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Quality of life: patient-reported outcomes after total replacement of the temporomandibular joint

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Abstract

Since publication of the UK guidelines on total replacement of the temporomandibular joint (TMJ) in 2008 by the British Association of Oral and Maxillofacial Surgeons (BAOMS), pain scores, mouth opening, and diet have been used as markers of success. We have looked at quality of life (QoL) as another. We analysed the data from a single surgeon on patients who had had joints replaced and devised a questionnaire to find out about the subjective, functional, psychological, and social aspects of TMJ disease. A total of 18 patients who had the same operation were included (mean (range) age 50 (33 - 73) years, mean (range) follow up 30 (18 - 48) months). Jaw function and facial aesthetics had improved, and patients needed less analgesia. Overall, they reported a better QoL with improvements in mood and social interaction, and the activities of daily life were easier. The NHS uses QoL questionnaires to measure success in fields such as orthopaedic surgery, but currently we know of no nationally accepted questionnaire that measures success after total replacement of the TMJ.

Keywords: Temporomandibular joint; Total joint replacement surgery; Quality of life

Introduction

The World Health Organization (WHO) defines health as "a state of complete physical, mental, and social well-being and not merely the absence of disease or infirmity". It advocates the use of quality of life (QoL) questionnaires to assess the impact of disease on daily activities, and does not recommend sole reliance on traditional outcome measures such as morbidity and mortality to measure health.[1] These questionnaires can also measure the effectiveness of treatment, and the data collected can be used to inform other patients.

The first temporomandibular joint (TMJ) was replaced in 1987, and between 1994 and 2012, 402 joints were replaced in the UK.[2] In 2008 the British Association of Oral and Maxillofacial Surgeons (BAOMS) published UK guidelines on total replacements, and in May 2014, the National Institute for Health and Care Excellence (NICE) published independent guidelines.[3,4]

Patients who require replacement joints usually suffer from end-stage disease that leads to severe disability and disfigurement. Many studies have shown a reduction in pain scores, and improvements in mouth opening and diet after replacement, but few have looked at the effect of the disease on QoL. We therefore investigated the changes and potential improvements in the QoL of these patients.

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Material and methods

The patients included fulfilled the criteria of the National Institute for Health and Care Excellence (NICE) for total replacement of the TMJ.[4] All were treated by a single surgeon and were followed up regularly. Objective measurements such as mouth opening, pain scores, and dietary scores were recorded before and after operation. Mouth opening or maximum incisal opening was measured in mm, and pain was recorded on a visual analogue scale (VAS) (0 = no pain, 10 = the most unbearable pain imaginable). Dietary scores were graded from 1 to 3 (1 = liquids, 2 = semi-solids, 3 = normal solid diet). At the end of the six months, patients were asked to complete the TMJ – QoL questionnaire, which we adapted from similar validated questionnaires that are routinely used by other surgical specialties. It consists of 9 components that cover the physical, functional, and psychosocial aspects of patients' lives, and each component is graded from 1 to 5 (Fig. 1).

We paired and tabulated the data. The Wilcoxon signed rank test was used to assess the significance of the differences in means because the sample size was small, and because assumptions of normality did not hold true for most of the data. The Shapiro-Wilk test was used to test whether the data were normally distributed. For most, the test statistics fell below the threshold of 0.897, which describes a sample size of 18 and a probability of 0.05. The only exceptions were the preoperative scores for "having conversations" and "sleeping", for which the test statistics of 0.9104 and 0.9003, respectively, gave probabilities that were slightly greater than 0.05.

The magnitude of the statistical change is usually calculated from the size of the effect, which is obtained by dividing the mean change in scores by the SD. We assumed that the larger the effect, the greater the significance of the change as a result of the intervention, but in our case the size of the effect based on mean differences could not have been accurate because the data were not normally distributed. This is because the size of the effect depends on the normality of the distribution of the data, and is one of the limitations of using this method to estimate the size of the difference.

Results

A total of 18 patients (15 women, 3 men, mean age 50 years, range 33 - 73) were included. They all had Biomet custom-made (patient-specific) implants (Biomet Microfixation, Jacksonville, USA). The mean follow up was 30 months (range 18-48) (Table 1).

Ability to use the jaw

Table 2 shows significant improvements in talking ($p = 0.00033$), eating ($p = 0.00015$), yawning ($p = 0.00032$), and sleeping ($p = 0.00072$), and a large effect size for each one (Table 2).

Severity of pain and jaw clicking

All patients reported significant improvements in pain scores ($p = 00022$) (Table 3). Mean pain scores improved from 4.11 (extreme pain) preoperatively to 1.88 (mild pain) after operation (a large effect size), and the need for regular analgesics 6 months postoperatively was significantly reduced ($p = 0.00022$) (Table 3). Mean improvements in jaw clicking from 2.72 (mild to moderate) to 1.61 (none to mild) were not significant ($p = 0.013$).

Change in facial appearance and improvement in mouth opening

Fifteen of the18 patients thought that their facial appearance had improved ($p = 0.0019$, medium effect size: 0.48) (Table 3). Mouth opening improved "significantly" in 8 patients, "quite a bit" in 6, "moderately" in 3, and one reported no real improvement ($p = 0.000098$, large effect size: 0.62) (Table 1).

Effect of symptoms on the activities of daily life, and social and emotional well-being

The patients' ability to carry out daily activities also improved after operation ($p = 0.000098$, large effect size: 0.62). Before operation they reported that the disease had affected their social life "quite a bit", but postoperatively this ranged from "not at all" to "slightly" ($p = 0.00015$, large effect size: 0.60) (Table 4).

With respect to mood, patients also reported a significant improvement ($p = 0.000098$, large effect size: 0.62) after operation. Generally, after 6 months they reported that they seldom felt low whereas they had felt low quite often before. Overall, they thought that their QoL had improved from very poor before the operation to extremely good or good afterwards ($p = 0.000098$, large effect size: 0.62) (Table 4).

Discussion

The pathological process of end-stage disease of the TMJ disrupts the normal anatomical relations of the joint and leads to physiological and functional dysfunction, which causes a great deal of physical and emotional suffering. The aim of total alloplastic replacement is therefore to correct or improve the distorted anatomy. Quinn suggested that a properly placed implant can improve mouth opening to 30 - 35 mm, reduce pain by 50% - 70%, and improve diet by 50% -70%.[5] Initially, many implants failed, but overall success rates are now around 84% – 91%.[6–8] In our study, no implants needed to be removed because they had failed.

Currently, there seems to be a desire to use mathematical values to measure surgical outcome. In their multicentre study of 288 patients with Biomet prostheses, Giannakoulos et al. reported a 44.6% improvement in mouth opening, a