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Alloplastic Total Temporomandibular Joint Reconstruction: A 10-Year Experience of the University of the Witwatersrand, Johannesburg

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Aim: This study aimed to retrospectively analyze our 10-year experience with total alloplastic reconstruction of the temporomandibular joint prostheses. Indications and clinical outcomes were also evaluated.

Methodology: This was a cross-sectional study in which 31 patients who had alloplastic total Temporomandibular Joint prosthesis implanted between 2007 and 2017 were reviewed.

Objective: Outcomes (maximum mouth opening distance and occlusion), subjective outcomes (pain, diet consistency and chewing, quality of life), and complications were evaluated.

Results: There were 16 females and 15 males with a mean age of 36.94 years (range 11–72 years). In total, 51 prostheses (20 bilateral, 11 unilateral) were implanted. The stock prostheses were used in 28 patients (90.32%) and only 3 (9.68%) were of custom-made type. Fifty-eight percent of patients were diagnosed with temporomandibular joint ankylosis, 22.58% had degenerative conditions, 9.68% had pathology (hemifacial microsomia, synovial chondromatosis, and osteochondroma), and 9.68% had malocclusion.

The results showed that there was a significant improvement in maximum mouth opening distance (P-value < 0.0001), particularly in patients who had ankylosis.

There was improvement in diet consistency (P-value < 0.0001) and quality of life (P-value 0.013). Postoperative complications ranged from facial nerve injuries (n = 4), keloids (n = 2), and heterotopic bone formation (n = 2).

Conclusion: TMJ alloplasts provide satisfactory clinical and functional outcomes for patients with end-stage TMJ diseases, evidenced by overall improvement in maximum mouth opening, chewing ability and quality of life and reduction in pain. Previously operated joints and a preoperative diagnosis of ankylosis increase the risk of occurrence of complications postimplantation of total alloplastic joints.

Key Words: Alloplasts, ankylosis, degenerative joint diseases, reconstruction, temporomandibular joint

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TMJ reconstruction can be accomplished by either autogenous grafts or alloplastic prostheses. This reconstruction aims to restore the anatomy of the joint, improve jaw function, and quality of life of affected individual as well as to prevent further morbidity & disease process.[1–4]

Autogenous grafts involve harvesting of vascularized or non-vascularized tissue and contouring it to the shape of the condyle to restore the anatomy and function of the TMJ. The most commonly used autogenous graft in TMJ reconstruction is non-vascularized costochondral graft. Costochondral grafts are most useful in skeletally growing patients because of their ability to retain their growth potential. However, they have variable biologic behavior and are very unpredictable. They can result in under or excessive growth, complete resorption, or ankylosis. Another disadvantage of autogenous grafts is an additional surgical donor site and the associated morbidity.[1]

Alloplastic total temporomandibular joint reconstruction, on the other hand, involves the use of biocompatible prosthesis to replace the diseased articular components of the TMJ in end-stage TMJ diseases.

Advantages of alloplastic joint reconstruction include immediate post-reconstruction physiotherapy and function, obviation of secondary donor site and its morbidities, reduced surgery time, and decreased hospitalization period. In addition, it provides a higher occlusal stability and relatively higher predictability as compared to CCGs. Its disadvantages include high cost of the device, potential device failure (loosening of screw and material wear), foreign body reaction, and restricted use in growing patients.[5,6]

Dolwick et al,[7] reported in their review article that while there was an increase in surgical options and improvements in prostheses used, case selection was prudent, since it affected, to some extent, the outcomes. Studies worldwide have continued to report on long-term improvement of symptoms and quality of life of affected patients after alloplastic total TMJ reconstruction.[3,5,8,9]

Against this background, this study aimed to retrospectively analyze our 10-year experience with total alloplastic reconstruction of the TMJ using Zimmer-Biomet prostheses. Indications, clinical outcomes, complications, and quality of life of patients who had undergone alloplastic total TMJ replacements were also evaluated.

