

Patient-centered quality of life measures after alloplastic temporomandibular joint replacement surgery

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Abstract. The purpose of this study was to evaluate patient-reported outcome measures of quality of life (QoL) for patients with end-stage temporomandibular joint (TMJ) disease who have undergone TMJ prosthetic replacement. The records of 36 patients who had undergone alloplastic total joint replacement procedures were analyzed. Patients were treated using either TMJ Concepts or Biomet/Lorenz prosthetics. Patients were asked to complete a 12-item TMJ-S-QoL survey, which encompassed questions pertaining to pain, speech, chewing function, and various aspects of social life and mental health. The questions were answered on a 5-point scale. Data were analyzed using the Wilcoxon signed-rank test. Among the 36 patients (six male and 30 female), 18 responded to the survey. Markers of QoL after surgery were compared to the preoperative period. Significant improvements were reported for pain (94.4% of patients), chewing (83.3% of patients), speech (55.6% of patients), anxiety (72.2% of patients), activity (66.7% of patients), recreation (61.1% of patients), and mood (66.7% of patients) (all $P < 0.05$). TMJ prosthetic replacement significantly enhanced QoL among patients suffering from chronic pain, limited range of motion, anxiety, impaired speech, and chewing due to end-stage TMJ disease in this sample of surgical patients.

Key words: temporomandibular joint; alloplastic; replacement; total joint prosthesis; quality of life.

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End-stage joint disease refers to a joint that is negatively affected architecturally by disease or injury to the point that severe functional impairment is the final result for the patient.¹ Generally considered a biomechanical solution to end-stage temporomandibular joint (TMJ) disease,

TMJ reconstruction refers to surgical procedures that involve reconstruction of both the condyle and the fossa segments. Indications for TMJ reconstruction include bony ankylosis, previously failed reconstruction, post-traumatic irreparable condylar injury, post-tumor reconstruction,

severe inflammatory joint disease that has failed conservative measures, and congenital–developmental abnormalities.^{2–4}

Several techniques have been described for TMJ reconstruction, including autogenous bone grafting and alloplastic replacement. An ideal total

joint reconstruction – autogenous or alloplastic – is defined as one that mimics the form and the function of the original joint it replaces.⁵ Of all autogenous donor sites, the costochondral bone graft has been most frequently used in TMJ reconstruction because of its gross anatomical similarity to the mandibular condyle, ease of harvest, and ease of adaptation to the recipient site. Although successfully utilized and well described by several authors for use in TMJ reconstruction, costochondral bone grafts have also been associated with several disadvantages, which include the growth potential in adult patients, ankylosis, and donor site morbidity.^{6,7} Recently, alloplastic TMJ replacement has become an increasingly popular alternative to autogenous grafting by virtue of its inherent characteristics, which include biocompatibility, reduced intraoperative surgical time, immediate function, maintenance of stable occlusion, lack of donor site morbidity, and improved predictability.^{2,4,8}

Alloplastic TMJ replacement systems are currently produced as stock or custom implants.⁹ A stock device is a standard prefabricated design, which comes in different sizes and has the advantage of being readily available. A custom-made device is fabricated to match the patient's individual anatomy using computer-aided systems, and often does not require reshaping of the host bone. Regardless of the system utilized, the goals of any TMJ replacement procedure are to improve function and form, reduce suffering, reduce excessive treatment, and prevent further morbidity while increasing the patient's quality of life (QoL).^{2,10}

Alloplastic total joint replacement (TJR) procedures have been shown to reduce mandibular motion, reduce pain levels, and minimize diet restriction while improving the patient's ability to carry out normal life activities. Several authors have previously reported the successful application of alloplastic devices, not only by assessing and measuring improved function and facial form, but also by assessing the reduction in pain and disability and the improvement in QoL. Mercuri et al. assessed a customized computer-aided design and manufacture (CAD/CAM)-based total TMJ reconstruction system in a sample of patients.² Based on objective (e.g., maximum inter-incisal opening) and subjective (e.g., pain, mandibular function, diet consistency, QoL) outcomes, they reported 30% improvement in mandibular range of motion, 71% reduction in pain scores, 62% increase in mean mandibular

function, and 60% improvement in mean diet consistency scores. Long-term QoL scores revealed that 85% of patients showed improvement from the baseline levels. Chase et al. also reported a significant improvement in function (86% had an increased ability to eat and 91% had an increased maximum inter-incisal opening) and reduction in pain levels (95% of patients).¹¹

The purpose of the present study was to evaluate outcome measures of QoL among patients who have undergone alloplastic, unilateral or bilateral TMJ replacement surgery. It was hypothesized that alloplastic TJR procedures improve functionality and QoL in end-stage TMJ disease.

Materials and methods

This study was approved by the necessary institutional review board. This was a single-institution, retrospective report of patients with end-stage TMJ disease treated with alloplastic TJR by the same surgeon. Electronic and paper medical records of patients who had undergone unilateral or bilateral alloplastic TJR procedures were reviewed. All patients were treated using either TMJ Concepts (TMJ Concepts Inc., Ventura, CA, USA) or Biomet/Lorenz (Biomet Microfixation Inc., Jacksonville, FL, USA) prosthetics. Subjects were included in the study if they had undergone unilateral or bilateral TMJ reconstruction with a total joint prosthesis, and were excluded if they did not have adequate follow-up of at least 1 year or had undergone concomitant surgery such as orthognathic procedures.

Patients were asked to complete a 12-item QoL survey. The survey used

was the TMJ-S-QoL questionnaire, which was developed by Dimitroulis et al. in 2010 as a TMJ-specific adaptation of the University of Washington UW-QoL-R questionnaire.^{12,13} The questionnaire compares preoperative and postoperative states encompassing questions pertaining to speech, pain, chewing function, and various aspects of social life and mental health. The questions were answered on a 5-point scale (1 = excellent to 5 = poor). The data were collected at clinic visits, through the mail, and through direct patient contact via telephone calls when required.

Paired pre- and post-surgery data were statistically analyzed using the Wilcoxon signed-rank test with significance set at $P < 0.05$. All data were analyzed using IBM SPSS Statistics version 20.0 (IBM Corp., Armonk, NY, USA).

Results

Thirty-six patients (six male and 30 female) met the inclusion criteria and were included in the study. Among these patients, 18 (50%) responded to the survey. The remaining patients did not respond after a mailed letter and three separate phone call attempts. The patients who responded ranged in age from 24 to 78 years. These patients had a total of 31 individual joints replaced; 13 patients had bilateral joints replaced and five had unilateral joints replaced (Table 1).

Seventeen patients (94.4%) reported improvement in pain measures. The difference was statistically significant ($P < 0.05$). Similarly, diet consistency and chewing improved significantly, as 15 patients (83.3%) expressed improved

Table 1. Data regarding age, sex, type of prosthesis, and laterality for the 18 study patients.

	Age, years	Sex	Type of prosthesis	Laterality
1	78	F	Biomet	BL
2	63	F	Biomet	R
3	50	F	Biomet	BL
4	30	M	Biomet	R
5	63	F	Biomet	R
6	58	F	Biomet	BL
7	45	M	Biomet	BL
8	56	F	Biomet	R
9	37	F	Biomet	BL
10	55	F	Biomet	BL
11	24	F	Concepts	BL
12	29	F	Biomet	R
13	53	F	Concepts	BL
14	30	F	Biomet	BL
15	58	F	Concepts	BL
16	29	F	Biomet	BL
17	61	F	Biomet	BL
18	51	F	Biomet	BL

F, female; M, male; BL, bilateral; R, right.

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