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# Alloplastic Total Temporomandibular Joint Replacement as Primary Reconstruction for Ankylosis in Children with Systemic Juvenile Idiopathic Arthritis: A Case Series

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**Case Report**

**Keywords:** Juvenile idiopathic arthritis, Temporomandibular joint ankylosis, Total joint replacement, Costochondral graft, Paediatric, Alloplastic reconstruction

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# Alloplastic Total Temporomandibular Joint Replacement as Primary Reconstruction for Ankylosis in Children with Systemic Juvenile Idiopathic Arthritis: A Case Series

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## Abstract

**Purpose** To describe the clinical decision-making, surgical management and outcomes of alloplastic total temporomandibular joint replacement (TJR) as primary reconstruction for temporomandibular joint (TMJ) ankylosis in children with systemic juvenile idiopathic arthritis (JIA).

**Methods** Retrospective case series of three consecutive children with systemic JIA and painful Sawhney type III ankylosis with complete condylar destruction, treated between 2024 and 2025 with single-stage ankylotic mass resection, coronoidectomy, autogenous fat interposition and TJR (patient-specific in two, stock in one), without orthognathic surgery. Maximum interincisal opening (MIO), pain (visual analogue scale, VAS), diet, occlusion, complications and radiographic findings were recorded descriptively.

**Results** Patients were aged 9, 13 and 14 years, and four joints were replaced. Mean MIO increased from 5.0 mm (range 4–6) to 32.3 mm (range 31–34) at latest follow-up, a mean gain of 27.3 mm. Mean VAS fell from 8.0 to 0, and all patients returned to a regular diet. Transient temporal-branch facial nerve weakness in two patients resolved at 15 and 18 weeks. Over a mean follow-up of 22.7 months (range 12–30), there was no infection, dislocation, heterotopic ossification, re-ankylosis, implant loosening or revision.

**Conclusion** In carefully selected children with systemic JIA and irreversible end-stage TMJ ankylosis, TJR was associated with substantial restoration of opening and resolution of pain. These descriptive findings do not show that TJR is growth-neutral; surveillance through skeletal maturity is essential.

**Keywords** Juvenile idiopathic arthritis; Temporomandibular joint ankylosis; Total joint replacement; Costochondral graft; Paediatric; Alloplastic reconstruction

## Introduction

Juvenile idiopathic arthritis (JIA) is the most common chronic rheumatic disease of childhood and comprises seven categories in the International League of Associations for Rheumatology (ILAR) classification [1]. The temporomandibular joint (TMJ) is frequently involved: in a longitudinal cohort of 223 children, 38.6% developed TMJ arthritis over a mean of 4.6 years [2]. TMJ arthritis is often clinically silent, yet progressive destruction may cause condylar resorption, loss of ramal height, mandibular growth disturbance, malocclusion, pain and restricted movement, and may culminate in fibrous or bony ankylosis [2, 3].

Management is directed at controlling inflammation and preventing irreversible damage [3], but a subset of patients progresses to end-stage destruction requiring reconstruction. Conventional options in children include gap and interpositional arthroplasty and reconstruction of the ramus–condyle unit with a costochondral graft (CCG) or distraction osteogenesis [4]. A CCG is attractive because of its growth potential, but growth is unpredictable and recurrent ankylosis is common [5, 6]. Alloplastic total joint replacement (TJR) removes the diseased articulation, reconstructs both fossa and condyle, and permits immediate mobilisation [7].

TJR in growing patients remains controversial because the prosthesis cannot grow and long-term implant survival is uncertain [7]; an interdisciplinary German guideline still regards alloplastic reconstruction in children as experimental [8]. Nevertheless, an international survey of 14 skeletally immature patients receiving 24 prostheses reported improved function without reported asymmetric growth or retrognathia [9], and small series and case reports describe stable gains after TJR for paediatric ankylosis [10–12]. In a systematic review of 73 growing patients, however, all had undergone multiple previous operations before TJR [13].

Evidence specific to JIA is limited. Brown et al. reported 20 patients in whom maximum interincisal opening (MIO) increased from 33.5 to 44 mm [14]; Hechler and Matthews

described five adolescents and young adults with a mean gain of 24 mm [15]; and Lypka et al. reported nine joints in five adolescent females, with one delayed *Cutibacterium acnes* infection requiring explantation [16]. Several reported patients, including the 42 described by Wolford and Kesterke, underwent simultaneous orthognathic surgery, and most were not ankylosed [16, 17].

