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Clinical Paper
TMJ Disorders

Temporomandibular joint replacement: a New Zealand perspective

B. Murdoch[1], J. Buchanan[2], J. Cliff[3]
[1]Broadway Surgical Clinic, Palmerston North, New Zealand; [2]Middlemore Hospital, Auckland, New Zealand; [3]Palmerston North Hospital, MidCentral DHB, Palmerston North, New Zealand

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Abstract. Alloplastic total temporomandibular joint replacement (TMJ TJR) has been performed in New Zealand utilizing the TMJ Concepts patient-fitted system since 2000. The data analysed in this study were collected retrospectively from questionnaires sent to all maxillofacial surgeons in New Zealand who had implanted TMJ Concepts devices between 2000 and 2011. A total of 63 devices were implanted in 42 patients (13 males, 29 females) during this 12-year period. The primary indication for TMJ TJR was end-stage joint disease resulting from ankylosis and arthritis. The mean age of the patients was 47 years (range 7–80 years). The most common complication reported was transient facial nerve impairment in 4.8% of the patients. Objective results, measured as the maximal incisional opening, improved by a mean of 17.3 mm ($P < 0.01$); 90% of patients reported improved quality of life. New Zealand oral and maxillofacial surgeons have concluded that TMJ TJR using the TMJ Concepts prosthesis is a reliable treatment option for the management of end-stage TMJ disease.

Key words: TMJ; alloplastic; replacement; end-stage joint disease.

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Total temporomandibular joint (TMJ) alloplastic replacement (TMJ TJR) is a biomechanical solution rather than a biological answer to the management of severe joint disease. The TMJ Concepts system was designed to manage a specific group of patients with end-stage TMJ disorders (Table 1).

The ideal total joint reconstruction, autogenous or alloplastic, is one that closely mimics the form and function of the original joint it replaces. Successful alloplastic joint replacement has been well documented in the orthopaedic literature.[1] A 14-year follow-up after TMJ TJR with TMJ Concepts devices concluded that this system was a safe, effective, and reliable long-term management option for the patients studied.[2]

The goals of TMJ reconstruction are to improve function and form, reduce suffering, contain excessive treatment, and prevent further morbidity.[3] Therefore, clinicians employing such devices should monitor these cases for long-term safety and effectiveness.[4,5] The purpose of this article is to present the demographics, indications for placement, and outcomes of patients implanted with this joint replacement system over a 12-year period in New Zealand.

Materials and methods

Questionnaires were sent to all maxillofacial surgeons in New Zealand who had implanted TMJ Concepts devices between 2000 and 2011. The retrospective data collected from returned surveys were recorded on an Excel database (Microsoft, Redmond, WA, USA). Age, sex, side of the TMJ replaced, indication for joint replacement, use of autogenous fat graft, and intraoperative adverse events were recorded. Objective data included the maximal incisal opening (MIO) recorded in millimetres. Pain was measured on a visual analogue scale (VAS). This score

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was measured as 0 = no pain, to 10 = severest pain. Inclusion of the VAS score and MIO was considered valid if recorded at a presurgical baseline and at a postsurgical follow-up.

Quality of Life (QOL) data were recorded on a point scale: 0 = much better, 1 = better, 2 = the same, 3 = worse, and 4 = much worse. This scale has been described previously by Mercuri et al.[2] The score converts a patient's reported overall QOL post implant to a subjective outcome variable.

The statistical analysis was performed using SPSS version (SPSS Inc., Chicago, IL, USA). Following the computation of descriptive data, the paired *t*-test was used to evaluate the means of presurgical and postsurgical databases. A probability level of $P < 0.05$ was considered statistically significant.

Results

A total of 46 survey questionnaires were sent out, of which 42 (91%) were returned completed. Over the 12-year study period these 42 patients had 63 devices placed (21 unilateral and 21 bilateral) (Tables 2 and 3). Of the surveys returned, 29 (69%) were completed for female patients with a mean age of 46.1 years (standard deviation (SD) 10.9, range 22–67 years), and 13 (31%) were completed for male patients with a mean age of 49.5 years (SD 21.3, range 7–80 years) (Table 4). Joints were placed at six locations in New Zealand; 22 (52%) patients were treated at a single surgical location (Fig. 1). The mean follow-up time was 43 months (SD 35, range 1–135 months).

The primary indications for TMJ TJR were recurrent fibrous or bony ankylosis not responsive to other management modalities, reported for 17 (40%) patients, followed by inflammatory arthritis, in 16 (38%) patients. Thirty (71%) patients had more than one indication for surgery. Twenty-one (33%) patients had fulfilled three indications for surgery. Trauma ($n = 16$, 38%) and osteoarthritis ($n = 15$, 36%) were the main causes of end-stage disease (Table 5). Thirty-one (74%) patients had placement of an autogenous fat graft.

There were no operative complications for 54 (86%) devices placed. Three cases by device (4.8%) resulted in temporary impairment of the zygomatic branch of the facial nerve. Two patients (3.6%) had two or more adverse events (Table 6).

QOL scores were valid for 33 (79%) patients (Table 7). The mean QOL score was 0.74 (SD 0.71). Thirty (90%) of these patients reported a better or much better QOL score.

The VAS score for pain had improved post placement of the TMJ prosthesis and was significant. The mean improvement relative to baseline was 6.6 (95% confidence interval 5.8–7.4; $P < 0.001$).

Thirty (71%) of the patients had data recorded for MIO, with the mean increasing significantly by 17.3 mm (95% confidence interval 13.4–21.1; $P < 0.01$).

Table 1. Indications for alloplastic total temporomandibular joint replacement.

1. Inflammatory arthritis of TMJ not responsive to other modalities of treatment
2. Recurrent fibrous and/or bony ankylosis not responsive to other modalities of treatment
3. Failed tissue grafts
4. Failed alloplastic TMJ reconstruction
5. Loss of vertical mandibular height and/or occlusal relationship due to bone resorption, trauma, developmental abnormality, or pathological lesion

TMJ, temporomandibular joint.

Table 2. Patient numbers over time, by prosthesis placement and location.

	2000–2005	2006–2011	Combined, 2000–2011
Side			
Unilateral	6	15	21
Bilateral	5	16	21
Location			
Auckland	2	6	8
Hamilton	3	4	7
New Plymouth	0	1	1
Hawke's Bay	0	2	2
Palmerston North	6	16	22
Dunedin	0	2	2
Total	11	31	42

Table 3. Number of devices placed over time by joint surgery type.

Year	Surgery		Total
	Bilateral	Unilateral	
2000	0	1	1
2001	0	2	2
2002	2	1	3
2003	4	1	5
2004	2	1	3
2005	2	0	2
2006	0	1	1
2007	4	2	6
2008	8	5	13
2009	8	1	9
2010	4	3	7
2011	8	3	11
Total	42	21	63

Table 4. Age and gender distributions of the patients.

Age group, years	Sex		Total (%)
	Female (%)	Male (%)	
0–20	0 (0)	2 (15)	2 (5)
21–39	7 (24)	1 (8)	8 (19)
40–59	20 (69)	7 (54)	27 (64)
≥60	2 (7)	3 (23)	5 (12)
Total	29 (69)	13 (31)	42 (100)

Discussion

End-stage TMJ pathologies accompanied by physiological function and anatomical form distortions dictate the need for replacement. The TMJ Concepts patient-fitted