

Provision of an Appliance to Correct Mandibular Deviation Secondary to Temporomandibular Joint Replacement

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Abstract - This report outlines the provision of an appliance of novel design to correct mandibular deviation secondary to temporomandibular joint replacement. The aim of the appliance was to reduce the deviation of the mandible by guiding its path during function, thus reducing the symptoms of facial pain. A significant improvement in symptoms was noted as a result of wearing the appliance which was still evident at the 12 month review. In a patient with high levels of chronic pain associated with TMJ dysfunction, reversible minimally invasive treatment has definite advantages, particular if there is a wish to avoid further surgical intervention.

KEY WORDS: Temporomandibular Joint, Replacement, Removable appliance

INTRODUCTION

Temporomandibular joint (TMJ) disorders are estimated to affect up to 40% of the population¹ and may present as pain in the jaw joint or muscles of mastication, trismus or joint clicking and crepitus. The management of these disorders differs depending on whether symptoms are related primarily to the jaw joint or the supporting musculature². In cases of internal derangement of the joint, an initial period of conservative management is advised³. This includes jaw rest, a soft diet and adjunctive interventions such as physiotherapy exercises and the provision of occlusal splints as required^{2,4}. If after this, symptoms persist at a level which significantly affects the patient's quality of life, surgery may be indicated⁵. This can range from minimally invasive techniques including arthrocentesis and surgical arthroscopy, to open joint surgery including discectomy and joint replacement. Open TMJ surgery is often regarded as a last resort for these patients who after surgery may be left with residual symptoms and limited options for further treatment^{6,7}.

This case reports details the prosthetic treatment of a patient with a long standing history of temporomandibular dysfunction, related to internal joint derangement with significant limitation of opening. At presentation, prosthetic joint replacement of the left TMJ had been performed. This had improved the patient's jaw opening, however, there was significant deviation of the mandible during function and associated myofascial pain. To avoid further surgery, an alternative minimally invasive prosthetic solution to control symptoms was sought.

HISTORY

This 51 year old lady was referred to the Restorative Department at Leeds Dental Institute for treatment. She had undergone left temporomandibular joint replacement 2 years previously which aimed to alleviate her symptoms of marked trismus and facial pain.

Whilst this surgery had significantly improved jaw opening, the patient reported that her lower jaw deviated to the left at both at rest and when eating and speaking causing severe pain to the left side of her face. Her only position of comfort was when her anterior teeth were in contact although in this position she was aware of an increased strain on her jaw muscles. In an attempt to address these symptoms, interocclusal elastics were provided, attached to the teeth with orthodontic brackets with the aim of controlling the movement of the mandible (Figure 1). This reduced the patient's symptoms but as the elastics had to be worn all day it was not regarded as a long term solution.

EXAMINATION

Extraoral examination revealed:

- Protrusion and deviation of the mandible to the left by up to 10mm during wide opening and such that during function the upper and lower anterior teeth contacted prematurely
- Tenderness in the left masseter, temporalis and lateral pterygoid muscles
- Maximum mouth opening of 30mm

Intraoral examination revealed:

- A well maintained dentition with good oral hygiene
- Stable intercuspal position (ICP)

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Figure 1. Interocclusal elastics to control the lateral deviation of the mandible. Note the centreline shift from opening to ICP.



Figure 2. Series of photographs showing the acrylic flange engaging to correct the left centreline on closure

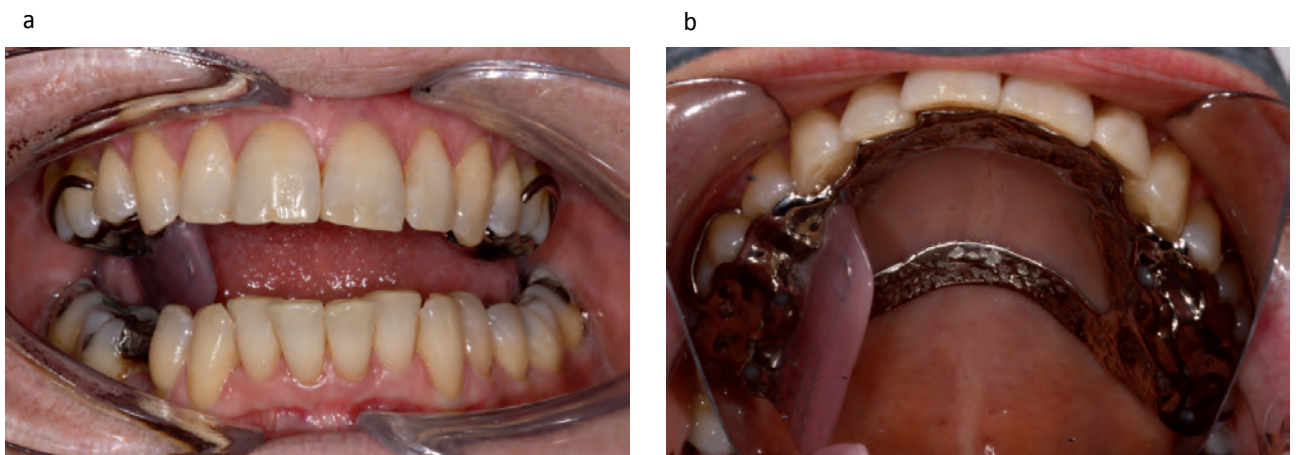


Figure 3. a) Framework in situ with flange guiding occlusion. b) Occlusal view of framework in situ