METHODS

This was a retrospective cross-sectional observational study of the outcomes of patients who had alloplastic total temporomandibular

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joint replacements between June 2007 and December 2017, at the Maxillo-Facial and Oral Surgery Department, Chris Hani Baragwanath Academic Hospital, University of the Witwatersrand (Johannesburg, South Africa).

Inclusion criteria were complete pre- and postoperative records; and follow-up for at least 6 months.

All patients had undergone Biomet/Lorenz TMJ implant placement (Biomet Microfixation, Jacksonville, FL) after removal of diseased condyle (condylectomy) or ankylotic mass (gap arthroplasty). The Biomet/Lorenz system is available in both patient-matched type and stock type; and is comprised of a condylar/ramus component made from chromium-cobalt-molybdenum alloy, with a plasma spray titanium coating on the bone contacting surface to facilitate bone apposition and biologic fixation. Its fossa component is manufactured from ultra-high molecular weight polyethylene. The fossa component is secured to the zygomatic arch with four 2 mm screws in 7 or 9 mm lengths. The condylar prosthesis is secured with 4 to six 2,7 mm screws.

Access to the TMJ was achieved via combined Alkayat-Bramley (modified preauricular) and Risdon (submandibular) approaches. For those with ankylosis, Kaban protocol for management of ankylosis was used.[10] After placement of prosthetic joint(s), occlusion and maximum mouth opening (MMO) were rechecked (the target intraoperative minimum mouth opening was 35 mm) and wounds were closed in layers using 3/0 vicryl (for deep layers) and 5/0 monocryl or nylon (for the skin). Patients had 5 day courses of Augmentin 1.2 g IVI 8 hourly or Clindamycin 600 mg IVI 6 hourly in case of allergy to penicillin. Aggressive physical therapy exercises were started 2 to 3 days postoperatively. Patients were then followed up at 1, 4, 6 weeks intervals, then monthly for the first 3 months, and thereafter yearly

For the study, hospital records were used to collect patients' information. The following details were recorded: age at time of surgery, gender; diagnosis, affected side (s), date of surgery, preoperative and postoperative data (maximum mouth opening distance, occlusion status) as well as complications. Postoperative data at 6, 12, 18, 24 months were recorded. The type of prostheses (stock versus custom) was recorded. Maximum mouth opening distance was measured using calliper ruler and reported in millimeters.

Alloplastic TMJ – Reconstruction: Quality of Life (TMJ-R-QoL) questionnaire (Appendix I, http://links.lww.com/SCS/C52), which was adapted from TMJ – Surgery: QoL questionnaire by Dimitroulis et al[11] was used to record all the subjective outcomes (pain; diet and chewing function; and quality of life).

DATA MANAGEMENT AND ANALYSIS

Objective and subjective outcomes after TMJ replacement were evaluated. Data was captured into Microsoft Excel spreadsheet (Microsoft Office; Microsoft, Redmond, WA) and statistical analysis was carried out using Stata/ IC 14.2 software.

Continuous variables measured were:

- age described as the age of the patient at the time of surgery,
- maximum mouth opening distance (MMO) measured in millimeters (mm),
- pain score (0 = no pain; 1 = mild bearable pain not needing medication; 2 = moderate pain alleviated by regular analgesics; 3 = severe pain controlled only by strong analgesics; 4 = severe pain which was not controlled by analgesics; 5 = worst, most unbearable pain ever,
- diet consistency and chewing function (1 = normal diet of any consistency; 2 = most foods except tough consistency; 3 = only soft foods; 4 = foods cut into small pieces; 5 = only only foods put in a blender or liquids).

Categorical variables measured were age at time of surgery, gender, diagnosis, and complications.

Continuous data were presented as mean (standard deviation) or median (ranges [minimum-maximum] or [25th–75th] interquartile ranges). The mean MMO was stratified by age, gender, diagnosis, preoperative, and postoperative follow-up period, and complications. One way analysis of variance (ANOVA) was conducted to compare multivariable data and Post Hoc Bonferroni test was conducted to check where the difference lay. The relationship between preoperative and postoperative continuous and categorical data was compared using paired *t*-tests, A P-value < 0.05 was considered statistically significant.

