

MINI-IMPLANT SUPPORTED OVERDENTURE IN A PATIENT WITH DOWN SYNDROME: A CASE REPORT

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Case Report

ABSTRACT

The presence of macroglossia, a tendency towards poor cooperation and the inability to adapt to complete dental prostheses due to motor and mental deficiencies makes the oral rehabilitation of Down Syndrome patients difficult. This article reports on the use of mini implant supported overdenture to rehabilitate a Down Syndrome patient who had difficulty adapting to his new mandibular complete denture. The patient's ability to cooperate during treatment as well as the maintenance of an optimal oral hygiene practice enabled mini-implants to be inserted and maintained 20 months post insertion as evidenced by clinical and radiological findings. To the author's knowledge, this is the first reporting of a successful mini implant supported overdenture in a Down Syndrome patient.

Key words: Down syndrome; mini implants; overdenture.

INTRODUCTION

Down Syndrome, also known as trisomy 21 and mongolism, was first described by John Langdon Down (1). It is a genetic condition caused by an extra chromosome 21 which results in various systemic and oral anomalies as well as learning disabilities and a characteristic appearance (1). Dental features associated with Down Syndrome include open mouth posture due to underdevelopment of the middle third of the face and poor muscle tone, macroglossia, delayed development and eruption of the teeth, hypodontia, microdontia, hypocalcification and hypoplastic defects, reduced caries risk and high incidence of severe periodontal disease (2-5). The increased frequency of periodontitis is due in a large part to poor oral hygiene (6) and an exaggerated immune-inflammatory response (7) of the oral tissues. Therefore, the most common dental problem faced by these patients in their mid-30s is extreme tooth mobility leaving no choice but extraction (8).

The management of missing teeth in Down Syndrome patient's poses a challenge due to the presence of macroglossia, a tendency towards poor cooperation and the inability to adapt to complete dental prostheses due to motor and mental deficiencies (9). The replacement of missing teeth with dental

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implants may overcome some of these problems and provide patients with a stable prosthesis.

Over the past decade, endosseous implants of increasingly smaller diameters have been introduced into the field of dentistry. Small dental implants (SOIs) in the range of 2.75mm to 3.3mm diameter have been shown to be viable alternatives in cases of limited anatomical geography (10). Mini dental implants (MDIs), which are smaller than their SDI counterparts, have been introduced. The titanium-aluminium-vanadium alloy of these mini implants provides extra strength required for long term application (11). The MDIs, with diameters in the range of 1.8mm to 2.4mm, have a survival rate of 95.1% for supporting full lower dentures, over a mean duration of 2.9 implant-years (12). Mazor and colleagues (13) followed 32 mini-implants which were used for stabilization of full lower dentures with immediate loading over a 3-year period and reported a survival rate of 94%. A multicenter analysis using MDIs found similar results with success rates of approximately 91% (14).

This article reports on the use of mini implants in a Down Syndrome patient who was initially treated for periodontitis and who had difficulty adapting to his new mandibular complete denture.

CASE REPORT

A 45 year old male patient (Figure 1) who had been diagnosed with Down syndrome and otherwise healthy was referred to the Periodontal Unit, Seremban Dental Clinic, Malaysia, in January 2007 with a complaint of mobile teeth. The patient had moderate mental



Figure 1. The 45 year old Down Syndrome patient.

retardation but was able to understand and communicate to an acceptable level. He attended the clinic with his older brother who was also his caregiver. He was independent in his oral hygiene practice and brushed his teeth once a day using a manual toothbrush. His dental treatment prior to this visit was irregular and mainly to private dental practitioners where treatment consisted of extractions and occasionally scaling and fillings.

On examination, his oral hygiene was poor with generalized plaque accumulation as well as supra- and subgingival deposits of calculus. His gingivae was generally erythematous with pocket depths of 5-6 mm on teeth 18, 17, 13, 12, 24 and 27. Teeth 17, 24, 27 and 44 had Grade 3 mobility. Radiographic interpretation presented generalized horizontal bone loss of half to two third root length (Figure 2). There

was a high frenal attachment on the mandibular anterior ridge. The patient was diagnosed with generalized moderate to advanced chronic periodontitis.

A comprehensive treatment plan was prepared and after discussions with his caregiver, it was agreed that 17, 24, 27 and 44 would be extracted. Options for the replacement of missing teeth such as implant-supported fixed/removable maxillary and mandibular prostheses were also discussed. It was decided that since the caregiver was unable to afford the cost of implants, the patient would receive a removable acrylic maxillary partial and complete mandibular prostheses. Extractions were completed under local anaesthesia without any complications. The remaining teeth were 18, 13, 12, 11, 21 and 22. Oral hygiene instructions were provided to both the patient and his brother. An electric toothbrush was recommended. Over the next few weeks, the patient demonstrated excellent improvements in his oral hygiene. Full mouth scaling and root planing was completed.

