



## Surgical correction of facial asymmetry without bone grafting for unilateral temporomandibular joint ankylosis



Serap Titiz<sup>a,\*</sup>, Aynur Aras<sup>b</sup>, Özgür Gözlüklü<sup>c</sup>

<sup>a</sup> Department of Orthodontics, Faculty of Dentistry, Usak University Hospital, Izmir, Turkey

<sup>b</sup> Department of Orthodontics, Faculty of Dentistry, Ege University Hospital, Izmir, Turkey

<sup>c</sup> Private Practice in Izmir, Turkey

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### ABSTRACT

This case report evaluated the clinical value, therapeutic effectiveness, and stability of a bilateral sagittal split osteotomy of the rami (BSSRO) and genioplasty, without temporomandibular joint (TMJ) bone grafting, for the treatment of mandibular asymmetry and deviation in patients with unilateral TMJ ankylosis. A 2-stage procedure was planned, with an initial release of the TMJ, using a gap arthroplasty, followed by orthognathic treatment for the maxillofacial deformities. This orthognathic surgical approach is suitable for patients who only need a slight mandibular advancement, without a vertical height increase. In this case, acceptable occlusion and facial esthetics were obtained, with results being stable over a 4-year postoperative follow-up.

### 1. Introduction

Temporomandibular joint (TMJ) ankylosis is characterized by partial or complete mandibular immobilization due to fusion between the mandibular condyle and the bony surface of the mandibular fossa [1,2]. Various factors can lead to TMJ ankylosis. Trauma is the most common cause of TMJ ankylosis, followed by infection [3,4]. TMJ ankylosis and maxillofacial deformity secondary to TMJ ankylosis interfere with mastication, speech, oral hygiene, and reduces quality of life. The main aims in the treatment of joint ankylosis are to increase mandibular function, correct maxillofacial deformity secondary to TMJ ankylosis, decrease pain, and prevent reankylosis.

TMJ ankylosis and maxillofacial deformity, secondary to TMJ ankylosis, are generally treated with a 1- or 2-stage surgical procedure. In a 1-stage procedure, the correction of skeletal deformities is obtained with release of the unilateral TMJ ankylosis, while in a 2-stage procedure, condylar reconstruction is first performed, followed by combined orthodontic and surgical treatment of the maxillofacial deformity. In this case report, we describe a 2-stage procedure performed for the treatment of TMJ ankylosis, with secondary maxillofacial deformity, which was performed without bone grafting of the TMJ. The outcomes are presented for a 4-year follow-up.

### 2. Case presentation

A 14.5-year-old girl presented to our facility with limited mouth opening, difficulty speaking and chewing, and facial asymmetry. Clinical examination and computed tomography revealed right facial asymmetry, 10-mm mouth opening, and a right bony TMJ ankylosis (Fig. 1). The lateral cephalometric radiograph showed mandibular retrognathia, and lower face deficiency (Fig. 1H). No

\* Corresponding author. Usak University, Faculty of Dentistry, Department of Orthodontics, Izmir, Turkey.  
E-mail address: [serap.titiz@usak.edu.tr](mailto:serap.titiz@usak.edu.tr) (S. Titiz).