ETHICAL CONSIDERATIONS

Ethical clearance (M180412) was granted by the Human Research Ethics Committee (Medical) of the University of the Witwatersrand before commencement of the study.

All participants who fulfilled the inclusion criteria were informed verbally and in writing about the study details. Written informed consent was obtained from participants or guardian in case of minors (younger than 18 years)

RESULTS

From 2007 to 2017, a total of 35 patients had undergone TMJ reconstruction. Out of these, 31 patients met the inclusion criteria while 4 were excluded due to missing records and failure to attend the requisite follow up. Sixteen patients (51.61%) were females and 15 (48.39%) were males. The mean age at the time of surgery was 36.94 years (median 31 years, range 11–72 years, SD 16.28) (Fig. 1A). Furthermore, the age at the time of surgery was categorized into 2 broad groups, namely, under 30 years old (n = 14, 45.16%) and 30 years old and older (n = 17, 54.84%). Four (12.90%) patients had undergone total joint replacement as a second TMJ surgery for reankylosis after gap arthroplasty and/or for failure of costochondral graft, while 27 (87.10%) patients had only 1 surgery.

The average length of follow up was 58.8 months (range 6–122 months). All 31 patients had a minimum follow-up of 6 months. Twenty-six (83.87%) of the total patients were followed up for 24 months or more.

A total of 51 joint prostheses were implanted in 31 patients and 20 (64.52%) of them were bilateral while 11 (35.48%) were unilateral (6 right; 5 left). The stock prostheses were used in 28 patients (90.32%) and only 3 (9.68%) were of custom-made type.

The preoperative diagnoses were categorized into 4 groups, namely, ankylosis; degenerative conditions; pathology; and malocclusion (Fig. 2A). Ankylosis (n = 18, 58.06%) had the highest

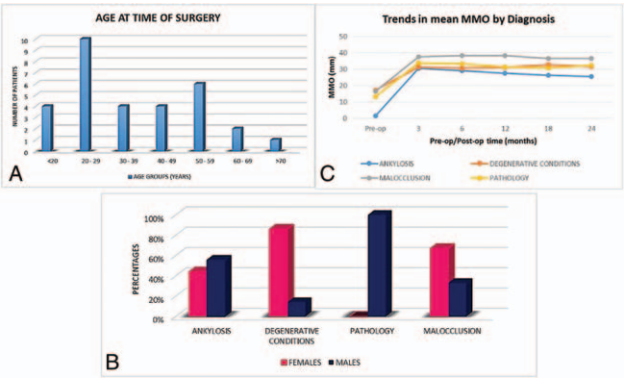


FIGURE 1. (A) The distribution of age at the time of surgery. (B) Frequency distribution of the relationship between gender and diagnosis. (C) The trends of mean maximum mouth opening (MMO) in relation to diagnosis when compared at different time frames.

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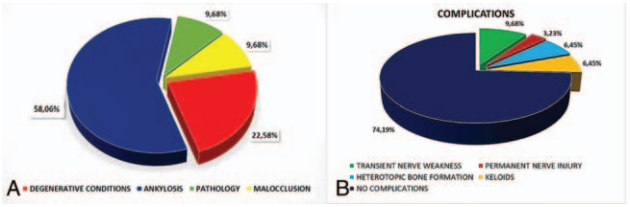


FIGURE 2. (A) Diagnosis categories. (B) Distribution of postoperative complications.

prevalence followed by degenerative conditions (n = 7, 22.58%), pathology and malocclusion, each at 9.68% (n = 3). TMJ synovial chondromatosis, hemifacial microsomia, and osteochondroma were the 3 cases in the pathology group.

The mean age for ankylosis group was 30 years (range 13–44 years, median 28 years); 30.29 years (range 11–72 years, median 55 years) for degenerative conditions; 40 years (range 20–50 years, median 50 years) for pathology and 46.33 years (range 20–50 years, median 50 years) for malocclusion. Figure 1B shows frequency of distribution between gender and diagnosis.