A frenectomy removed the frenal attachment on the mandibular anterior ridge to allow the proper seating of his full denture. All surgeries (frenectomy and implant placements) were done under local anaesthesia as facilities for intra-venous sedation was unavailable in this town. The family was also reluctant for any procedure to be done under general anaesthesia. The patient was cooperative throughout these surgeries. One month after the frenectomy (five months after the extractions), impressions of his maxillary and mandibular arches were taken for the construction of maxillary partial and a mandibular full acrylic denture. The completed dentures were issued in June 2007. Good retention of the prostheses was obtained. However, when the patient was examined a week later, his brother complained that he had a habit of pushing his mandibular denture out with the tongue. This made eating and speaking with his dentures difficult.

The treatment was then modified to include an implant-supported mandibular overdenture to secure the denture in place. Due to financial constraints, it was

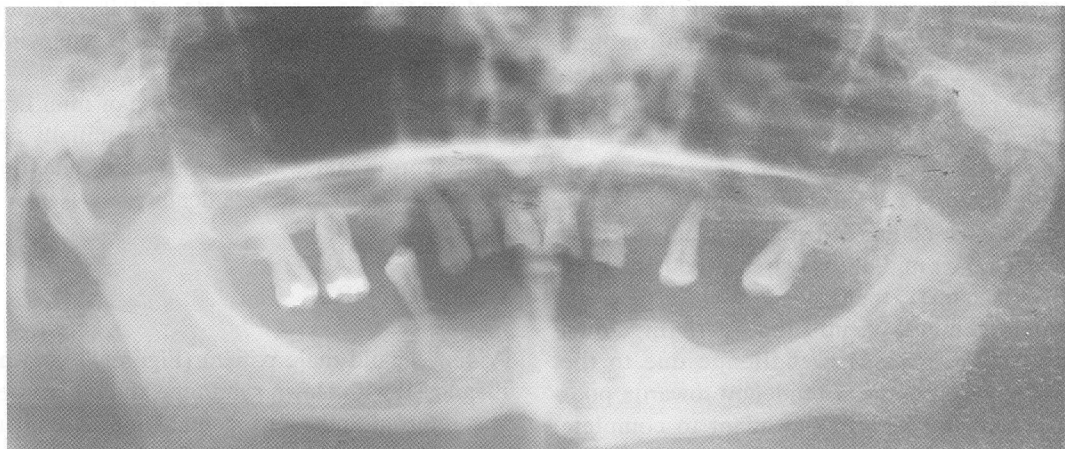


Figure 2. Panoramic radiograph taken at initial examination.

decided that mini implants would be used and the present mandibular full acrylic denture would be modified.

In August 2007, 4 mini implants (MOL mini implants, Intra-lock International Inc., US) 2.5mm in diameter and 13 mm in length were placed between the edentulous region 33 and 43. Following local anaesthesia, a crestal incision was made between 34 and 44 and mucoperiosteal flaps were raised. Pilot drills of 1.2mm diameter followed by 1.5mm diameter were used to prepare sites at region of 33, 32, 42 and 43. The mini implants were inserted with a finger wrench. They were ratcheted into position with a torque of 45N (Figures 3 and 4). The mucoperiosteal flaps were repositioned and sutured. Bleeding was arrested and post-operative instructions were given to the patient and his brother.

The patient was reviewed five days after surgery. Healing of the surgical site was uneventful. The mandibular overdenture was fitted onto the mini implants by creating a depression over the location of the mini implant heads. The housings were placed on the implant heads and picked up to the overdenture using self-curing intra-oral resin with the patient in centric occlusion (Figures 5, 6 and 7). The overdenture was stable and the patient was able to function, while talking and eating without pushing the appliance out of his mouth with his tongue. The patient and his brother were instructed on mini implant and denture hygiene. Throughout the treatment, the patient managed to maintain good oral hygiene. The patient was placed on regular maintenance review where oral hygiene instructions were reinforced and prophylaxis completed. Twenty months post-loading with regular follow-ups, the mini implants and dentures are functioning well (Figures 8, 9 and 10). Radiographs show an increase in peri-implant marginal bone loss of approximately one to two threads from the time of insertion. The success of the mini-implants in this case were based on the criteria set forth by Buser and colleagues (15) which includes the absence of persistent subjective complaints such as pain, foreign body sensation, or dysesthesia; the absence of recurrent peri-implant infection with suppuration; the absence of mobility and the absence of a continuous radiolucency around the implant.

