

Introduction

Alloplastic joint replacement of the temporomandibular joint (TMJ) has been performed in the United Kingdom (UK) since 1987¹. Increasingly however, total joint replacement has become the province of the sub-specialist, with supra-regional centres emerging based on the performance of sufficient numbers of the procedure to ensure high standards are achieved and maintained. Recent publications in this journal have highlighted the trend towards centralization of such surgery and the need for continued training above and beyond that provided by higher surgical training in Oral and Maxillofacial Surgery (OMFS) in the UK^{2,3}.

Guidelines have been produced for prosthetic total joint replacement (TJR) of the TMJ in the UK and are adhered to by members of the British Association of TMJ Surgeons (BATS)⁴. BATS surgeons have developed an internet-accessed tool using Snap Surveys to provide national data on TMJ replacement and allow surgeons to compare outcomes with peers⁵. Such national outcomes recording have been shown to be useful in other areas of surgery that have benefitted from greater centralization, such as cleft care in the UK and enable greater transparency of results, shared experience and collaborative learning⁶.

We have previously published a paper highlighting the introduction of the national TMJ joint replacement database endorsed by BATS surgeons and reported on baseline data⁵. This paper follows on directly, presenting the first year outcomes of this database of alloplastic TMJ replacements in the UK.

Method

This was a review of all data available from the BATS National Case Registration of Temporomandibular Joint Replacement as at June 2014. Data entry commenced in the Summer of 2011 and included prospective as well as retrospective data from as far back as 1994. Longitudinal results for individual patients were available for analysis at baseline and one year, though cross-sectional results were available for up to 5-years.

Results

A total of 592 baseline records were available for analysis as of June 2014. Cases were performed by year as shown in Figure 1. Patients had an average (SD) age of 45 (14) and female to male ratio of 5:1. The various diagnoses at replacement are shown in Figure 2. Unilateral joint replacements were equally distributed between left and right sides. The commonest system used was TMJ Concepts accounting for 147/318 (46%) unilateral joint replacements and 131/265 (49%) bilateral replacements (Table 1); Custom made prostheses were used more commonly than stock versions.

On cross-sectional analysis of the baseline results, the maximum inter-incisal distance achieved (where recorded) was <30mm in 444/539 (82%) of patients, but <10mm in 59/539 (11%) patients. There was a median dietary score of 3 (n=419) (range 0-10, with 0 being a liquid diet) at baseline. From those patients where it was recorded, 185/282 (66%) said they always had difficulty chewing and 181/265 (68%) said they always had pain when they chewed. Pain was measured on both left and right sides, with a median (IQR) pain score for the worst side of 8 (7-9), mean 7.2 (on a scale of 0-10, with 10 being the most pain). Just over half (53%, 269/506) were known to have undergone at least one prior open joint procedure.

A total of 252 1-year records were available for analysis. There was a median (IQR) improvement of 9 (4-15) mm of inter-incisal distance achieved (n=220), and of 6 (4-8) in worst sided pain (n=201), both $p < 0.001$ paired t-test. With the exception of 3 (1.5%) patients, pain scores either improved or remained static at one year (Table 2). There was a reduction in worst-side mean (SD) pain score from 7.61 (2.46) to 1.77 (2.35). Where recorded,

longitudinal analysis of 1-year outcome data demonstrated a significant improvement ($p < 0.001$) in response to questions about difficulty in chewing (Table 3) and pain on chewing (Table 4). There was also a notable improvement in patient reported health related quality of life, with an increase from 38% (41/107) to 87% (93/107) in patients reporting this as good, very good or outstanding (McNemar test $p < 0.001$).

With regard to complications, 3/233 (1.3%) developed an infection on the left side and 4/233 (1.7%) on the right. Only 1/233 (0.4%) persisted from baseline to one year with ongoing infection. Numbness to the skin was reported in 27/233 (11.6%) cases on the left and 28/233 (12.0%) on the right at baseline. This persisted in 11/233 (4.7%) on the left and 13/233 (5.6%) on the right at one year. Facial nerve weakness was detected at baseline in 53/233 (22.7%) of left TMJ replacements and 49/233 (21.0%) on the right. This persisted at one year in 14/233 (6.0%) and 11/233 (4.7%) respectively. Finally, bite disturbance was seen in 4/233 (1.7%) of left TMJ replacements and 7/233 (3.0%) of right joint replacements. This persisted in 1/233 (0.4%) and 2/233 (0.9%) respectively in the 1-year outcome analysis.