The mean preoperative MMO between the 4 diagnosis groups was 1.83 mm for temporomandibular joint ankylosis (TMJ-A) and 17.43 mm for degenerative conditions, 13.33 mm for pathology and 16.66 mm for malocclusion. Maximum mouth opening distance between the 4 diagnostic groups was statistically significant at preoperative phase (*P*-value < 0.001), particularly between the ankylosis and the non-ankylosis groups (degenerative conditions, pathology, and malocclusion) (Supplementary Digital Content, Table 1, http://links.lww.com/SCS/C52). The maximum mouth opening distance improved significantly after total TMJ replacement (Supplementary Digital Content, Table 2, http://links.lww.com/SCS/C52).

Postoperative MMO between the 4 groups was however insignificant at the 3 and 24 months postoperative period (*P*-value 0.37 and *P*-value 0.19, respectively). The average postoperative MMO for all the analyzed categories was 28.77 mm. Overall, only 25% of the patients could maintain MMO $\geq$25 mm at 3 months, while 50% achieved it at 6 months and 75% at 24 months postoperatively.

The maximum mouth opening distance from preoperative to 24 months postoperatively (by diagnosis groups) showed a very steep upwards trend, which demonstrated drastic increase in mouth opening from preoperative to 3 months postoperative (Fig. 1C). Thereafter, the graph assumed an almost straight constant line with stabilization of the results from 18 months after the surgery. Malocclusion group had a better MMO as compared to other diagnosis groups, with ankylosis having the lowest range. Linear regression analysis was performed to compare the relationship between mean MMO to age, gender, and diagnosis. Maximum mouth opening changes were determined when all variables were compared against ankylosis, under 30 years old at time of surgery and females were used as references. The regression coefficients, *P*-values and 95% confidence intervals are illustrated in Supplementary Digital Content, Table 3, http://links.lww.com/SCS/C52.

The regression analysis showed that for the diagnosis, ankylosis had better MMO outcomes as compared to other diagnosis groups. Moreover, it also indicated that those patients with ankylosis improved far better than those with degenerative conditions (–11.47), followed by those with pathology (–4.67) and malocclusion (–3.67). The difference was significant for degenerative conditions (*P*-value 0.017) but not statistically significant for pathology and malocclusion ($P = 0.509$ and 0.402, respectively).

The analysis also showed that males performed better than females when it came to postoperative mouth opening distance, with coefficient of 7.04, and the difference was significant (*P*-value 0.051). Furthermore, those who were younger than 30 years, did statistically better than those who were older than 30 years, even though it was only by a small margin.

Six (19.35%) patients presented with preoperative malocclusion which was corrected by TMJ reconstruction in 4 patients. The preoperative causes of the malocclusion included unilateral idiopathic condylar hyperplasia, CCG overgrowth, trauma, and pathology (osteochondroma). For the remaining 2 patients who still had malocclusion after surgery, one had restoration of occlusion after occlusal equilibration while the other required orthodontic correction. Fisher exact test yielded a *P*-value of 0.034 which showed statistical significance.

Seventeen (54.84%) of the 31 patients reported preoperative pain. Of these only 2 patients (6.26%) reported postoperative pain which was of less severity when compared to their preoperative pain score (1 patient expressed improvement from 4 to 2 while the other patient, from 3 to 1). The Wilcoxon signed-rank test carried out to compare the difference between preoperative and postoperative mean pain score was statistically significant (*P*-value < 0.001).

Diet consistency and chewing function significantly improved. The *P*-value from Wilcoxon signed-rank test was <0.0001, while preoperative and postoperative median and interquartile range (IQR) was 5 (3–5) and 1 (1–1), respectively. Thirty (96.77%) patients expressed improved ability to biting and chewing normal diet as compared to having liquids or blenderized foods before the surgery. Only 1 patient reported that the diet consistency remained the same (diet score of 2) (Supplementary Digital Content, Table 4, http://links.lww.com/SCS/C52).

