Effect of visual impairment upon oral health care: a review

E. K. Mahoney,[1] N. Kumar[2] and S. R. Porter[3]

IN BRIEF

- A brief overview of visual impairment and its causes.
- The possible implications of visual impairment upon access to oral health care and dental treatment are discussed.
- Highlights the possible oral complications of ophthalmic disease.

PRACTICE

The incidence of visual impairment is increasing globally and in the United Kingdom due to local and systemic disease, medical advances, and the increasing age of population groups. Despite there being a large number of people resident in the UK with a visual impairment, there is little information available regarding the dental health care and needs of such individuals. As reported in other groups of patients with special needs, many individuals with a visual impairment may only seek oral health care when a problem arises, such as pain. Visual impairment may have a negative effect upon oral hygiene with many blind and partially sighted individuals having worse oral hygiene than sighted peers.

This review article was undertaken to examine the literature relating to visual impairment, oral health and dental care. This article will discuss the dental aspects of visual impairment, its implications for obtaining dental care, associated oral conditions and medical complications.

INTRODUCTION

Globally in 1997 the WHO estimated that there were 45 million people who were blind, almost 60% of whom were aged more than 60 years.[1] The most common causes of blindness globally are cataract (43%) and ocular disease secondary to diabetes mellitus (24%).[1-2] In the UK there are approximately two million people with a severe sight problem, the majority of whom are also over 60 years of age. This is likely to increase with medical advances, increasing life expectancy and the rising number of people affected by diabetes mellitus.[3] In developed countries like the UK the most common cause of visual impairment is age-related macular degeneration.[4] Only 8% of people have a congenital visual impairment with the rest developing a visual impairment through local or systemic disease, accidents or age related degeneration.[3,5-6] It is estimated that other disabilities and health problems occur in two thirds of those with a visual impairment. Some of the causes of visual impairment are indicated in Table 1.

1-3*Oral Medicine and Special Needs, UCL Eastman Dental Institute, 256 Gray's Inn Road, London WC1X 8LD
*Correspondence to: Professor Stephen R. Porter
Email: s.porter@eastman.ucl.ac.uk

Refereed Paper
Accepted 25 September 2007
DOI: 10.1038/bdj.2008.2
©British Dental Journal 2008; 204: 63-67

DENTAL CARE FOR INDIVIDUALS WITH A VISUAL IMPAIRMENT

The provision of oral health care to adults with a visual disability differs in physical access to surgeries, access to information as well as associated disabilities or medical conditions that affect dental care, such as diabetes mellitus or cardiac disease. With the full implementation of the Disability Discrimination Act 1995[7] there is a need to ensure that all barriers to dental care for this group of individuals are removed to ensure equal access for all.

Access to dental services

Many individuals with a visual disability receive dental care in the General Dental Service and those with complicating medical conditions may be seen in community and hospital dental services. Sighted individuals often find dental care through directories such as the yellow pages and advertising, but for some visually impaired people this may not be possible. However, with the advent of NHS direct telephone advice service and telephone directory services, individuals should have improved access to information on local dental services. Individuals with a visual impairment may prefer to attend the same practitioner over many years as routes can be learnt and building/surgery layouts become familiar.

Physical access may be the first barrier to accessing dental care for individuals with a visual impairment. To improve access to dental services simple measures such as keeping passages clear, ensuring areas are well lit, door frames and handles are well defined, having high backed chairs with arms, placing large print signs in areas of danger, and placing handrails by stairs can be used.[8] In addition, tactile maps, paths, Braille signs and use of contrasting colours are helpful.[9]

The first person a patient may come into contact with is the receptionist and it is important that they introduce themselves. It may be appropriate for the receptionist to offer to lead the patient to a chair, taking care to avoid any obstacles and explain the surroundings.[10-12]

Communication in the dental setting takes four broad forms: verbal, non-verbal, affective/paralinguistic and written.[13-14] Hence it is not only what dental staff may say but the way they say it, the

