Implant, surgical and prosthodontic treatment for a patient with Down syndrome - a case report

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Abstract

Patients with Down syndrome often present with hypodontia, periodontal disease and early tooth loss. The treatment of a 49-year-old man by a surgical, implant/prosthodontic approach is described. Research shows that dentures are not always the best solution for edentulous patients. Patients with disabilities are often excluded from advanced dental treatment options. This case aims to demonstrate that although implants are not suitable for all patients, they can be successful, for carefully chosen candidates irrespective of any disability.

Key words: Implants, disability, Down syndrome

Introduction

Down syndrome (DS) is a genetic condition originally described by John Langdon Down in 1866. It is most commonly caused by a trisomy of the 21st chromosome. Nationally, 1 in every 600 babies is born with DS, leading to approximately 60,000 people with DS currently living in the UK. People with DS all have some degree of growth and developmental abnormalities, learning disability (LD) and some or all of the associated medical conditions such as cardiac anomalies, musculoskeletal disorders, nervous system anomalies, immune deficiencies, haematological disorders, sleep apnoea and early onset Alzheimer’s disease (Kieser et al., 2003). Due to advances in, and increased access to, medical care mean life expectancy of people with DS is now estimated to be around 60-65 years of age.

Dental features of people with DS may include hypodontia (Kieser et al., 2003), poor oral hygiene, decreased manual dexterity, mouth breathing, xerostomia, reduced tooth and root size, changes in tooth shape, excessive tooth wear and an inability to accept dental treatment. Periodontal disease has been found to be significantly more prevalent and more severe in people with DS (Morgan, 2007). This phenomenon cannot simply be attributed to poor oral hygiene. In recent years, much focus has been placed on the altered immune response resulting from the underlying genetic disorder (Morgan, 2007). Lewis et al., (2008) propose that ‘the short roots of teeth in DS combined with increased periodontal disease make it possible that tooth loss from periodontal disease is more likely’. Gabre et al. (2001) found patients with DS had even higher bone loss compared to other patients with intellectual disability.

Implants are being used increasingly in the general population, to rehabilitate edentulous and partially edentulous jaws, with good long term success, but are infrequently used in people with disabilities, in particular people with LD. Lustig et al., (2002) stated that ‘oral manifestations as well as a tendency toward poor cooperation in the dental office contribute to the belief among dentists that people with DS are not good candidates for implants’. Little documentation exists regarding rehabilitation with implant-supported prostheses in patients with disabilities, although case reports are emerging (Lustig et al., 2002; Ekfeldt, 2005; Oczakir et al., 2005; Durham et al., 2006; Van de Velde et al., 2007).

Lustig et al., (2002) placed implants in a 16-year-old patient with DS to replace his missing premolar teeth. One implant failed, having a diameter of 3.75mm compared to the successful three implants which were 4.2mm diameter. The authors concluded that in their experience, implants with a larger diameter should be used in patients with osteoporotic bone as may be present in patients with DS (Lustig et al., 2002). Oczakir et al. (2005) placed 105 implants in 25 special care patients, including three patients with DS. Three implants were lost in the healing phase, but the survival rate of the loaded implants was 100% (Oczakir et al., 2005). Van de Velde et al., (2007) also found that two out of five fixtures were lost within three months in a DS patient but that the patient was successfully retreated.

In a study by Durham et al., (2006) implants were placed for six edentulous adults with cognitive disabilities. They had a successful osseointegration result of 93.5% overall and 100% in the mandible; however, the authors also concluded that ‘these results do not substantiate that this is an appropriate treatment for this population, as they may not be able to comply with maintenance or it may be impossible to provide a functional appliance’.

Reported contraindications to implant placement are ‘malocclusion, bruxism and other parafunctional habits’,
these habits are often found in patients with cognitive impairments’. This may further contraindicate implant placement for people with DS or LD. However, it is important to be able to provide an anti-discriminatory policy to oral rehabilitation, where appropriate, and access to dental care is essential for adults with DS (Lewis et al., 2008).

In April 2009, the British Society for the Study of Prosthetic Dentistry held their annual conference and the York Consensus Statement was published. This statement concludes that the restoration of the edentulous mandible with a conventional denture is an inferior treatment option when compared to an implant-supported prosthesis. The consensus also reported that there is now a large body of evidence to support the ideology that a two-implant supported mandibular overdenture should be the minimum offered to edentulous patients as a first choice of treatment (Thomason et al., 2009).

Clinical report

A 49-year-old man was referred to a periodontist at a specialist dental clinic by his dental practitioner because of discomfort and inability to function with his increasingly mobile teeth. The patient was a regular dental attender who visited the hygienist every three months. He was medically fit and well, a non-smoker, lived in his own flat, worked and drove his own car. The patient had a well supported family network of parents and three siblings. He presented with a history of retained deciduous teeth, which on presentation had been lost, hypodontia and a Class III occlusion with occlusal contact only on the central incisors. Teeth present were 18,16,14,13,11,21,22,23,26,28,37,34,33,32,31,41,42,43,44.

Of these the upper central incisors and lower premolars had grade III mobility, 37 grade II mobility and the remaining upper teeth grade I mobility. Although twice daily tooth brushing with an electric toothbrush was reported, plaque control was poor and a Basic Periodontal Examination (BPE) graded 4 in all sextants except the lower anterior teeth which were graded 2.