Discussion

Much of the data from the cross-sectional analysis of baseline figures augments the findings previously reported in this journal by Idle et al⁵ and adds a further two years of data (2012-2014).

The earliest dedicated paper on outcomes following a large cohort of alloplastic TMJ replacements in the UK is that published by Speculand and colleagues in 2000⁷. They demonstrated improvements in pain, mouth opening and diet in 62 patients treated between 1988 and 1997 with two systems, the Vitek VK II and Christensen system. Foreign body giant cell reactions were demonstrated to the former system (now defunct) and the latter following a switch in 1999 to a metal-on-metal cobalt chrome condyle and fossa^{7,8}.

The reduction in pain scores is comparable to smaller series in the United Kingdom from single centres such as that published by Gruber et al⁹, which showed a statistically significant reduction in visual analogue pain scores from a mean (SD) score of 7.4(2) to 0.9(1) at one year post-operatively ($p < 0.0001$). Similarly, in Sweden, Westermarck has shown in a small personal series of joint replacements the elimination of joint pain and interference with eating, as well as an improvement in mouth opening from 3.8mm at baseline to 30.2mm at one year, although a high proportion of his group were undergoing treatment for TMJ ankylosis¹⁰. In Spain, Gonzalez-Perez and colleagues¹¹ have shown reduction in mean (SD) pain scores from 6.4 (1.4) to 1.6 (1.2) ($p < 0.001$) and improvement in mouth opening from 27 (9) mm to 42 (7) mm ($p < 0.001$) using stock Biomet® prostheses. Other single centre series demonstrating similar outcomes include Aagaard and Thygesen¹² and Sidebottom and Gruber¹³.

Further outcomes papers on TJRs have been published by Giannakopoulos et al¹⁴ (3-year follow-up of 288 patients), Leandro et al¹⁵ (10-year follow-up of 300 patients) and Mercuri et al¹⁶ (14-year outcomes of 193 patients). Perhaps the most impressive published series in the literature to date is that of Wolford et al¹⁷ who followed up patients with custom TMJ alloplastic joint replacements for a median (IQR) of 21 (20-22) years. Mean (SD) mouth opening improved from 25.8 (9.8) mm to 36.2 (7.8) mm ($p < 0.001$) and pain scores reduced from a median (IQR) of 8 (2) to 3 (6) ($p < 0.001$). Drawbacks of the study were that it was a prospective cohort study of the patients of only two surgeons and that only 56/111 (50.5%) patients were available for follow-up however. The database would aim to pool results of multiple surgeons with standardized data collection and is the first national database to examine outcomes of alloplastic TJR.

In summary, the BATS database provides a valuable resource of longitudinal follow-up of patients undergoing alloplastic joint replacements in the UK. In particular, it allows TMJ surgeons nationally to share case selection and outcomes, driving continued education as a group. As a registry it has its limitations, not least the fact that it is the work of a selection of

clinicians nationally (selection bias) and is contingent upon patients attending follow-up and data being accurately recorded (response bias).

Snap Surveys was identified as having some limitations in terms of allowing the extraction and modification of data. Following a recent meeting of members of BATS and the TMJ Sub-specialty Interest Group (SSIG) of the British Association of Oral and Maxillofacial Surgeons (BAOMS), an agreement was reached to change software. The new database has recently been launched.

Outcomes would appear to be comparable to smaller published series with improvements in pain, dietary intake and function, with few outliers. Complication rates at this initial point would appear to be acceptable (temporary facial nerve palsy rates of 12.5-32% are reported following open TMJ surgery in the literature¹⁸) and the paper further strengthens the argument for supra-regional care and dedicated subspecialists in TMJ surgery. In a recent survey of the American Society of Temporomandibular Joint Surgeons (ASTMJS), 34 (94.4%) respondents felt TMJ replacement devices had a life span of at least 10 years or more, with 25 (69.4%) feeling that they could have functional longevity of up to 20 years¹⁹. We look forward to TMJ surgeons continuing to engage with the database for many years to come to ensure that we monitor outcomes and continue to learn and improve. We hope to present further papers with 3- and 5-year outcome data in due course as this becomes available.

Ethical Approval

Individual units sought their local Research and Development (R&D) Department approval, registering the project as a national audit with intention to disseminate the data nationally. On collating the data, all patient identifiers were removed and the data anonymised.

Conflict of Interests

No conflict of interest

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