Table 1 Causes of visual impairment

Primary ocular disease	Secondary ocular disease
Acquired:	**Acquired:**
Age-related macular degeneration	Acromegaly
Cararacts	Behcets
Glaucoma	Corneal graft
Hemianopia	Diabetes related ocular disease (retinopathy, retinitis proliferans)
High degree myopia	Dry eye (Sjorgrens syndrome)
Nystagmus	Malignant hypertension
Retinal vein occlusion (thrombosis)	Mucous membrane pemphigoid
Retinopathy of prematurity	Multiple sclerosis (retrobulbar neuritis)
Uveitis	Muscular dystrophy
Congenital:	Reiter's syndrome
Aniridia	Steven-Johnson syndrome
Best's Disease	Temporal arteritis / giant cell arteritis
Charles Bonnet syndrome	Thyroid eye disease
Coats Disease	**Tumours:**
Colomboma	Basal cell carcinoma
Congenital cataracts	Melanoma
Corneal dystrophy	Metastases
Ehlers-Danlos syndrome	Retinoblastoma
Genetic eye disease	**Infections:**
High degree myopia	CMV
Intrauterine infections (CMV, Rubella, Syphilis)	Herpes simplex / zoster
Lacrimo-auricular-dento-digital syndrome	Toxoplasmosis
Laurence-Moon-Biedl syndrome	Trachoma
Marfans syndrome	**Drugs:**
Nystagmus	Methanol
Oculo-facio-cardio-dental syndrome	Phenothiazines
Retinitis pigmentosa	Quinine
Rieger syndrome	**Trauma:**
Treacher-Collins syndrome	Chemical trauma
Various inborn errors of metabolism	Damage / loss of eye
Zimmerman-Laband syndrome	Detached retina
	Foreign body
	Posterior vitreous detachment

(Adapted from Royal National Institute for the Blind 2004;[3] American Foundation for the Blind 2004[40])

tone of voice used, their facial expression, behaviour and body language which all impact on communication. Patients who have a visual impairment may not pick up on certain non-verbal aspects and may be disadvantaged. With respect to written information used in dental services few provide large print/ Braille appointment cards or information sheets.[8] One study found that, of the practices studied, 21% produced large print leaflets, 15% produced large print appointment cards and none produced information on audiotape.[15]

Dental treatment

It is vital to establish the degree of visual impairment so that information and treatment can be tailored accordingly. For example, some individuals are acutely sensitive to the operative light and thus it may be appropriate to provide dark safety glasses, as opposed to clear ones.

Dental treatment can be invasive and perceivably threatening and a visual impairment may make this more so, hence it may be appropriate to commence treatment with short appointments until the patient is accustomed to the dental staff and a rapport is established.[10-12] Schnuth[16] indicated that fear and apprehension might be reduced by the encouragement of questioning by the patient. It may also be useful to allow patients to touch instruments and to explain their action as some patients rely on senses other than sight to mentally visualise objects. A clear ongoing description on what they will feel, hear, taste and smell is important to ensure the patient is not surprised by an unexpected feeling, sound or taste. Movements should be explained and then carried out in a slow and deliberate manner.[10-12] A considerable proportion of adults with a visual impairment also have hearing loss which may require further modification to the provision of dental health care.[17-18] As in other groups of patients with special needs, many individuals with a visual impairment may only seek oral health care when a problem arises such as pain. This is especially true of the elderly, up to 80% of whom may not aware that it is advisable to have regular dental examinations.[19-20]

Medical complications of visual impairment relevant to dentistry

Some causes of visual impairment may be associated with other medical problems, such as cardiac defects or systemic disease (eg diabetes), which are more likely to affect dental care than the visual impairment. However, some causes of visual impairment do impact on dental care, ie diazepam and atropine need to be avoided for patients with glaucoma.[20-21] The provision of dental care for individuals with compromising medical conditions is adequately dealt with elsewhere and will not be discussed here. [20-21]

The medical conditions and disabilities most commonly associated with visual impairment[9] are listed below and reflect the older age of visually impaired persons:

Hearing impairment	34%
Arthritis	25%
Heart condition	18%
Mobility problems	14%
Diabetes	9%

More of the general medical complications of ophthalmic disease are summarised in Table 2.