The present series addresses a narrowly defined problem: children with systemic JIA and severe, painful Sawhney type III ankylosis with complete condylar destruction, treated with TJR as the primary reconstruction and without orthognathic surgery. The purpose was to describe the clinical decision-making, surgical management and short- to intermediate-term outcomes in this high-risk subgroup.

## Materials and methods

### *Study design and patients*

This retrospective case series was conducted in the Division of Oral and Maxillofacial Surgery, Centre for Dental Education and Research, All India Institute of Medical Sciences (AIIMS), New Delhi. This retrospective case series of routine clinical care is not a clinical trial and was therefore not registered in a clinical trial registry. Patients were identified from the institutional TJR database, with follow-up censored on 31 August 2026. Inclusion criteria were JIA diagnosed according to ILAR criteria [1]; age ≤18 years in boys or ≤15 years in girls at surgery, used as a pragmatic definition of skeletal immaturity [13]; severe TMJ pain and restricted opening; CT- or CBCT-confirmed Sawhney type III ankylosis; and treatment with alloplastic TJR. Three consecutive patients (four joints) met these criteria. None had previous TMJ surgery or concomitant orthognathic surgery. The Institutional Ethics Committee, AIIMS, New Delhi, approved the study (IEC-942/13.01.2023), which was conducted in accordance with the Declaration of Helsinki. Written informed consent for treatment and for publication of clinical

information and images was obtained from parents or legal guardians, with patient assent. The report was prepared with reference to the CARE guidelines.

### *Clinical and radiographic assessment*

MIO was measured between the incisal edges of the maxillary and mandibular central incisors. TMJ pain was scored on a 0–10 visual analogue scale (VAS), and diet was classified as liquid, soft or regular. Occlusion, facial asymmetry and mandibular retrognathia were assessed clinically. Ankylosis was evaluated with computed tomography (CT) or cone-beam CT (CBCT) and graded according to Sawhney. All patients were co-managed with paediatric rheumatology; disease activity was recorded from the clinical rheumatology assessment, as a formal Juvenile Arthritis Disease Activity Score was not available.

### *Prosthesis selection*

Prosthesis type was determined by CT-derived ramal anatomy. Patients 1 and 3 had short rami that precluded a stock device and received patient-specific prostheses designed with virtual surgical planning and custom cutting guides [18]. In Patient 2, fit of a stock prosthesis (Zimmer Biomet Microfixation, Jacksonville, FL, USA; small fossa) was confirmed on CBCT and a three-dimensional printed model [19]. Fossa components were ultra-high-molecular-weight polyethylene and mandibular components titanium alloy (Ti-6Al-4V). The interval from CT to surgery was 4 weeks.

### *Surgical technique*

After fibreoptic nasotracheal intubation, the ankylosed joint was exposed through an endaural (Patient 1, bilaterally) or preauricular approach and the ramus through a modified retromandibular (Patient 1) or submandibular approach. The ankylotic mass was resected to create a 15 mm gap, and coronoidectomy was performed ipsilaterally, or bilaterally in the bilateral case [4]. MIO was measured after release. With the occlusion held by direct

intermaxillary wiring, the fossa component was fixed to the zygomatic arch with 2.0 × 6 mm screws and the mandibular component to the ramus with 2.4 × 10 mm screws. Autogenous fat was packed around the articulation—abdominal fat in Patients 1 and 3 and pedicled buccal fat pad in Patient 2 [20, 21]. Wounds were closed over suction drains. Blood loss was under 100 mL in every patient, and none required transfusion.

### *Perioperative management and follow-up*

By institutional practice agreed with the rheumatology team, systemic disease-modifying and biologic therapy was withheld for 3 months before and after implantation; this was not a validated infection-prevention protocol. Intravenous ceftriaxone and clindamycin were given for 7 days. Trismus-screw exercises began on postoperative day 1 and continued for 6 months. Follow-up included MIO, VAS pain, diet, occlusion, facial nerve function and prosthesis-related complications, with orthopantomography and CBCT at 1 year.

### *Data analysis*

Because only three patients were included, outcomes were analysed descriptively as individual values, means and ranges; no inferential statistics were performed.