Only 1 patient (3.22%) reported QoL as fair due to limited mouth opening. The other 30 patients reported improvement in quality of life after TMJ replacement, 6.45% (n = 2) reported QoL as excellent; 16.13% (n = 5) as very good; 64.52% (n = 20) as good and 9.68% (n = 3) as somewhat better due to generalized arthralgia from severe rheumatoid arthritis. The improvement was statistically significant with paired *t*-test *P*-value of <0.013. The preoperative QoL had a median of 5 [IQR (5–5)] and postoperative median of 3 [IQR (2–3)].

Twenty-three (74.19%) patients had no complications. The distribution of the complications in the remaining 8 patients is shown in Figure 2B. Three (9.68%) patients had transient facial nerve (temporal branch) weakness which resolved completely within 6 months postoperatively. One (3.23%) patient had persistent paralysis of temporal branch of facial nerve. Two patients (6.45%) developed keloids and 2 (6.45%) had heterotopic bone formation (Fig. 3A-B). Overall complication rate was 25.8%. The number of sides operated on and the type of prosthesis used had no statistically significant effect on the development of complications (*P*-value 0.677 and 0.672, respectively). None of the patients needed removal of the prosthesis nor developed periprosthetic joint infection (PJI).

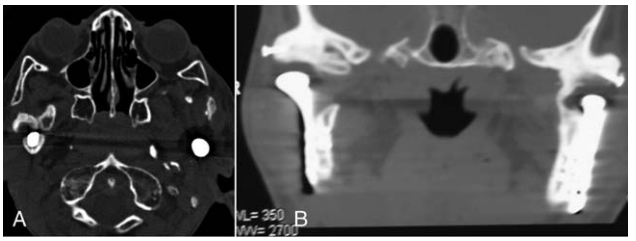


FIGURE 3. (A) Axial CT scan showing heterotopic ossification around the right TMJ condylar head prosthesis. (B) Coronal CT image showing heterotopic bone mass on the medial aspect of the condylar head prosthesis, extending to the medial surface of the glenoid fossa. CT, computed tomography.

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DISCUSSION

This retrospective study sought to report on the outcomes of patients who had alloplastic total TMJ replacement over a 10-year period in our institution. There were more females (86%) in the group with degenerative conditions. This is consistent with previous reports which suggest that female biological and/or hormonal factors could contribute to the pathogenesis of TMD.[12,13] In the present study, the group with TMJ-A had more males (n = 10, 56%) which is similar to the studies by Eltohami et al[14] and Murad et al[15] which reported a 66.6% and 64% male predominance, respectively. This could possibly be due to trauma being the most common predisposing factor for TMJ-A and males being more commonly affected by trauma than females.[15,16,17,18]

The overall age distribution in the present study was consistent with 38.6 years (15–59 years) and 41 years (15–68 years) reported by Wolford et al[8] and Mercuri et al[5] respectively. By contrast, the TMJ-A group had a younger median (28 years) as compared to the non-ankylosis groups (degenerative conditions = 55 years; pathology = 50 years and malocclusion = 50 years). This is due to high prevalence of TMJ-A in younger patients as a result of childhood trauma (predominantly due to falls), with subsequent mandibular condylar fracture(s) that were overlooked. Majority of ankylosis patients are only diagnosed later on in their early adulthood when they are more concerned about aesthetics and functional problems related to the facial asymmetry, restricted mouth opening, and mandibular retrognathism.

The findings in this study suggest that those patients requiring TMJ reconstruction are much younger (mean age of 36.94 in this study) when compared to those requiring hip and knee orthopedic joint reconstruction, whose reported average age is 65 years.[19]

Contrary to the findings in the present study, Giannakopoulos et al[3] and Wolford et al[8] reported osteoarthritis as the most prevalent diagnosis for alloplastic TMJ reconstruction. Although there are global variations, our findings suggest that trauma and degenerative joint disorders feature prominently in the etiology of end-stage TMJ diseases.