Periodontal disease

Advice on oral hygiene instruction should be adapted to reflect the individual's level of impairment. This may range from large bold text to Braille and audio information. There may also be a need to adapt oral hygiene instruction methods with the use of models and other aids. Studies of relevance have shown that

Table 2 Oral and dental implications of some ophthalmic disorders

Disease/Syndrome	Ocular defect	General medical features	Oral/dental anomalies
Congenital:			
Congenital syphilis	Uveitis	Deafness, infection risk before 2 years of age, cardiovascular and neurological complications	Hutchinson's incisors, Moon's molars, possible micrognathia
Cross syndrome	Microophthalmia, cloudy cornea	Learning disability	Gingival enlargement
Ehlers-Danlos syndrome	Fragile cornea/sclera, early sight loss	Cardiovascular and respiratory anomalies, possible platelet defects	Periodontal disease (rare), microdontia, root morphology anomalies, pulp stones
Lacrimo-auriculo-dento-digital syndrome	Hypoplasia/aplasia of lacrimal puncta		Microdontia, hypodontia, dark/grey thin enamel, midface hypoplasia
Marfan's syndrome	Dislocated lens, retinal detachment	Cardiac and respiratory anomalies	High arched palate, TMJ anomalies
Oculo-facio-cardio-dental syndrome	Congenital cataract, micro-ophthalmia	Renal impairment, hearing impairment	Radiomegalic canines, delayed eruption, open apices, malocclusions
Patau's syndrome (Trisomy 13)	Microphthalmia, anophthalmia	Cardiac defects, polydactaly	Microcephaly, clefts, malocclusion, hypodontia, ectopic teeth
Rieger syndrome	Hypoplasia of iris, corneal/lens/ Pupilary defects	Hepatosplenomegaly	Hypodontia, maxillary/mandibular hypoplasia, taurodontism
Riley Day syndrome	Corneal ulceration, early sight loss	Hypotension, pyrexia, dysphagia, breath holding, kyphoscloiosis	Crowding, early tooth loss, bruxism, tooth surface loss, traumatic ulceration, hypersalivation, reduced pain stimuli
Rutherford syndrome	Corneal opacity	Learning disability, aggression	Gingival enlargement, delayed eruption, dentigerous cyst
Treacher Collins syndrome	Colombomas	Cardiac anomalies, hearing loss, increased risk of oesophageal carcinoma	Malar and mandibular hypoplasia, clefts, malocclusion, spacing, ectopic and hypoplastic teeth, microstomia, blind oral fistulas
Turner's syndrome	Ptosis, striabismus, amblyopia, cataracts	Scoliosis, hearing loss, hypertension, cardiac defects/murmurs	Retrognathia, reduced crown height and root length, decreased enamel thickness
Zimmerman-Laband syndrome	Retinitis pigmentosa, cataracts	VSD, cardiomegaly, syndactyly	Gingival enlargement, delayed eruption
Other			
Acquired:			
Diabetes mellitus	Retinopathy, blindness	Nephropathy, neuropathy, poor wound healing, infection risk, hypertension, ischaemic heart disease, cerebrovascular disease	Periodontal disease, possible candidal infection, xerostomia, lichen planus
Herpes Simplex/Zoster viral infection	Ocular infection	Cross infection risk	
Hypertension	Retinopathy, retinal haemorrhages	Ischaemic heart disease, peripheral vascular disease, cerebrovascular disease, renal failure	Drug-related xerostomia, lichen planus, burning mouth, loss of taste, gingival enlargement
Mucous membrane pemphigoid, pemphigus vulgaris, Steven-Johnson syndrome, Behcet's disease	Corneal ulceration (all) Symblepharon (pemphigus), others	Corticosteroid therapy and other auto-immune diseases may complicate care	All may cause various types of oral ulceration, pemphigoid may cause mucosal scarring
Sjogren's syndrome	Corneal ulceration	Rheumatoid arthritis, anaemia, leucopenia, other auto-immune disorders	Xerostomia, burning mouth, candidal infection, sialadenitis, angular cheilitis, liability to MALT lymphoma
Others			