DISCUSSION

The severity of oral diseases in patients with Down Syndrome together with their psychomotor and cognitive disabilities requires a comprehensive treatment plan including the overall management of each individual's oral hygiene programme. This management depends on the patient's ability to cooperate during treatment as well as the maintenance of an optimal oral hygiene practice (16). In this case report, the patient has demonstrated a good oral

hygiene practice throughout his treatment. The maintenance of good oral hygiene was a requirement for the placement of mini implants as it enabled the

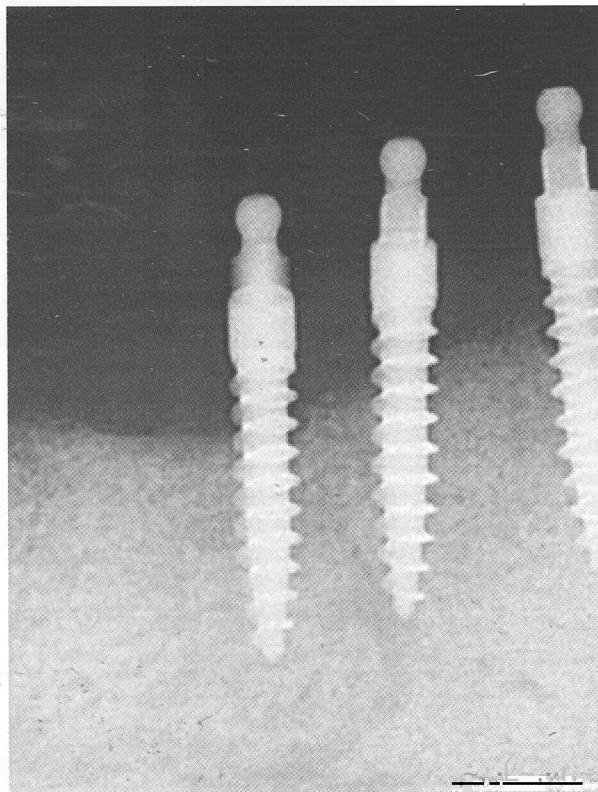


Figure 3. Periapical radiographs of lower right quadrant taken immediately after mini implant placement.

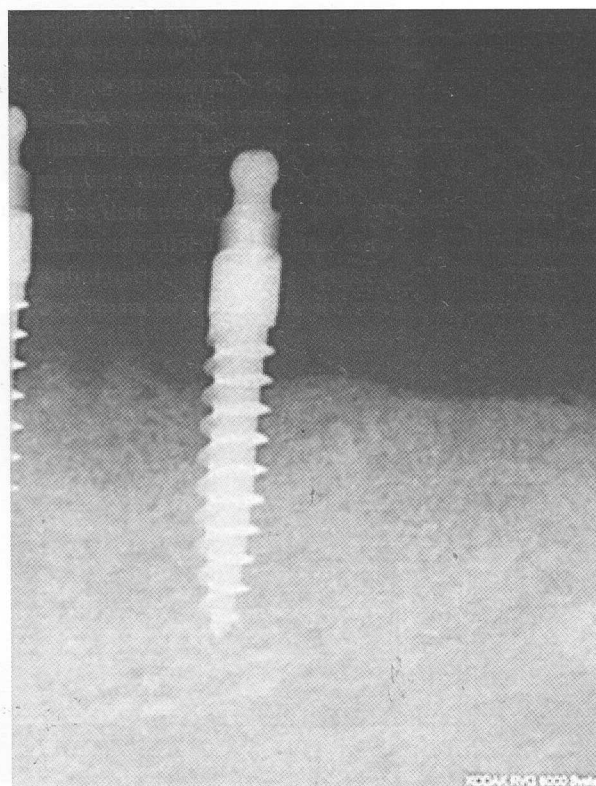


Figure 4. Periapical radiographs of lower left quadrant taken immediately after mini implant placement.