## Results

### *Patient characteristics*

Three patients (two male, one female) aged 9, 13 and 14 years (mean 12.0) underwent TJR of four joints: one bilateral and two unilateral (Table 1). All had polyarticular systemic JIA, seronegative for rheumatoid factor, antinuclear antibody and HLA-B27, with a disease duration of 5–8 years (mean 7.0) and active disease at the time of surgery. Patient 1 had received naproxen, hydroxychloroquine and methotrexate and had marked hand deformity (Fig. 1d); Patients 2 and 3 were receiving intravenous tocilizumab every 2 weeks with weekly methotrexate. Restricted opening had progressed over 2–6 years (mean 4.0). All joints showed

Sawhney type III ankylosis with complete condylar destruction, antegonial notching and coronoid elongation; the contralateral joints of Patients 2 and 3 showed mild articular changes. Mean operating time was 4 h 17 min (range 3 h 55 min to 4 h 50 min), and mean hospital stay was 8.3 days (range 8–9) (Table 2).

***Case presentations***

**Patient 1**

A 13-year-old boy with systemic JIA diagnosed at 8 years, with polyarticular involvement of the shoulders, elbows, knees, ankles and small joints of the hands and feet (Fig. 1d), had been treated with naproxen, hydroxychloroquine and methotrexate. Restricted opening began at 9 years and progressed over 4 years to an MIO of 4 mm (Fig. 1a), with bilateral TMJ pain (VAS 8), a soft diet, mandibular retrognathia and a mild anterior open bite. CT showed bilateral Sawhney type III ankylosis with complete condylar destruction, short rami, antegonial notching and coronoid elongation (Fig. 1b). He underwent single-stage bilateral patient-specific TJR (Fig. 1c) through endaural and modified retromandibular approaches, with bilateral coronoidectomy and abdominal fat grafting; intraoperative MIO was 34 mm and operating time 4 h 50 min. The retrognathia was deliberately left uncorrected. Facial nerve function was preserved, and he was discharged on day 8. At 30 months, MIO was 31 mm (Fig. 1h), he was pain-free on a regular diet, and occlusion was stable. CBCT at 1 year showed both components in position without loosening, heterotopic ossification or re-ankylosis (Fig. 1e–g).

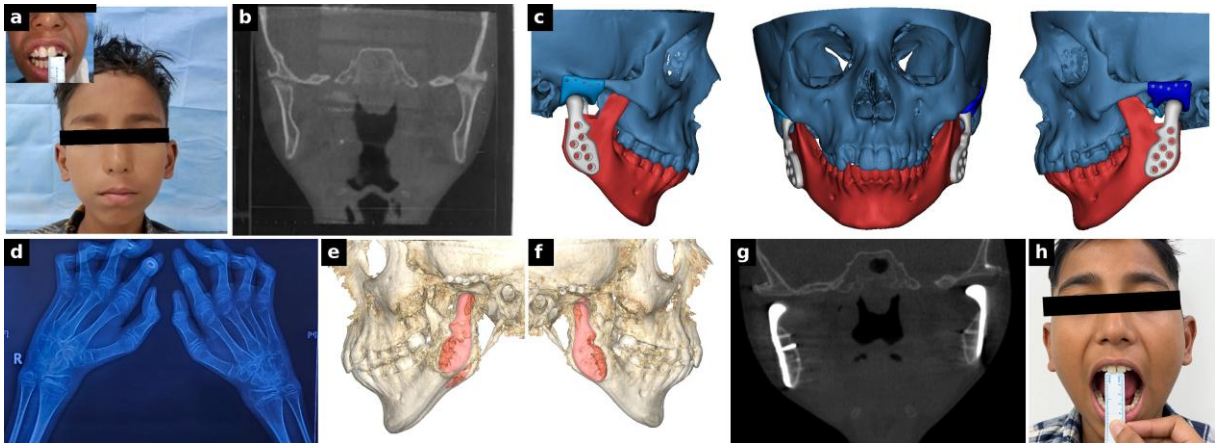



**Fig. 1** Patient 1 (13-year-old boy, bilateral ankylosis). **a** Preoperative mouth opening of 4 mm (inset, intraoral view). **b** Preoperative coronal CT showing bilateral Sawhney type III ankylosis. **c** Virtual surgical plan with bilateral patient-specific components. **d** Hand radiograph showing polyarticular deformity. **e, f** Three-dimensional CBCT reconstructions at 1 year with the mandibular components segmented in red. **g** Coronal CBCT at 1 year showing both prostheses in position. **h** Mouth opening of 31 mm at 30 months