The overall MMO significantly improved after total TMJ replacement (P-value < 0.0001). However, the trend showed that MMO stabilized from 18 months postoperatively. When MMO was analyzed against 2 different age groups at the time of surgery (>30 years and <30 years), the results showed that patients who were younger than 30 years had better outcomes than those older than 30 years. This could be due to the fact that most of the younger patients had ankylosis and their initial MMO was less than 5 mm as compared to the non-ankylosis groups, where most of the >30 years old patients belonged. The postoperative MMO gained in the ankylosis group was many-fold more than that observed in non-ankylosis groups. Even though the younger patients with TMJ-A improved better than the other groups, their MMO range remained lower than all the groups and the incidence of relapse was much higher as compared to the non-ankylosis groups. We also observed that in most patients, the MMO started to regress at approximately 12 months postoperatively. It appears like after this period most patients become complacent and stop doing the necessary mouth opening physical exercises. Muscle shortening and atrophy during the period of ankylosis, reduction in jaw function because of pain in the muscles and joints as well as surgical sites, and healing of the surgical sites with fibrosis of the tissues resulting in scar formation or heterotopic bone formation around the joint are factors that could also contribute to relapse in MMO. The general trend shown in this study was that 75% of patients could maintain MMO ≥25 mm at 24 months post-surgery. The linear regression test analysing relationship between MMO and gender, age at the time of surgery and diagnosis showed that males, those under 30 years of age, and in ankylosis group did better in terms of improvement in MMO over time, as compared to females, those older than 30 years of age and in non-ankylosis groups respectively. We concur with Gerbino et al that patients with multiple operations and those who had ankylosis for years, the stretching capabilities of the surrounding issues is greatly compromised; and as such it is very difficult to restore normal interincisal mouth opening.[20] Against this understanding, Aagaard and Thygesen[21] have suggested that a MMO of more than 25 mm, maintained permanently, could be considered a success for this select group.

Occlusion remained unchanged in all patients who presented with an intact preoperative occlusion. Other studies have also reported stable occlusion after total alloplastic TMJ reconstruction, confirming that TMJ reconstruction can withstand the reactive forces generated by mandibular repositioning.[20,22,23]

There was statistical significance in the reduction of pain after TMJ replacement (P-value < 0.05). The general improvement is similar to the results reported in other studies. However, the present study had a preoperative pain score median of 1 [IQR (0–2)] due to the fact that 58.06% of patients had ankylosis and did not report pain, as compared to other studies with most of their patients diagnosed with degenerative conditions, who reported moderate to severe pain.[3,9] The 2 patients with persistent pain postoperatively had some pain remission but generally improved from

(1) severe unbearable pain not responding to analgesics, to moderate pain requiring regular analgesics; and
(2) severe pain controlled only by opioids, to mild pain requiring no medication.

Both of these patients were females. The former had severe form of rheumatoid arthritis associated with bilateral TMJ ankylosis and generalized polyarthralgia, while the latter suffered from osteoarthritis. This observation is similar to the one made by Mercuri et al[5] where they noted that postoperative pain severity is highly dependent on preoperative pain severity.[5]

Diet consistency and chewing function improved significantly after TMJ reconstruction (P-value < 0.0001). None of the patients could have solid tough foods preoperatively and 54.84% of our sample could only have liquid diet. Thirty (96.77%) patients expressed improved ability in eating normal solid foods as compared to having liquids or blenderized foods before the surgery. Giannakopoulos et al[3] also reported a 69.5% decrease in interference with eating in their patients.

The quality of life after total TMJ replacement was significantly better than before the surgery (P-value < 0.013). Furthermore, our results showed that the QoL was not affected by relapse in postoperative MMO, pain, and complications. The observation is similar to that seen in the study by Burgess et al[2] where they noted that QoL remained significantly better even in those patients who reported long-term complications. Sanovich et al[24] also reported that pain and functional outcomes did not affect the QoL of the patients.

Common complications for total alloplastic TMJ reconstruction include PJI, heterotopic bone formation, persistent pain and hypersensitivity reaction reported at 1.6%, 2.0%, 0.43%, and 0.37% respectively.[25,26] The risk for complications has been reported to be statistically significant in groups of patients with prior TMJ surgeries, who also have a preoperative diagnosis of degenerated/resorbed joints, arthritis or ankylosis.[25]

Eight patients reported postoperative complications, yielding a 25.8% complication rate in the present study. Of the 31 patients, 2 (6.45%) had heterotopic bone formation. These 2 patients had previous TMJ surgery, with a preoperative diagnosis of ankylosis. These patients with heterotopic bone formation were re-operated on and the bone was carefully removed after the fossa components were explanted. The old fossa components were then re-implanted.