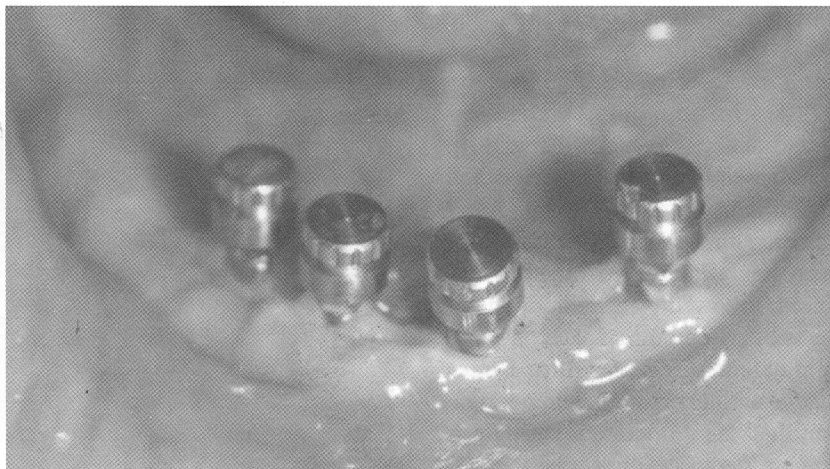


Figure 5. Housing locators placed over mini implants.

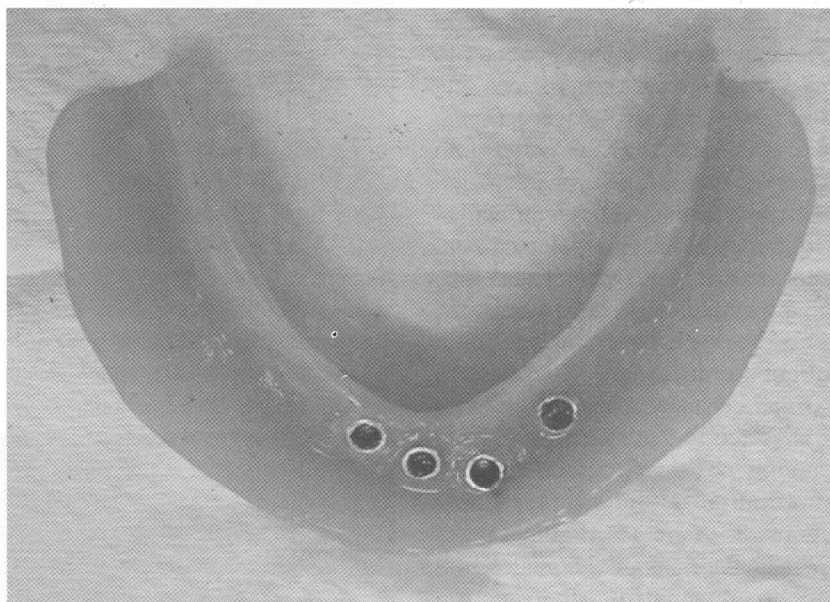


Figure 6. Mandibular overdenture with self-cured housing locators.

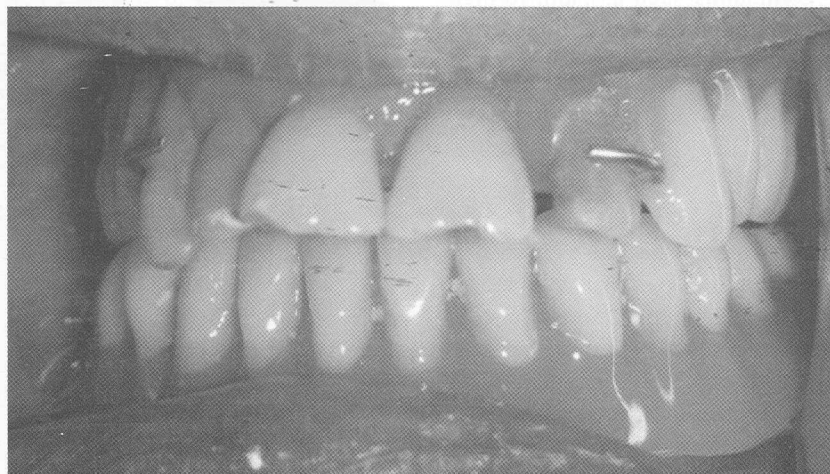


Figure 7. The Down syndrome patient using his prosthesis in centric occlusion. Note the good oral hygiene. Stains on the upper anterior teeth were caused by chlorhexidine mouthrinse.

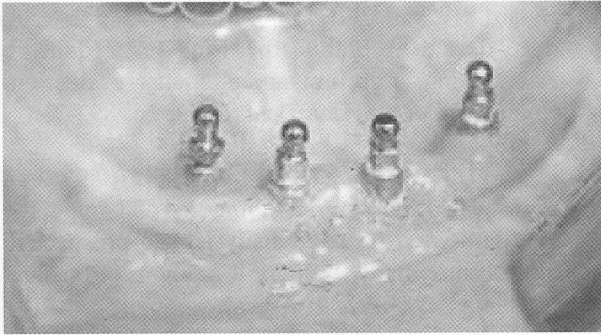


Figure 8. Mini-implants at 20 months post-loading showing healthy peri-implant soft tissue.