**Patient 2**

A 14-year-old boy with systemic JIA diagnosed at 6 years, involving the knees, ankles, hands and feet and treated with intravenous tocilizumab every 2 weeks and weekly methotrexate, presented with severe left TMJ pain (VAS 7) and an MIO of 5 mm (Fig. 2a) after 6 years of progressive restriction. CBCT showed left Sawhney type III ankylosis with complete condylar destruction, antegonial notching and coronoid elongation, with adequate ramal height; the right joint showed mild articular changes (Fig. 2b). Stock-prosthesis fit was confirmed on a three-dimensional printed model (Fig. 2c, d), and a left stock TJR was performed through preauricular and submandibular approaches with ipsilateral coronoidectomy and buccal fat pad interposition (intraoperative MIO 36 mm; operating time 3 h 55 min). Transient weakness of the temporal branch of the left facial nerve resolved completely by 15 weeks. At 26 months, MIO was 32 mm (Fig. 2g), with no pain, a regular diet and stable occlusion; imaging at 1 year showed the prosthesis in position without complications (Fig. 2e, f).

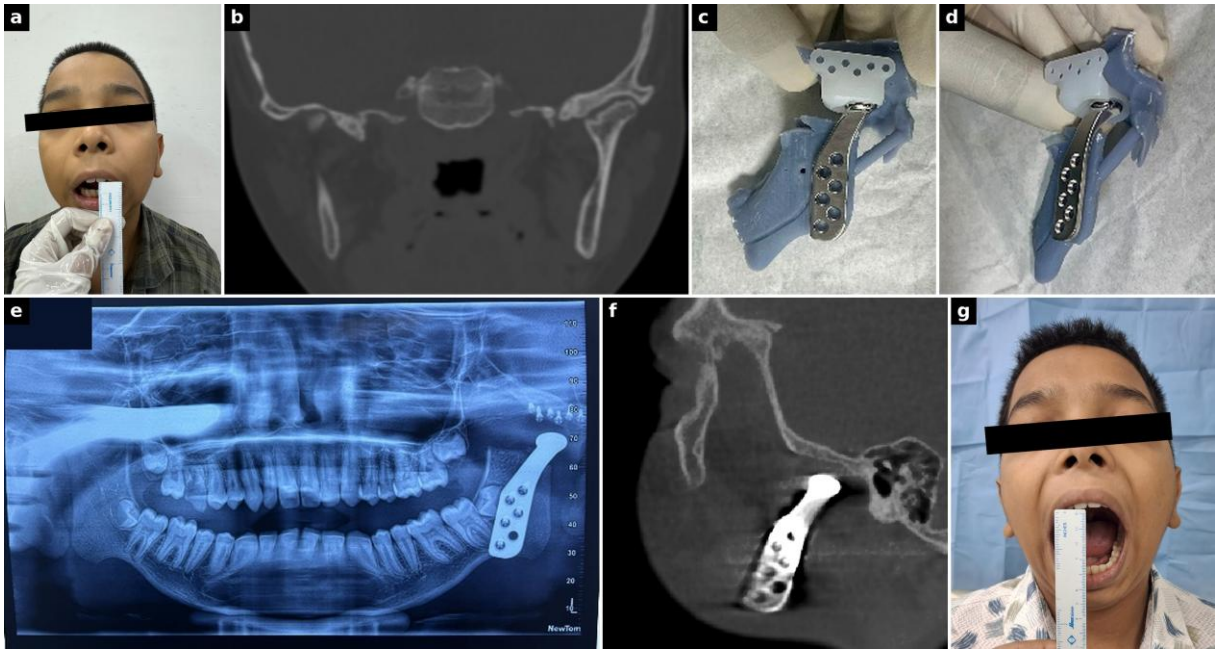



**Fig. 2** Patient 2 (14-year-old boy, left ankylosis). **a** Preoperative mouth opening of 5 mm. **b** Preoperative coronal CBCT showing left Sawhney type III ankylosis. **c, d** Fit of the stock prosthesis confirmed on a three-dimensional printed model. **e** Orthopantomogram at 1 year. **f** Sagittal CBCT at 1 year showing the prosthesis in position. **g** Mouth opening of 32 mm at 26 months