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These patients had autogenous fat grafting around the implant during the revision surgery, following, on the promising reports that fat grafting into the dead space around TMJ prostheses prevent heterotopic calcification and excessive fibrosis.[22,23] The mouth opening distance improved after surgery. For patients with a history of heterotopic bone formation or ankylosis, it seems plausible to incorporate the periarticular fat-grafting protocol. Prospective randomized controlled studies are needed to justify routine fat grafting in non-ankylotic patients and those with no history of heterotopic bone formation.

The reported incidence of PJI in the orthopedic and TMJ literature is 0.4% to 4.29%, with *Staphylococcus aureus* (53%) and *Propionibacterium acne* (33%) being the most cultured organisms.[27–29] Fortunately, no periprosthetic joint infection was reported in the present study. TMJ prostheses infection is very uncommon and is mostly due to skin microflora which is introduced into the surgical site and onto the surface of the prosthesis at the time of placement.[30] Whilst PJIs are rare, their occurrence are potentially catastrophic, as they are often difficult to treat, are costly for the patients and the healthcare system.[28] Strict adherence to infection control to prevent infection (such as preoperative skin preparation, antibiotic prophylaxis, and surgical techniques) that can lead to biofilm formation and eventual prosthetic failure is mandatory, though it may not completely eliminate the risk.[27]

Of the 4 patients with facial nerve injury, 3 had transient facial nerve weakness which resolved completely within 6 months postoperatively. The other patient had persistent paralysis of temporal branch of facial nerve and required a unilateral brow lift. Although the preauricular approach has been widely reported to offer better access with less risk of facial nerve injury, Dolwick et al[31] reported a 32% incidence of postoperative nerve complication. In their study, 9 out of 28 patients had transient nerve weakness which resolved within 6 months after surgery. Sidebottom and Gruber[32] also reported that 33 of their 74 patients had facial nerve paralysis (31 partial, and 2 total); all resolved fully except for the 1 patient who had a residual temporal branch weakness. It thus appear like the risk of permanent facial nerve damage is very low.

The number of sides operated on and the type of prosthesis used had no statistical significant effect on the development of complications, ($P = 0.677$ and $P = 0.672$ respectively). However, there was association between those patients who were operated previously and the occurrence of complications. Four (12.90%) patients had undergone previous TMJ surgery before alloplastic total TMJ reconstruction ranging from gap arthroplasty alone to gap arthroplasty and CCG. None of them had received alloplastic prosthesis previously. Three patients in this group presented with postoperative complications. Burgess et al[2] also reported similar results where the higher the number of previous surgeries each patient had, the more frequent the occurrence and the more permanent the complications were.

SUMMARY

Temporomandibular joint ankylosis and degenerative joint diseases were the most common indications for alloplastic TMJ reconstruction. Our results showed that both objective and subjective outcomes significantly improved after joint replacement, confirming published data that alloplastic joints provide satisfactory clinical and functional outcomes.

Patients diagnosed with ankylosis showed the most post-surgical improvement in terms of MMO, however, it also had 20.33% decrease in MMO 24 months after surgery. These results underscore the value of postoperative physiotherapy in the successful rehabilitation following TMJ reconstruction.

The risk of complication is significant in patients with previously operated joints and those with a preoperative diagnosis of ankylosis. The presence of complications, however, did not affect the quality of life of patients.

Notwithstanding its limitations, this study has demonstrated that alloplastic joints are an efficacious non-autogenous option when TMJ reconstruction is indicated. A larger sample size, with longer follow-up, will assist in validating and strengthening the results in this study. In particular, a prospective longitudinal study should be conducted to address the inherent deficiencies associated with retrospective studies like unavailability of records.

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