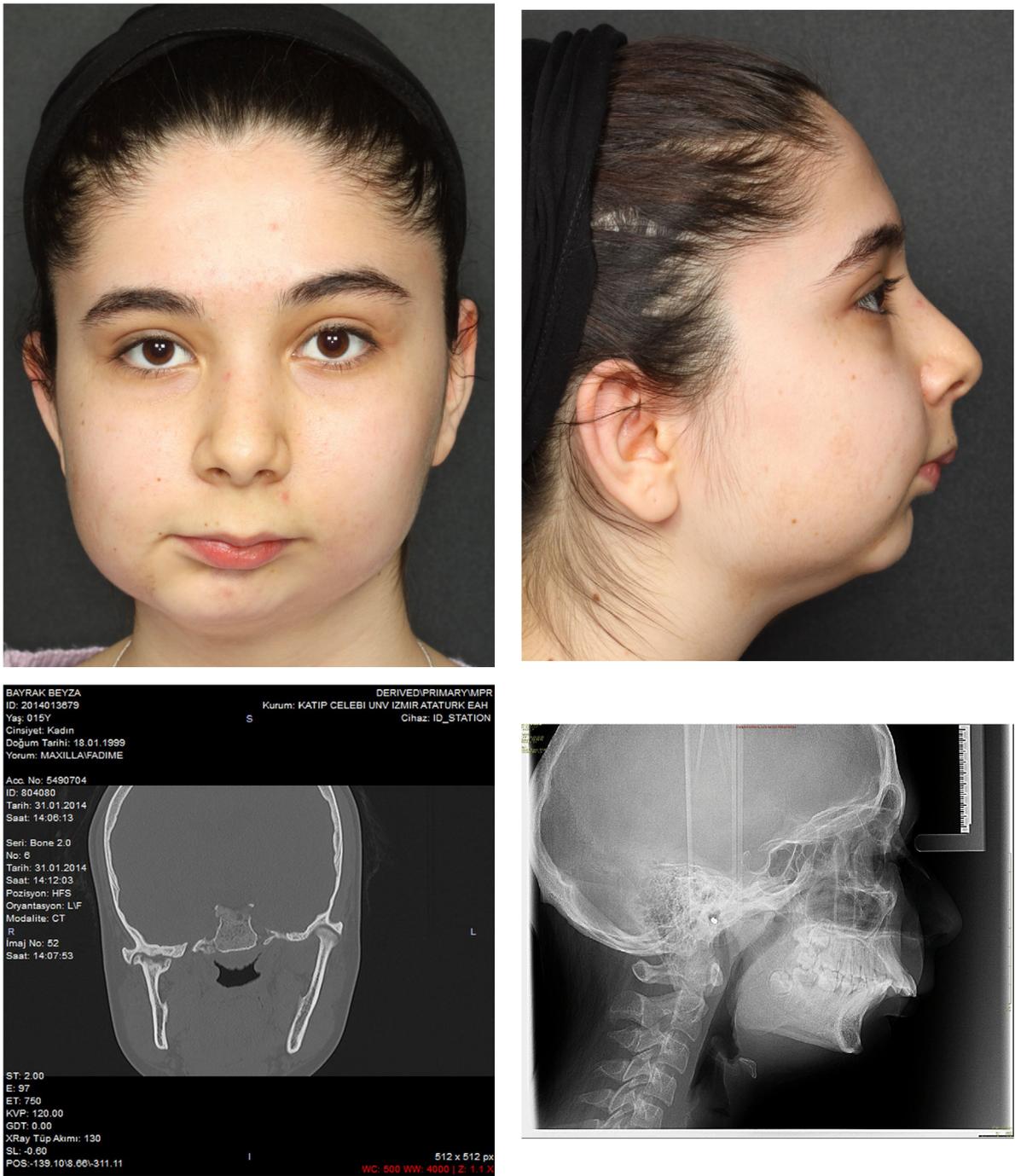


Fig. 1. Pre-treatment extra- and intra-oral photographs: (A) anterior facial; (B) profile; (C) computed tomography; (D) lateral cephalometric radiograph; (E) right dental; (F) frontal dental; (G) left dental; (H) limited mouth opening.



Fig. 1. (continued).

obvious cause was found in her medical history. The patient's limited mouth opening was recognized when the patient was 2 years old and her mother said that she was born through a vacuum-assisted delivery and had no trauma after birth, so we considered the birth method was the cause of the ankylosis.

Before starting treatment, study was conducted in accordance with the principles outlined in the Declaration of Helsinki and the parents gave signed informed consent. A 2-stage procedure was planned, with an initial release of the TMJ using gap arthroplasty, followed by orthognathic treatment for the maxillofacial deformities. The gap arthroplasty procedure was performed via a subcondillary approach; no material was inserted. There was no significant mandible right shift with premature contact on the right occlusion following the gap arthroplasty. After the initial TMJ release, mouth opening increased to 35 mm. To protect this interincisal opening, we applied an aggressive physical therapy program for 3 months consisting of passive mouth-opening exercises. Pre-surgical orthodontic treatment was initiated at the age of 15.5 years, with the bilateral sagittal split ramus osteotomy (BSSRO) performed when the patient was 17 years old (Fig. 2). The sagittal split osteotomy performed on the right side allowed for a distal drift of the mandibular body, with approximation of the condyle into the fibrotic tissue of the previously performed TMJ gap release. Because of the absence of the right mandibular condyle, rigid fixation was performed using bicortical screws to prevent relapsing of the deformity. After performing a sagittal split osteotomy, the left and right mandibles were advanced by 6.5 and 4 mm, respectively, to improve chin deviation. Despite these procedures, the asymmetric chin appearance could not be corrected. Final soft tissue profile and deviation degree was not predictable because of intraoperative edema. Therefore, six months after the BSSRO procedure, augmentation genioplasty was performed using allogenic bone block, which was stabilized using a 2 mm titanium plate and screws. Post-treatment results showed improved facial symmetry and harmony with good dental occlusion. Orthodontic appliances were removed five months after BSSRO and there was no premature occlusal contact in both sides. Over a 4-year follow-up, there was no evidence of relapse with regard to dental occlusion and facial symmetry, and the mouth opening distance was maintained between 34 and 36 mm (Fig. 3). In addition, there were no signs or symptoms of TMJ disorder and jaw movements during mastication remained within normal range.