**Patient 3**

A 9-year-old girl with systemic JIA diagnosed at 1 year, involving the hips, knees, ankles and hands and treated with intravenous tocilizumab every 2 weeks and weekly methotrexate, presented with severe right TMJ pain (VAS 9) and an MIO of 6 mm (Fig. 3a) after 2 years of progressive restriction. CT showed right Sawhney type III ankylosis with complete condylar destruction and a short ramus; the left joint showed mild articular changes (Fig. 3b). A right patient-specific TJR (Fig. 3c, d) was performed through preauricular and submandibular approaches with ipsilateral coronoidectomy and abdominal fat grafting (intraoperative MIO 33 mm; operating time 4 h 05 min). Transient weakness of the temporal branch of the right facial nerve resolved completely by 18 weeks. At 12 months, MIO was 34 mm (Fig. 3g), she was

pain-free on a regular diet with stable occlusion, and CBCT showed the component in position without heterotopic bone or re-ankylosis (Fig. 3e, f).

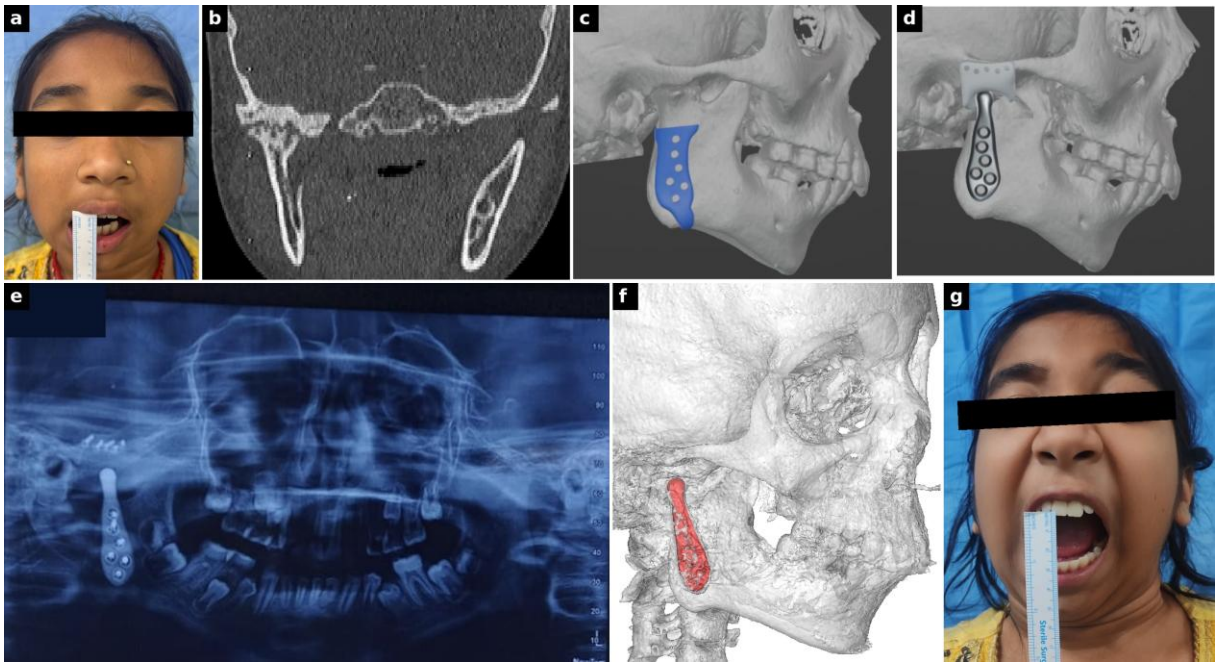



**Fig. 3** Patient 3 (9-year-old girl, right ankylosis). **a** Preoperative mouth opening of 6 mm. **b** Preoperative coronal CT showing right Sawhney type III ankylosis. **c, d** Virtual surgical plan with patient-specific components. **e** Immediate postoperative orthopantomogram. **f** Three-dimensional CBCT reconstruction at 1 year with the mandibular component segmented in red. **g** Mouth opening of 34 mm at 12 months

### *Clinical outcomes*

Mean MIO increased from 5.0 mm (range 4–6) preoperatively to 34.3 mm (range 33–36) intraoperatively and 32.3 mm (range 31–34) at the latest follow-up, a mean gain of 27.3 mm (range 27–28) (Table 2). Mean VAS pain fell from 8.0 (range 7–9) to 0 in all patients, and all progressed from a soft to a regular diet. Occlusion remained stable; the mild anterior open bite in Patient 1 did not worsen, and no patient developed new facial asymmetry. Transient weakness of the temporal branch of the facial nerve occurred in Patients 2 and 3 and recovered completely at 15 and 18 weeks. Over a mean follow-up of 22.7 months (range 12–30), there

was no prosthetic joint infection, wound dehiscence, dislocation, postoperative malocclusion or revision.

