

Behaviour management needs for the orthodontic treatment of children with disabilities

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SUMMARY A displeasing dental appearance may have a significant emotional impact on an individual's well being. Although malocclusions occur more often in physically and/or mentally handicapped children than in normal children, the most severely handicapped patients are those least likely to receive orthodontic treatment. This investigation studied the modes of behaviour management used in the orthodontic treatment of disabled children, and the preferred criteria. The files of 49 disabled children were retrospectively evaluated. Two classification systems, the Frankl Behaviour Rating Scale (FBRS), and that of Owen and Graber were found to be unsuitable for determining the appropriate treatment modality. Five specific factors, frequently seen in disabled children, gag reflex, drooling, uncontrollable movements, inability to remain still, and the need for additional procedures, were graded and a scoring system was devised to include these factors within the assessment.

This scoring system may be used to evaluate new patients and to assist in the choice of the appropriate behavioural management mode.

Introduction

An unaesthetic dental appearance may have a significant emotional impact on an individual's well being. It may adversely affect their self-esteem and evoke an unfavourable social response in many facets of his or her social interaction (Shaw, 1981). There is evidence to indicate that a marred physical appearance provokes a less favourable first impression and can bias judgements of social acceptability, ability, and personality. The face and oral region in particular, appear to be of primary importance in determining attractiveness and the teeth are a frequent target for teasing and ridicule amongst children (Shaw *et al.*, 1980).

It has already been reported that malocclusions occur more often in physically and/or mentally handicapped children than in healthy children. Specific handicapped groups, such as those with Down's syndrome or cerebral palsy, have been associated with increased frequencies of particular dental features (Cohen and Winer,

1965; Franklin *et al.*, 1996). Orelund *et al.* (1987) found a higher prevalence of dental malocclusion in the severely mentally retarded compared with physically handicapped children, and concluded that the mental condition is more important for the orthodontic status than the medical diagnosis.

In addition to a displeasing appearance, malocclusion may compromise all aspects of oral function and generate adaptive alterations in chewing, swallowing or speech (Proffit, 1993). However, the most severely handicapped patients are those least likely to receive orthodontic treatment.

Owen and Graber (1974) classified handicapped children as mildly, moderately, and severely handicapped. They based the possible benefits from orthodontic treatment, the exact treatment plan, and the management modality on the physical and mental characteristics of each category. Since 1974 patient management has changed dramatically and a wide range of

pharmaceutical and behavioural techniques are available today that simplify the control of adverse behavioural patterns. As a result, it has been possible to considerably narrow the chasm separating treatment need from treatment access and delivery. The spectrum of methods used for pain and anxiety control may be divided into conscious methods (such as oral; intramuscular; inhalation with nitrous oxide and oxygen, and intravenous sedation), and unconscious methods which include intravenous or inhalation deep sedation and general anaesthesia (GA) with endotracheal intubation (Malamed, 1995).

Becker and Shapira (1996) have defined the main problems that may occur during orthodontic treatment and have shown how, using these methods, treatment delivery is possible for many disabled children. Based on their clinical experience, guidelines which may allow orthodontists to gain therapeutic access to these patients have been provided. Experience shows that most disabled children approach treatment with exaggerated levels of apprehension, far more than normal orthodontic patients. Accordingly, these patients must be approached with understanding and compassion to gain their trust.

The first several visits are directed towards raising the patient's confidence and determining the maximum level of compliance that is achievable. Far more important and critical in the long-term is the level of parental motivation, and the ability, willingness, and availability of the parent to carry out the new responsibilities posed by the orthodontic treatment of their child. Only after these assessments have been made during the first few visits, can the orthodontist establish reasonable individual goals on a modular, stage-by-stage basis, which need to be reassessed at the completion of each stage, being prepared to change these goals if needed. At the same time, an estimate of the most suitable way (behaviour management, sedation, or GA) to perform the more difficult procedures, such as impressions or bracket bonding may be made.

Perfection is not often achievable in these patients, but this need not deter an attempt to improve their occlusion. The practitioner should understand the particular relevance in this context of the concept that the patient may

Table 1 Distribution of patients related to medical diagnoses.

Mental retardation	17
Cerebral palsy	9
Down's syndrome	7
Muscular dystrophy	6
Autism	3
Lennox Gastaut syndrome	2
Russell Silver syndrome	1
Coffin Lowry syndrome	1
Behr syndrome	1
Congenital kyphoscoliosis	1
Incontinentia pigmenti	1
Total	49

benefit substantially from each treatment goal achieved, even when some may be beyond his/her reach.

The purpose of this article is to describe the modes of behaviour management that are used in our centre for the delivery of orthodontic treatment and the criteria for preferring one mode over another. The specific indications for choosing GA, in particular, will be emphasized and discussed.

Subjects and methods

The files of 49 handicapped children treated between 1989 and 1997 at the orthodontic department at the Hebrew University—Hadassah School of Dental Medicine by one author (AB) were retrospectively evaluated. The mean age of the patients was 12.9 years with a range of 7–21 years. The medical diagnoses are listed in Table 1. Each patient was classified according to two classification systems: one related to handicapped children (Owen and Graber, 1974) and the second to the delivery of routine dental treatment to normal children—the Frankl Behaviour Rating Scale (FBRS; Frankl *et al.*, 1962).