### 3. Discussion

Although treatment principles for TMJ ankylosis are well documented, there is no consensus on the treatment of TMJ ankylosis with maxillofacial deformity. Generally, a 1-stage approach is used in adults and a 2-stage approach is used in young children [5]. This

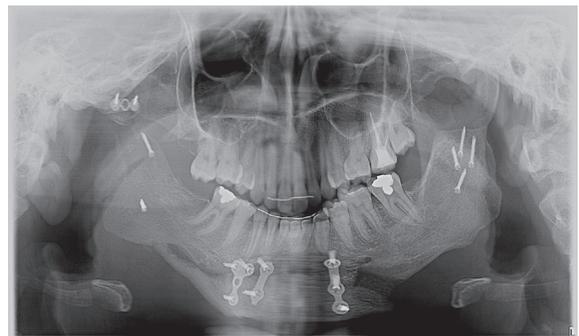
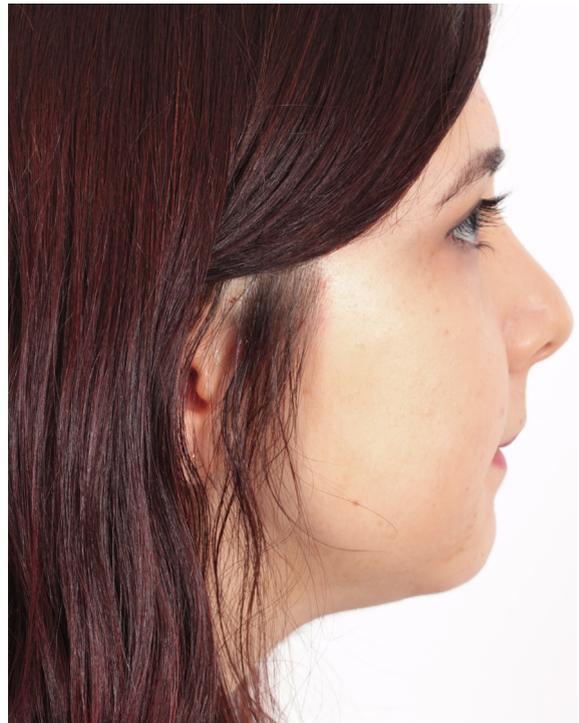
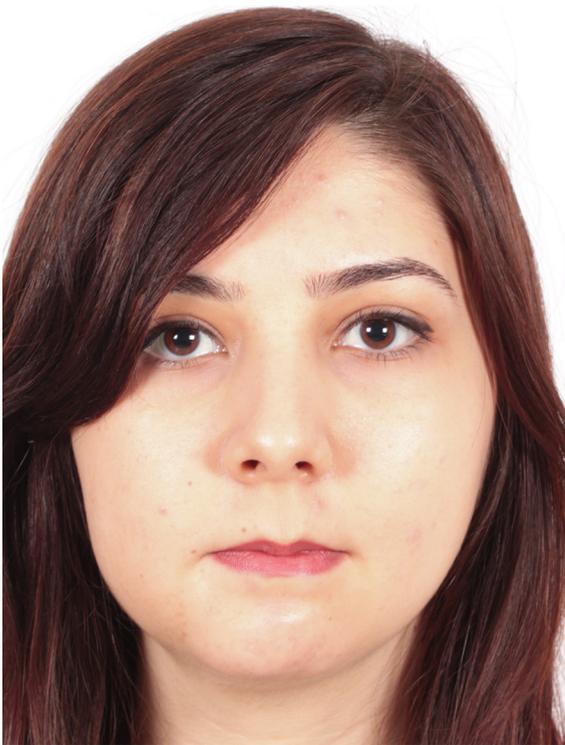


Fig. 2. Post-treatment extra-oral and intra-oral photographs after BSSRO: (A) anterior facial; (B) profile; (C) lateral cephalometric radiograph; (D) panoramic radiograph (E) right dental (F) frontal dental; (G) left dental.