Adapted from: Batterbury *et al* ;[41] Kawamoto *et al* ;[42] Koseki;[29] Shah *et al* ;[39] Kumar *et al*.;[43] Kuru *et al* ;[44] Barthelemy *et al* ;[45] Scully 2001;[46] Scully *et al* ;[50] Dimitrakopoulos *et al* ;[47] Lilly *et al* ;[48] Toumba *et al* ;[49] Mass *et al* ;[35] Naussbaum *et al* ;[36] Thompson *et al* [37]

individuals with a visual impairment are used to relying on verbal instructions and following them carefully and respond well to simple information which is adequately explained.[19]

Visual impairment can have a negative effect upon oral hygiene, some individuals having poorer oral hygiene than sighted peers.[22-23] There may also be an increase in periodontal disease with higher levels of calculus and debris than those who lack a visual impairment.[22-23] Several studies have examined oral hygiene advice for people who are blind or visually impaired (mainly children). These have hinged upon the use of good verbal instruction and tactile aids to improve tooth brushing methods.[24-26] O'Donnell and Crosswaite[26] found that children who were blind were very adept at converting oral instructions into manual oral hygiene practices. This confirms that given adequate verbal instruction individuals with a visual impairment can have the same levels of oral health as their sighted peers. Adequate oral hygiene instruction can have a positive impact on oral hygiene, periodontal status and maintain or improve self esteem.[16,19,27]

Dental caries

There appear to be no published data available on dental caries in adults who are blind or partially sighted. A study of children suggested that caries load is not affected by visual impairment.[22] A more recent study has shown a reduced number of decayed, missing or filled teeth (DMFT) in children who are visually impaired compared to sighted controls,[28] whereas others reported that DMFT scores were higher in a population of children who were blind when compared to sighted peers.[12] However, there is a positive association between some causes of ocular disease and dental caries, ie Sjögren's syndrome.[29]

Dental anomalies

It has previously been suggested that children who are visually impaired or blind have a liability to traumatic injuries of the teeth and the soft tissues of the mouth.[30] A study of children with impaired vision and hearing found that children with a visual impairment had a slightly higher incidence of incisal trauma than their sighted peers (9% and 6.7% respectively).[31] Others found no increased incidence of enamel fracture between the two groups of young adults.[22]

Dental anomalies secondary to congenital disease giving rise to sight loss may occur, eg enamel hypoplasia (Table 2). One report suggested an association between coloboma of the iris, hypodontia and amelogenesis imperfecta.[32] However, there appear to be no published reports of the rate and nature of dental anomalies associated with congenital sight loss.

It has also been suggested that occlusal wear may be increased in some individuals with a visual impairment, as a consequence of bruxism,[30] but the exact mechanism by which this occurs is unclear. Others have reported an association between ocular convergence and functional mandibular deviation.[33] Bruxism is also often associated with developmental delay and learning disability.[34] There is also an association between bruxism and familial dysautonomia (Riley-Day syndrome), an extremely rare disorder characterised by associated ocular involvement; there is reduced pain perception.[35-37]

Orthodontic treatment

Al-Sarheed and co-workers[38] found that children with a visual disability had a higher aesthetic orthodontic need than a sighted control population. It was noted that the parents felt their children were unconcerned about their appearance, yet in contrast, it was found that almost two thirds of children with a visual impairment wished orthodontic treatment.

Soft tissue lesions

Mucosal lesions may arise in individuals with impaired vision possibly as a consequence of bruxism and lip/cheek biting,[30] but there are no data to suggest that oral mucosal disease is notably increased in the visually impaired. An association has been highlighted between some congenital ocular defects and gingival fibromatosis/enlargement.[39] Impaired vision may prevent detection of asymptomatic oral mucosal disease,[19-20] eg malignancy, yet without good data this cannot be proved.

SUMMARY

The prevalence of visual impairment is increasing. This may be due in part to the increase in the average life expectancy of the population, improvements in medical science and higher levels of diabetes mellitus. Visual impairment may impact on access to dental care and oral health information. Associated systemic disease may complicate dental management. There is a paucity of information available on dental care for visually impaired adults and little information to help direct future health plans. The currently available data concerning visual impairment and dental care provided are out of date and provide conflicting advice. Clarification is required to enable effective and timely dental care service provision.

FUTURE RECOMMENDATIONS

As there are few data available on the oral health of individuals with a visual impairment more relevant research is needed to make any authoritative conclusions.

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