships were achieved, triangular elastics with vertical force vectors were used to assist closing of the anterior open bite. Additionally, the slight intrusion observed in the mandibular molars (Figure 13) compensated for the extrusion of the maxillary molars. A theoretical explanation is that the Class III elastic attached to the anterior segment of the SJ caused extrusion close to the point of force application, which produced an intrusion tendency at the SJ distal end (i.e., at the mandibular molars).

Although there is no published consensus regarding the benefits of orofacial myofunctional therapy (OMT) to increase the long-term stability of anterior open bite correction, it has been suggested that treatment associated with OMT was more effective in maintaining open bite closure than orthodontic therapy alone.¹³ Furthermore, Garrett et al.¹⁷ stated that, regardless of whether open bite treatment involved orthodontics only or surgical-orthodontics, tongue posture should be corrected to decrease the chances of relapse. Although the anterior open bite observed in the transfer consultation was not seen in the initial records, inadequate tongue posture was

identified in speech, rest and swallowing during the initial examination. Tongue spurs were recommended to address the tongue dysfunction because there is evidence of good long-term stability.^{18,19} The patient firmly rejected that option and so OMT was recommended and successfully performed.

The treatment option chosen by the patient was most challenging, specifically because success would depend heavily on excellent Class III elastic wear. The positive result achieved in treatment was due to the patient's exceptional adherence to instructions. Changing the treatment direction of a transfer patient from one that requires minimum cooperation to one fully dependent on the patient's compliance may increase the orthodontist's exposure to legal consequences if the patient becomes uncooperative. The receiving orthodontist must also have a signed patient's informed consent that discloses reasonable treatment options, known risks, complications, and expected outcomes of each option, before the final decision is agreed.^{5,20}

Finally, before the continuation of treatment, the patient was informed that the chosen option was not the most efficient and the overall treatment duration would range from 30 to 36 months. While this was accepted, the extraction of one mandibular incisor could have been a more predictable and faster treatment option. The incisor extraction decision could have been supported by the moderate Class III with reduced overjet and overbite, large intercanine width, mild crowding and mandibular anterior tooth size excess,²¹ as presented by the patient.

Conclusions

Receiving transfer patients is a reality and clinicians should be prepared to accept and continue these cases. For technical and legal reasons, excellent records and a signed informed consent are paramount. The present case report illustrates that reversing a transfer patient's plan from a surgical orthodontic direction to camouflage therapy is valid in a case in which good communication between the receiving orthodontist and the patient is maintained throughout treatment. The goals and responsibilities of both parties should be clear from the initial transfer appointment and the patient made aware of the challenges resulting from his/her decision.

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