Fig. 2. (continued).

difference between adults and children reflects the greater difficulty in correcting the secondary maxillofacial deformity once skeletal maturity has been achieved. The use of a 1-stage approach for TMJ release and correction of the maxillofacial deformity in adults is also difficult from a surgical technique perspective, increasing the operative and general anesthesia time.

In this case, we did not use costochondral grafts, which are often used for reconstruction, due their unpredictable growth pattern which could lead to loss of TMJ stability [6]. The potential risks of performing this surgery without a neocondyle are occlusal and skeletal instability, reankylosis, and the effect of growth in younger patients. We considered that ensuring maximum intercuspid occlusion and minimizing vertical and sagittal mandible displacement were factors that contributed to the long-term stability of the correction because a significant change in muscle length was avoided. It is important to consider muscle length as muscles return to their original length over time, which could lead to a relapse. For patients who need a significant increase in vertical mid-face height or correction of a severely canted occlusal plane, bone grafting should be performed [5].

The growth of the patient was completed according to wrist and hand radiography, so no effect of patient growth was expected. We believe that active and long-term physical therapy is effective in reducing the risk of ankylosis. Other treatment options for TMJ ankylosis include sternoclavicular grafts, dermal grafts, fat grafts, temporalis fascial flaps, rib grafts, fibular grafts, and total joint prostheses [2].

The use of patient-fitted or stock prostheses reduces operative time, prevents potential donor site morbidity, and the patient can immediately return to function [7,8]. Disadvantages include increased cost, difficult correction of significant dentofacial deformities, potential material wear, and failure [9].

Distraction osteogenesis has also been used to manage TMJ ankylosis with release of ankylosis before and after the distraction process [10]. However, harvesting complications and questionable long-term outcomes must be taken into consideration.

This case shows that a three-stage approach may be feasible for the management of unilateral TMJ ankylosis with an associated mandibular deformity; however, an increased number of cases is required to validate this treatment protocol.

#### Conflicts of interest

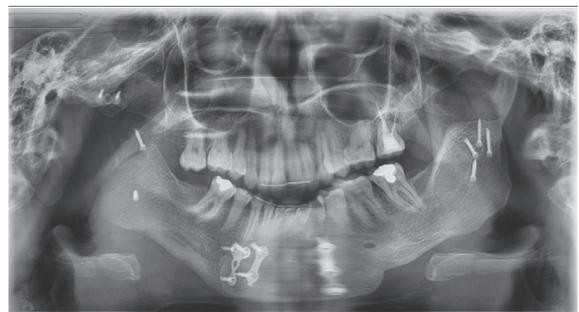
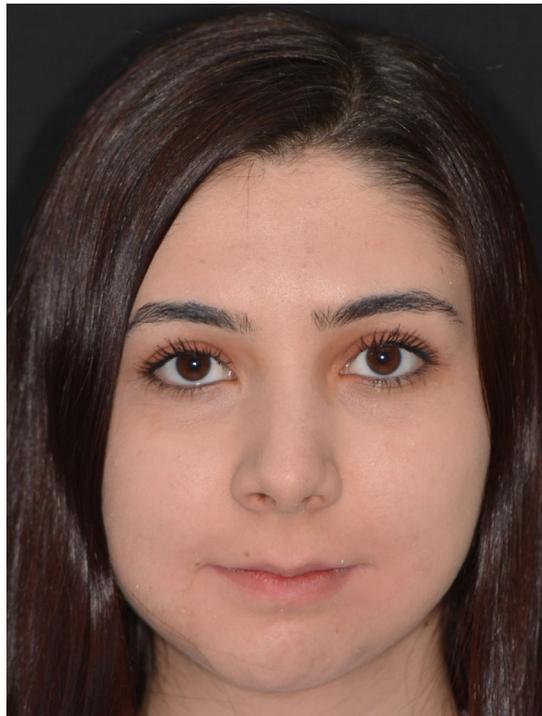
The authors declare no conflicts of interest. No funding was used for the study.

#### Authorship criteria

Serap titiz: manuscript preparation, literature research, clinical study, guarantor of this manuscript.

Özgür gözlüklü: manuscript preparation, clinical study and surgery.

Aynur aras: literature research.



**Fig. 3.** Post-treatment extra-oral and intra-oral photographs after a 4-year follow-up: (A) anterior facial; (B) profile; (C) lateral cephalometric radiograph; (D) panoramic radiograph (E) right dental (F) frontal dental; (G) left dental; (H) 35 mm opening of the mouth.



Fig. 3. (continued).

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