# Is Alloplastic Temporomandibular Joint Reconstruction a Viable Option in the Surgical Management of Adult Patients With Idiopathic Condylar Resorption?

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**Purpose:** Idiopathic condylar resorption (ICR) presents diagnostic and therapeutic challenges to practitioners because of the rarity of the condition, progressive deformity, and simultaneous involvement of skeletal, occlusal, and articular disorders. The objective of this study was to report clinical outcomes after prosthetic replacement of the temporomandibular joint (TMJ) for the management of ICR.

**Patients and Methods:** A retrospective analysis of patients with ICR managed by bilateral total TMJ replacement and concomitant mandibular advancement with or without maxillary surgery was performed using data gathered from medical records. The primary treatment outcomes of interest were *1)* correction of anterior open bite malocclusion, *2)* mandibular advancement, and *3)* increase in posterior facial height. Secondary outcomes included subjective assessment of pain, dietary restrictions, and functional disability and objective evaluations of TMJ sounds, occlusal relation, mandibular range of motion, cranial nerve VII injury, and objectionable scarring. Radiographs were used to measure surgical change and relapse.

**Results:** Twenty-one patients met the inclusion criteria for this retrospective study. The average patient age was 25.6 years (range, 22 to 32 yr) and mean follow-up was 6.2 years (range, 5 to 12 yr). Mean mandibular advancement at the B point was 24.3 mm and mean change in occlusal plane was −10.2°. Sixteen patients (76%) underwent maxillary orthognathic surgery for posterior downgrafting with rigid fixation and grafting. Long-term follow-up showed excellent stability of surgical movements with a decrease in TMJ and myofascial pain, headaches, and dietary restrictions.

**Conclusions:** Patients with ICR can be effectively treated using total TMJ prostheses with maxillary orthognathic surgery when indicated for the correction of an associated dentofacial deformity. Use of alloplastic joint prostheses allows for the execution of large mandibular advancements in a predictable and accurate manner with a meaningful decrease in symptoms of TMJ dysfunction.



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Idiopathic condylar resorption (ICR) is an acquired disorder that results in the progressive decrease of the condylar size or mass without an identifiable etiology. It was first reported as condylar hypoplasia by Burke[1] in 1961. The exact etiology that initiates the process of condylar resorption is not known. However, several theories have been described to explain the pathogenesis of condylar resorption. Arnett et al[2,3] associated condylar resorption with an increased mechanical load on the temporomandibular joint (TMJ) after orthodontic treatment, orthognathic surgery, trauma, internal derangement, occlusal therapy, or parafunctional habits. Chuong and Piper[4] proposed that avascular necrosis might play a role in the pathogenesis of ICR in a fashion similar to avascular necrosis of the femoral head. ICR mostly affects teenage girls, with a 9:1 female-to-male frequency ratio, and rarely develops after 40 years of age. A theory of hormonal mediation has been proposed based on the finding of estrogen receptors in the human TMJ,[5] and its hypothesis is that female hormones mediate hyperplasia of synovial tissues, which starts the destructive process once in contact with the condyles.[5] Gunson et al[6] also found that lower levels of 17$\beta$-estradiol with the use of oral contraceptive pills was a major risk factor in ICR initiation and progression.

Patients with ICR typically present with progressive chin retrusion with or without associated TMJ pain or clicking. Wolford and Cardenas[7] found that 25% of patients had no TMJ dysfunction symptoms. If it occurs in a symmetric bilateral fashion, then it will result in a symmetric posterior shift of the mandible, leading to high angle Class 2 skeletal and dental malocclusion. Conversely, asymmetric bilateral or unilateral condylar resorption will result in a dental and skeletal mandibular midline shift, a contralateral posterior open bite, and an ipsilateral crossbite. Patients with ICR usually have been managed by a range of medical and surgical treatment options. Treatment is often dictated by the severity of dentofacial deformity, limitation of jaw function, and a surgeon's preference and experience.

The ideal surgical treatment of ICR remains controversial. Treatment options include orthognathic surgery alone, concomitant or staged TMJ and orthognathic surgery, distraction osteogenesis, and autogenous or alloplastic TMJ replacement (TJR).[7-11] Q3 Although there are multiple articles in the literature reporting the clinical outcomes of the alloplastic total TMJ prosthesis, there are only few case reports of using it in patients with ICR or as a part of a heterogeneous patient sample.[12,13] The purpose of this study was to evaluate the clinical outcomes of using patient-fitted TJR in the management of ICR. The specific aims of this study were to compare results of subjective and objective clinical examinations and radiographic findings at 3 separate intervals: before surgery (T1), immediately after surgery (within 2 weeks; T2), and at longest follow-up (T3).

## Patients and Methods

To address the research purpose, the authors designed and implemented a retrospective case series. The study population was collected by reviewing the medical records of all patients who underwent surgical management of ICR by a single surgeon (P.M.) at Boston University Medical Center (Boston, MA) from 2000 through 2008. Institutional board approval was obtained for the retrospective analysis (H-34770). The inclusion criteria for the study were *1)* progressive mandibular retrusion secondary to TMJ resorption, *2)* negative screening results for known forms of systemic arthritides or other conditions known to cause TMJ resorption, *3)* no history of trauma, *4)* presence of Class 2 skeletal and dental malocclusion, and *5)* surgical treatment involving bilateral total TJR and concomitant mandibular advancement with or without maxillary surgery. Patients were excluded if they had multiple joint involvement (juvenile idiopathic arthritis), incomplete medical records, or a follow-up span shorter than 2 years after surgery. Figures 1 to 8 show a typical patient with ICR who was included in the study and treated by the present protocol. Preoperative planning for all patients was similar to that described in managing other end-stage TMJ diseases.[14] Le Fort I osteotomies (when indicated) were performed and rigid fixation was accomplished with 4 bone plates in every case.

Demographic data, including patient's age and gender, were collected. Radiographic examinations were available for all patients at T1, T2, and T3. The primary treatment outcomes of interest were *1)* correction of anterior open bite malocclusion, *2)* mandibular advancement (measured at the B point), and *3)* increase in posterior facial height (gonial lengthening). In addition, secondary outcomes were assessed using clinical examination and a visual analog scale (VAS; score, 0 to 10) for subjective examination of pain (0, no pain; 10, worst pain imaginable), dietary restrictions (0, no restriction; 10, confined to liquids), and functional disability (0, no disability; 10, completely disabled) at each of these intervals. The objective criteria studied were *1)* clinical evaluations of TMJ sounds, anterior open bite, occlusal relation, mandibular range of motion (excursions, protrusion, and maximum opening), cranial nerve VII injury, and objectionable scarring; and *2)* radiographic analysis by superimposition of cephalometric tracings for measuring surgical change (T2 vs T1) and relapse (T3 vs T2).