***Radiographic outcomes***

Orthopantomography and CBCT at 1 year showed satisfactory component position in all patients, with no screw loosening or migration, heterotopic ossification or re-ankylosis (Figs 1e–g, 2e, f and 3f; Table 3). The clinical course of each patient, from diagnosis of JIA to latest review, is summarised in Table 4.

## Discussion

The principal observation from this series is that TJR can be used as the primary reconstruction in children with systemic JIA whose TMJs have progressed to severe, painful, end-stage ankylosis. After single-stage release, coronoidectomy, fat interposition and TJR, MIO increased by a mean of 27.3 mm, pain resolved and all patients returned to a regular diet. These findings are descriptive and cannot establish efficacy or superiority over alternative reconstructions.

The indication for TJR was irreversible joint destruction, not JIA itself. Early recognition of TMJ involvement and control of inflammation remain fundamental [3]. Active systemic disease, present in all three patients, should not be equated with active TMJ arthritis, which is best established by clinical assessment and contrast-enhanced magnetic resonance imaging [3]. Once the condyle has been destroyed and ankylosis has developed, the objective changes to restoration of movement and a stable articulation.

A CCG remains an important alternative in growing children, but its growth potential is also its principal limitation. In a 10-year series of 55 children receiving 74 CCGs, 58.2% had at least one complication, with re-ankylosis in 32.7% and overgrowth in 16.4%, and the authors advised caution in ankylosed joints [5]. A systematic review of CCG reconstruction for

ankylosis in young patients likewise found re-ankylosis, overgrowth, deficient growth and facial asymmetry to be frequent long-term problems [6], and a comparative series found no significant difference in outcome between gap arthroplasty, CCG and TJR [22]. These data do not make CCG contraindicated in JIA, but they highlight the uncertainty of placing a living graft in an inflammatory environment. An interdisciplinary guideline still regards alloplastic reconstruction in children as experimental [8]; our patients, with complete condylar destruction and type III ankylosis, represent the exceptional end of the spectrum. TJR provides no growth, but offers a stable mechanical articulation that is not itself biologically active. Moreover, in the systematic review by Khattak et al., all growing patients had undergone multiple previous operations—up to 17—before TJR [13]; using TJR as the primary procedure avoided the cumulative scarring and heterotopic bone of revision surgery.

Final MIO (mean 32.3 mm) was lower than in the JIA series of Brown et al. (43–44 mm) [14], Hechler and Matthews (>35 mm) [15] and Lypka et al. (37 mm) [16], but those patients were largely not ankylosed and started from 31–34 mm. The mean gain of 27.3 mm is comparable to or greater than that of Hechler and Matthews (24 mm) [15] and of TJR series for ankylosis: 7.4 to 24 mm in five skeletally immature patients [10], 14.5 to 35 mm in 32 patients [21] and 0.6 to 25 mm in five patients [18]. The small loss from intraoperative to final opening reflects soft-tissue adaptation after years of restriction and underlines the need for sustained physiotherapy.

Prosthesis selection was determined by anatomy rather than an assumption that every child requires a custom device. In a CT study of 71 ankylosed joints from our centre, only about 20% could accept a stock prosthesis without compromise, chiefly because of short rami [19]. Short rami dictated patient-specific devices in Patients 1 and 3, whereas Patient 2, with adequate ramal dimensions, received a stock device and achieved an equivalent outcome. Stock TJR

with fat grafting has produced good results in adult ankylosis at our centre [20, 23], and may be an affordable option in selected older children, although one case cannot establish this.