Owen and Graber's (1974) classification employs three categories:

1. The mildly handicapped: (a) physical; (b) mental; (c) emotional.
2. The moderately handicapped: (a) physical; (b) mental; (c) emotional.
3. The severely handicapped: (a) physical.

In order to extend the use of the classification, a further category titled 3b was added and included those patients with severe mental retardation, with whom no verbal interaction was possible.

The FBRS (Frankl *et al.*, 1962), divided behaviour into four categories:

Rating 1: Definitely negative.

Rating 2: Negative.

Rating 3: Positive.

Rating 4: Definitely positive.

The placement of bonded fixed appliances demands strict control of the intra-oral environment and any adverse behavioural tendency must be overcome in order to permit its successful conclusion. The means by which the adverse behaviour was overcome—the adjunctive modality, in order to place the appliances, was recorded as: GA, general anaesthesia; SED, sedation; BM, behavioural modification techniques alone.

The efficacy of each classification scheme to predict the treatment modality was evaluated. From experience in providing orthodontic treatment for these patients, certain observable and unfavourable behavioural anomalies were found, which may prejudice treatment delivery. One or more of these may dictate the need for GA management and were evaluated retrospectively by the same orthodontist (AB), who was directly responsible for the treatment of all the patients:

Gag reflex

- normal gag reflex
- + exaggerated gag reflex still permitting regular treatment
- ++ extreme gag reflex interfering with regular treatment

Uncontrolled movements

- no uncontrolled movements
- + movements that do not interfere with the treatment

- ++ movements interfere, but treatment is still possible in the dental chair
- +++ movements which prohibit treatment in dental chair

Ability to submit to prolonged dental treatment procedures

- no inability to remain still
- + mild inability to remain still
- ++ moderate inability to remain still compatible with treatment in dental chair
- +++ severe inability to remain still incompatible with treatment in dental chair

Drooling

- no drooling present
- + mild hypersalivation
- ++ moderate hypersalivation controllable for bonding in dental chair
- +++ severe hypersalivation prohibiting bonding

The need for additional procedures under general anaesthesia

The association between these criteria and the selected management modality was evaluated.

Results

Table 2 describes the group of patients, divided according to the various diagnoses and in descending order of the score indicating difficulty of management. The prevalence of the different factors in this sample was as follows: gag reflex, 33 per cent; drooling, 43 per cent; uncontrolled movements, 43 per cent; inability to sit still, 71 per cent.

For the more difficult procedures in the treatment of 49 patients in this sample, 12 were treated with the aid of GA, seven by sedation, and 30 by behavioural modification techniques. With one exception, all those treated by GA required this modality for additional dental procedures, such as tooth extraction. The reason for the appliance being placed under GA was

Table 2 Sex, age, diagnosis, classifications, presence of the different criteria, mode of management, and final score.

Patient	Sex/ age	Owen and Graber, 1974	FBRs	Gag reflex	Drooling	Uncontrolled movement	Inability to remain still	Additional procedures under GA	Manage- ment	Final score
(a) Mental retardation group										
1	M/13	3a + b	1	-	+	+++	+++	+	GA	125
2	F/14	2a + 3b	1	-	+	+	+++	+	GA	110
3	F/13	1b	2	-	++	+++	+++	+	GA	105
4	F/12	2a + b	1	++	-	-	+++	+	GA	100
5	F/16	2b	2	-	-	++	+++	+	GA	90
6	F/21	2b	2	-	+	-	+++	+	GA	85
7	M/11	2a + b	1	++	-	++	+++	-	SED	70
8	M/10	2b	2	+	-	-	++	-	BM	35
9	M/16	1b	3	+	-	+	++	-	BM	30
10	M/10	2b	3	-	+	+	+	-	BM	30
11	F/12	1b	2	-	-	+	+	-	BM	25
12	F/18	1b	3	-	-	-	++	-	BM	20
13	F/15	2b	3	-	-	-	-	-	BM	15
14	F/10	1b	4	+	+	-	-	-	BM	10
15	F/13	1a + b	3	-	-	-	-	-	BM	10
16	F/13	1b	4	-	-	-	-	-	BM	5
17	F/14	1b	4	-	-	-	-	-	BM	5
(b) Cerebral palsy group										
1	M/18	1a + 2b	3	++	-	-	+++	+	GA	85
2	F/13	2a + 3b	1	-	+	+++	+++	-	SED	85
3	M/18	1b + 2a	4	-	++	+++	-	+	GA	80
4	M/13	3a + 2b	3	++	+++	++	++	-	GA	75
5	M/12	3a + 1b	3	++	+++	++	+	-	SED	70
6	F/15	2a + b	2	++	-	++	+++	-	SED	60
7	F/13	1a + 2b	2	+	+++	+	+	-	SED	55
8	F/15	2a + b	2	+	-	+	+	-	BM	35
9	M/14	1b	4	-	-	-	-	-	BM	5
(c) Down's syndrome group										
1	M/8	2b	1		+	+	+++	+	GA	100
2	M/10	2b	2	-	+	+	+++	-	SED	50
3	M/11	2b	2	-	+	-	+++	-	BM	45
4	F/15	2b	2	-	+	-	++	-	BM	35
5	F/7	2b + 1a	3	+	-	-	+	-	BM	30
6	M/15	2b	2	-	-	-	+	-	BM	30
7	M/9	2b	3	-	-	-	++	-	BM	25
(d) Muscular dystrophy group										
1	F/9	2a + b	2	+	+	+	++	+	GA	80
2	M/15	1a + b	3	++	++	-	++	-	BM	40
3	F/10	2a	3	-	+++	-	-	-	BM	35
4	F/12	2a	3	-	++	-	+	-	BM	30
5	M/11	3a	4	-	-	-	-	-	BM	20
6	M/11	1a + b	3	-	-	-	-	-	BM	10
(e) Other diagnoses										
Coffin Lowry	M/13	2b	1	-	+++	+++	+++	+	GA	130
Autism	M/10	2b	1	-	-	+++	+++	-	SED	70
Behr syndrome	F/17	1a + 2b	2	+	+	+	++	-	BM	45
Autism	M/12	3a	2	-	-	-	++	-	BM	30
Congenital kyphosoliosis	F/12	1b	3	-	-	-	+	-	BM	30
Autism	M/13	1b	4	-	++	-	+	-	BM	20
Lennox										
Gastout	F/13	1b	3	-	-	-	-	-	BM	10
Lennox										
Gastout	M/14	1b	3	-	-	-	-	-	BM	10
Incontinentia										
Pigmenti	F/13	1a	3	-	-	-	-	-	BM	10
Russell										
Silver	F/11	1a + b	4	-	-	-	-	-	BM	5