Radiographs (Figure 1) revealed generalised short roots on all teeth and bone loss between 30-50%. The prognosis of all teeth was generally poor and a diagnosis of chronic adult periodontitis was made. As part of the treatment plan discussion, partial immediate dentures were suggested and removal of the lower anterior teeth considered. The patient was deemed to have capacity to consent to dental treatment and he declined dentures as a treatment option. The patient’s family was advised of all treatment option discussions, at the request of the patient, and were in full support of his decisions. Implants were suggested as an alternative treatment modality and the patient elected to proceed with this plan (Figure 1).

A CT scan of upper and lower jaws was performed which revealed a hypoplastic maxilla with bone of poor quality.
requiring augmentation, if implants were to be considered. Following discussion with the patient, consent was obtained to carry out an upper dental clearance and extraction of the 44, 34 and 37 under local anaesthesia. Temporary immediate dentures were made, full and partial, for the upper and lower arches respectively. The dentures were to restore appearance and prepare drilling guides. Appointments were arranged for intensive oral hygiene instruction.

Four months following the patient’s upper clearance under local anaesthesia, the patient underwent bone augmentation surgery under general anaesthesia. This comprised sinus lifts with inlay and onlay bone grafting. Autogenous block grafts were placed in the maxilla with bone taken from the iliac crest. Bovine-derived xenograft material (Bio-Oss) was used as an adjunct in an attempt to maximise bone levels. Healing was uneventful and six months post surgery, six implants (D 3.8, L 11 – 15) were placed in the upper arch to support a 12 unit bridge. Two implants (D 3.4, L 11) were placed in the lower premolar region to support two lower cantilevered bridges replacing the lower first and second premolars accepting a shortened dental arch in the mandible. The implants used in this case were XIVE S plus manufactured by Denstply Friadent and were placed using local anaesthesia in two visits. Laboratory made temporary bridges were constructed for placement during the five month healing phase prior to the definitive restoration.

The upper arch was restored with a fixed bridge. The two lower fixtures failed shortly after placement as they failed to integrate and were removed. Also at this point, increased mobility and discomfort was noted in the remaining lower teeth. These teeth were subsequently removed. It is likely that both the relatively short implants (11mm) and the short roots of the natural teeth in addition to an increased susceptibility to periodontal disease combined with an increased load from the stable implant supported upper bridge contributed to this failure. After a healing period of eight months, four longer (13mm) implants were placed in the mandible to support a new bridge (Figure 2). The implant sites were chosen at points of optimal bone quality and quantity and to ensure even spacing between the mental foramen. A temporary bridge was fitted at placement to splint the implants. The rationale being to reduce the risk of individual implant loading thus reducing movement and providing increased stability during the healing phase (Figure 2).

The patient has been kept under review and is now 39 months post lower fixture placement and 59 months post upper fixture placement, the patient continues to function well with his new dentition (Figures 3 and 4). The patient has three-monthly hygienist visits and successfully uses an electric toothbrush, interdental brushes and interspace brushes. These visits help the patient maintain motivation for good oral hygiene. He currently has six-monthly recall appointments with an implantologist however, his maintenance could easily been carried out by a general dental practitioner comfortable with maintaining implants (Figures 3 and 4).

Discussion

In the general population successful oral rehabilitation with dental implants depends on careful case selection. This requires the assessment of a multitude of local and systemic factors in order to determine the potential success of such care. Within the group of special care patients who benefit from implants, many of the reported contraindications to implant placement are present (Durham et al., 2006).

Many medical conditions have been listed as potentially critical to implant placement, but studies comparing patients with and without these conditions in a controlled setting are sparse. It has been suggested that illnesses that impair the normal healing cascade worsen surgical success but no evidence exists that supports the mere presence of disease precluding implant therapy or how it may significantly affect long term outcomes. It has been suggested that as osseointegration is essentially a wound healing process, factors that interfere with healing may contribute to implant failure.

Excessive force is the primary cause of late implant complications. Bruxism and parafunction are often found in people with special needs and it is reported that people with DS show severe toothwear more often than other people with L.D. However the evidence to suggest bruxism as an absolute contraindication still does not exist.

It is evident that successful osseointegration in DS and other special needs individuals can be achieved (Lustig et al., 2002; Ekfeldt, 2005; Oczakir et al., 2005; Durham et al., 2006; Van de Velde et al., 2007). However, achieving predictable integration does not substantiate that this is an appropriate treatment modality for this population (Durham et al., 2006). The ability to provide a functional prosthesis, compliance with maintenance and improvement of quality of life must all be considered. Oczakir et al. (2005) found complications included insufficient hygiene, soft tissue hyperplasia that resulted in extraction of remaining teeth and repair of prostheses. These were more common in certain groups including DS.
Oczakir et al. (2005) concluded that the mostly unknown implications and possible risks for the process of osseo-integration and long-term maintenance in patients with such rare diseases and defects have resulted in a restricted application of implants but that implants can be successfully placed and maintained in these patient groups. This is ascribed in part to strict maintenance care provided by the caregivers and to a high compliance of the patients who participated, to perform good oral hygiene. Many patients with disabilities live in supported or residential care and, if not able to maintain a high standard of oral care themselves, are reliant on carers or family members to meet their personal care needs. Patient’s social circumstances may also mean the cost of implants or other advanced dental treatment is prohibitive.

There is no universal treatment of choice for all patients with or without DS and every patient should be individually assessed taking into account all factors appropriate to the treatment offered. This case report is presented in an attempt to demonstrate that implants should not be eliminated from the treatment options considered for a patient merely because they have DS. However, successful osseointegration must not be considered successful treatment in the absence of maintenance, sustainable good oral hygiene and long term patient support.

Oral health is an integral part of general health. Improving the oral health of people with disabilities calls for the involvement of all dental specialities. We need to ensure that those who have the greatest need also receive the best dental care and treatment.

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References


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