The principal concern with TJR in children is growth [7]. Previous reports in growing patients have not shown a consistent signal of progressive asymmetry or retrognathia [9–11], but the evidence is limited and heterogeneous. The present study cannot address growth, because skeletal maturity was not assessed with a radiographic maturation index and serial cephalometric analysis was not available; the results should not be interpreted as evidence that TJR is growth-neutral. In Patient 1, the retrognathia and mild open bite were deliberately not corrected, because the immediate aim was to release the ankylosis and restore movement; the residual deformity will be reassessed after growth. This also strengthens interpretation of the functional outcome, which did not depend on orthognathic correction, unlike several previous JIA series [16, 17].

Infection is an important concern in immunosuppressed children receiving a permanent prosthesis; two of our patients were receiving the interleukin-6 receptor antagonist tocilizumab, and Lypka et al. reported a delayed *C. acnes* infection requiring explantation [16]. No infection occurred here, but the sample is far too small to support conclusions about infection risk or about the institutional medication-withholding and antibiotic regimen, which was individualised with rheumatology and should not be taken as a universal recommendation. Similarly, the absence of heterotopic ossification and re-ankylosis cannot establish the efficacy of fat grafting [20, 21]. Transient temporal-branch weakness in two patients resolved fully, consistent with the two transient palsies among five patients reported by Lypka et al. [16].

### *Limitations*

The main limitations are the retrospective design, three-patient sample, mixed use of patient-specific and stock prostheses, and follow-up of 12–30 months. Skeletal maturity was defined by age, serial cephalometric growth analysis was unavailable, and mandibular excursions,

interim MIO measurements and standardised patient-reported outcomes were not consistently recorded. Longer follow-up is needed to determine implant longevity, growth-related skeletal change and the need for secondary surgery.

## Conclusion

In carefully selected children with systemic JIA and irreversible end-stage TMJ ankylosis, single-stage TJR with ankylosis release, coronoidectomy and fat interposition was associated with substantial restoration of opening, resolution of pain and a return to a regular diet over 12–30 months. The choice between autogenous and alloplastic reconstruction should be individualised according to the extent of joint destruction, inflammatory disease status, mandibular anatomy and anticipated growth, and long-term surveillance through skeletal maturity is essential.

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## Statements and Declarations

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**Competing interests** The authors have no relevant financial or non-financial interests to disclose.

**Author contributions** AR conceived the study, secured funding with KB, provided resources, and supervised and administered the project. SSD, DN and KB developed the methodology. SSD and DN collected and curated the clinical and radiographic data, carried out the investigation, and performed the formal and software-based analyses, with KB contributing to the analysis. AR, SSD and KB validated the results and prepared the figures. The first draft of the manuscript was written by AR, SSD and DN, and all authors critically revised it for important intellectual content. All authors read and approved the final manuscript and agree to be accountable for all aspects of the work.

**Ethics approval** This study was performed in line with the principles of the Declaration of Helsinki. Approval was granted by the Institutional Ethics Committee, All India Institute of Medical Sciences, New Delhi (IEC-942/13.01.2023).

**Consent to participate** Written informed consent was obtained from the parents or legal guardians of all patients, with assent from the patients.

**Consent to publish** The parents or legal guardians of all patients signed informed consent for publication of clinical data and images.

**Data availability** The data supporting this study are available from the corresponding author on reasonable request, subject to institutional ethical and privacy requirements.

A**I disclosure:** Not Applicable.

## Table 1. Patient characteristics

| | Patient 1 | Patient 2 | Patient 3 |
|---|---|---|---|
| Sex / age at TJR (years) | Male / 13 | Male / 14 | Female / 9 |
| Age at JIA diagnosis (years) | 8 | 6 | 1 |
| JIA duration at TJR (years) | 5 | 8 | 8 |
| JIA category (ILAR) | Systemic | Systemic | Systemic |
| RF / ANA / HLA-B27 | Negative | Negative | Negative |
| Other joints involved | Shoulders, elbows, knees, ankles, hands, feet | Knees, ankles, hands, feet | Hips, knees, ankles, hands |
| Systemic treatment | Naproxen, hydroxychloroquine, methotrexate | Tocilizumab IV 2-weekly, methotrexate weekly | Tocilizumab IV 2-weekly, methotrexate weekly |
| Systemic corticosteroids | None | None | None |
| Disease activity at TJR | Active | Active | Active |
| Restricted opening before TJR (years) | 4 | 6 | 2 |
| Previous TMJ treatment / surgery | None | None | None |
| Ankylosed joint(s) | Bilateral | Left | Right |
| Preoperative MIO (mm) / pain VAS | 4 / 8 | 5 / 7 | 6 / 9 |
| Preoperative diet | Soft | Soft | Soft |
| Preoperative occlusion | Mild anterior open bite; retrognathia | Stable | Stable |

ANA, antinuclear antibody; ILAR, International League of Associations for Rheumatology; IV, intravenous; JIA, juvenile idiopathic arthritis; MIO, maximum interincisal opening; RF, rheumatoid factor; TJR, total joint replacement; VAS, visual analogue scale (0–10).