TREATMENT

Background searches of the literature failed to reveal any similar TMD cases treated with a prosthodontic appliance. There were however, cases reporting the use of various designs of removable appliance to aid function in cases of muscle imbalance following hemi-mandibulectomy⁸. The aim of these appliances was to prevent or reduce the deviation of the mandible by guiding its path during function. As the patient's occlusion was stable and the teeth interdigitated well in ICP, the decision was made to provide a removable appliance to guide the mandible back to this position during function, reducing lateral deviation.

A trial acrylic overlay appliance with an inter-arch guidance plane was designed. This was based on the principles of an Occlusal Stabilisation Splint⁹ to give some freedom of movement in centric relation and retained by Adam's Clasps on the UR6 and UL6. Upper and lower alginate impressions were recorded and the patient's models mounted on a semi-adjustable Denar articulator. Occlusal records were taken of the extent of lateral deviation of the mandible, where the LL3, UL3 and UL2 were in contact. This information was used to determine the height, angle and contour of the inter-arch extension used to guide the mandible into its correct position. For the patient to tolerate the appliance it was important that the guiding flange was kept as discrete as possible and exhibited a progressive and even guidance on the lingual aspects of the mandibular teeth on closure (Figure 2). At review the patient reported that she felt comfortable wearing the appliance and noted a reduction in pain symptoms.

Further review was carried out 3 and 6 months following initial fit of the appliance and the patient continued to report that she found the appliance useful in managing her symptoms. The decision was then made to produce a Cobalt Chrome appliance of similar design which allowed for a decreased thickness of framework and minimal palatal coverage (Figure 3). At 3 and 6 month review the patient reported an improved level of comfort associated with this appliance and continued improvement of her symptoms.

DISCUSSION

The use of joint replacement surgery for the treatment of disorders of the temporomandibular joint is rare, estimated at less than 100 per year in the UK¹⁰. It is not usually considered an option unless a patient is severely affected by symptoms and conservative measures have failed. If symptoms persist following prosthetic replacement, treatment options are limited and although surgical revision can be considered, the risks associated with the procedure increase with every episode of intervention^{6,10,11}.

In this case the patient was keen to avoid further surgical intervention at this point. She was aware that the approximate life span of her prosthetic joint was 10 years¹² and therefore, in the long term, further surgery would most likely be required. The provision of a removable appliance had the advantage of being minimally invasive and reversible. It allowed a staged approach to intervention, so that the patient's tolerance could be assessed.

The design of appliance in this case utilised the basic principles of partial denture design and occlusal splint therapy

as a guide. Once the appropriate clinical information had been gathered, the technical stages of producing the appliance were a combination of those used to construct a functional orthodontic appliance and a Cobalt Chrome overlay denture.

Case reports detailing the prosthetic treatment of hemi-mandibulectomy patients were consulted^{7,8,13,14} as these prostheses are designed to prevent the deviation which may occur following resective surgery. This deviation is due the loss of the synchronous bilateral activity of the muscles of mastication¹⁵. In this case there was a similar alteration to the muscular balance. The flange guiding the mandible was carefully designed to be as unobtrusive as possible but provide sufficient surface area to guide the mandibular teeth into position. The design of the appliance was similar to that described by Moore and Mitchell⁸, with a single flange on the palatal aspect of upper right quadrant. This seemed to be more likely to be tolerated than the design described by Monaghan and Bear¹³ which involved fused vacuum formed splints covering the upper and lower teeth.

As with any overlay appliance a high standard of oral hygiene is imperative to avoid complications such as caries and periodontal disease. This was the most important aspect of long term maintenance for this patient.

CONCLUSION

The provision of a removable appliance of novel design was successful in reducing pain related to deviation of the mandible following temporomandibular joint replacement. This avoided the need for repeat TMJ surgery in the immediate term and provided a more functional and aesthetic outcome than the interocclusal elastics seen at presentation. In a patient with high levels of chronic pain associated with TMJ dysfunction, the provision of a reversible minimally invasive treatment option has definite advantages, particular if there is a wish to avoid further surgical intervention.

ADDRESS FOR CORRESPONDENCE

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