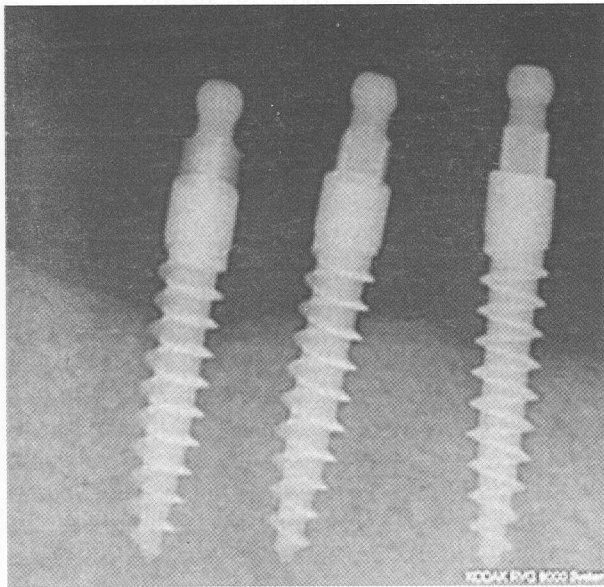


Figure 9. Periapical radiographs showing mini implants at lower right quadrant 20 months post-loading. There is an increase in peri-implant marginal bone loss of approximately one to two threads from the time of insertion.

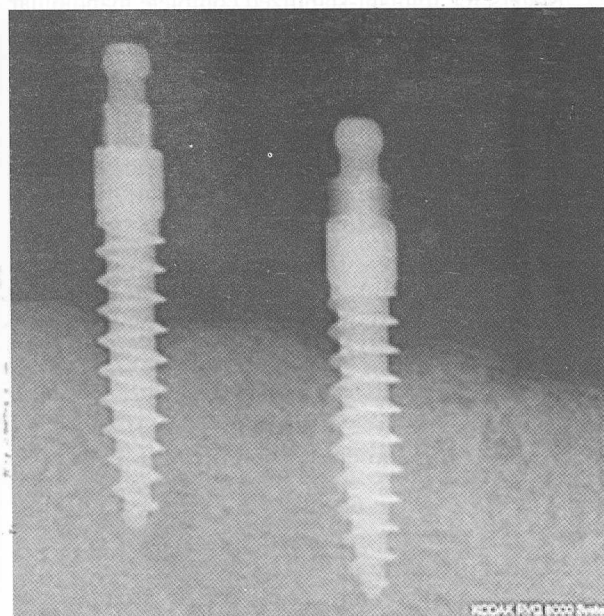


Figure 10. Periapical radiographs showing mini implants at lower left quadrant 20 months post-loading. There is an increase in peri-implant marginal bone loss of approximately one to two threads from the time of insertion.

peri-implant tissues to remain constantly healthy (17,18).

Complete dentures are contraindicated for patients who lack adequate muscle control or cognitive skills to fully adapt to the prosthesis (16). A study of patients with different disabilities, including mental retardation, illustrated how implant-supported prostheses produced relatively good results which contributed to improved aesthetics and oral function (17). As has been shown in this case report, treatment with mini implant supported overdenture served to not only increase the patient's comfort but also allowed him to improve his function in terms of speech and mastication with the added benefit of reduced cost.

Most patients with mental or physical disabilities may require conscious sedation or even general anaesthesia for surgery to be undertaken. In this case however, the patient proved to be cooperative during his initial frenectomy procedure as well as during mini-implant placement. This was achieved through verbal communicative efforts throughout his treatment.

One of the more important factors responsible for implant failure is poor bone quality and quantity (19). Patients with Down Syndrome are prone to develop osteoporotic bone (20,21). In the present case however, there was only peri-implant marginal bone loss of approximately one to two threads at twenty months post-loading as compared to the initial post-surgical bone levels. The success of the mini implants over a twenty month period in this Down Syndrome patient indicates that these osteoporotic alveolar bone problems are not always encountered.

Numerous case reports have provided evidence of successful 1 year treatment outcomes using conventional implants in special care patients (21-23). Long-term studies of mini implants show a 94.2% survival rate over a 5 year period in healthy adults (12,24). The present case report has shown that a mini implant supported overdenture can survive over a period of twenty months in a Down Syndrome patient.

CONCLUSION

Mini implants with good oral hygiene can successfully be used to support overdentures in Down Syndrome patients.

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