## Table 2. Surgical details and clinical outcomes

| | Patient 1 | Patient 2 | Patient 3 |
|---|---|---|---|
| Joints replaced | 2 (bilateral) | 1 (left) | 1 (right) |
| Prosthesis (reason) | Patient-specific (short rami) | Stock, Zimmer Biomet small (fit feasible) | Patient-specific (short ramus) |
| Virtual planning / cutting guides | Yes / yes | No / no | Yes / yes |
| Fossa / ramus approach | Endaural / modified retromandibular | Preauricular / submandibular | Preauricular / submandibular |
| Coronoidectomy | Bilateral | Ipsilateral | Ipsilateral |
| Interpositional fat | Abdominal | Buccal fat pad | Abdominal |
| Operating time / hospital stay | 4 h 50 min / 8 days | 3 h 55 min / 8 days | 4 h 05 min / 9 days |
| MIO (mm): preoperative / intraoperative / latest | 4 / 34 / 31 | 5 / 36 / 32 | 6 / 33 / 34 |
| Gain in MIO (mm) | 27 | 27 | 28 |
| Pain VAS: preoperative → latest | 8 → 0 | 7 → 0 | 9 → 0 |
| Diet: preoperative → latest | Soft → regular | Soft → regular | Soft → regular |
| Follow-up (months) | 30 | 26 | 12 |
| Complications | None | Transient temporal-branch weakness; recovered at 15 weeks | Transient temporal-branch weakness; recovered at 18 weeks |
| Revision | None | None | None |

MIO, maximum interincisal opening; VAS, visual analogue scale (0–10). Follow-up censored on 31 August 2026.

## Table 3. Radiographic findings

| | Patient 1 | Patient 2 | Patient 3 |
|---|---|---|---|
| Preoperative imaging | CT | CBCT | CT |
| Sawhney type (right / left) | III / III | – / III | III / – |
| Condylar destruction | Complete | Complete | Complete |
| Antegonial notching / coronoid elongation | Present / present | Present / present | Present / present |
| Contralateral joint | Ankylosed | Mild articular changes | Mild articular changes |
| Postoperative imaging | OPG and CBCT at 1 year | OPG and CBCT at 1 year | OPG and CBCT at 1 year |
| Component position | Satisfactory | Satisfactory | Satisfactory |
| Screw loosening / migration | None | None | None |
| Heterotopic ossification / re-ankylosis | None / none | None / none | None / none |

CBCT, cone-beam computed tomography; CT, computed tomography; OPG, orthopantomogram.

## Table 4. Clinical timeline

| | Patient 1 | Patient 2 | Patient 3 |
|---|---|---|---|
| JIA diagnosis (age) | 8 years | 6 years | 1 year |
| Onset of restricted opening (age) | 9 years | 8 years | 7 years |
| Systemic therapy withheld | 3 months pre- to 3 months post-TJR | 3 months pre- to 3 months post-TJR | 3 months pre- to 3 months post-TJR |
| CT to surgery | 4 weeks | 4 weeks | 4 weeks |
| TJR (age); MIO pre → intra-op | 13 years; 4 → 34 mm | 14 years; 5 → 36 mm | 9 years; 6 → 33 mm |
| Physiotherapy | Day 1 to 6 months | Day 1 to 6 months | Day 1 to 6 months |
| Facial nerve recovery | Not applicable | 15 weeks | 18 weeks |
| 1-year OPG and CBCT | Stable | Stable | Stable |
| Latest review (months); MIO | 30; 31 mm | 26; 32 mm | 12; 34 mm |

CBCT, cone-beam computed tomography; MIO, maximum interincisal opening; OPG, orthopantomogram; TJR, total joint replacement.

## Supplementary Files

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