FBRs, Frankl Behavioural Rating Scale.

due to the presence of an extreme gag reflex and severe hypersalivation. Each of these children was unable to sit still for a sufficient time to allow for the performance of all but the simplest procedures. The mean FBRs was 1.9, indicating a negative behaviour pattern towards treatment, although not all the patients who were graded 1 or 2 required GA. The mean Owen and Graber category was 2.3 (moderate-to-severe handicap), but no correlation was found between this classification and the treatment mode. Other evaluated factors could not predict the need for one or other of the treatment modalities.

All the patients requiring sedation needed this because of their inability to sit still. The mean FBRs was 1.7, but there were patients graded 2 who were still treatable by behavioural modification techniques alone. Uncontrolled movements ranged from mild to severe, but none of the patients graded moderate or severe were treated with behavioural modification techniques alone. Thus, while the Owen and Graber grading was 2, it could not provide a directive to indicate the required adjunctive modality. The other factors were non-contributory.

Degrees of inability to sit still were subdivided as either mild or moderate in the group of patients treated by behavioural modification techniques. The mean FBRs was 2.9. The other factors were non-contributory.

Each category was scored as follows:

1. Owen and Graber: category 1, score 5; category 2, score 10; category 3, score 20. In the patients presenting several handicapping conditions in different categories, the more severe category was scored.
2. FBRs: rating 1, 2, 3, and 4 equals score 20, 10, 5, and 0, respectively.
3. Gag reflex: –, score 0; +, score 5; ++, score 10.
4. Drooling: –, score 0; +, score 5; ++, score 10; +++, score 20.
5. Uncontrolled movements: as with drooling.
6. Inability to sit still: as with drooling.
7. Need for additional procedures under GA: none-score, 0; affirmative-score, 40.
8. The total score was calculated and is summarized in Table 3.

Table 3 The total scores, means and ranges, in the different groups of treatment management.

	BM	SED	GA
Mean	22.8	65.7	97.5
Range	5–45	50–85	75–130
Number of patients	30	7	12
Percentage	61.2	14.3	24.5

BM, behavioural modification techniques alone; SED, sedation; GA, general anaesthesia.

The score in the GA group was significantly different from that in the sedation and the behavioural modification technique groups. The mean score was 97.5 in the GA group with a range of 75–130; 65.7 in the SED group with a range 50–85, and 22.8 in BM group with a range 5–45.

Discussion

Jackson (1967) believed that children with a learning disability 'should not be turned away merely because a really good result from an orthodontic standpoint is not possible'. Should more severely disabled children be discounted? These children, and by association many of their parents, already suffer from a social stigma, and a poor dental appearance accompanied by impaired oral functions, may lead to a further negative social response.

Becker and Shapira (1996) used conscious sedation or GA for the most difficult procedures needed during the orthodontic treatment of disabled patients. In the same article, they reported that it was policy to limit the use of GA, preferring to work on a fear-free child with unaltered normal reflexes. The use of Midazolam in the form of nose drops combined with nitrous oxide was the preferred sedation modality.

Jackson (1967) was the first to suggest using GA for the placement of orthodontic bands. Chadwick and Asher-McDade (1997) claimed that the majority of the more profoundly disabled patients are able to tolerate the adjustment of an appliance, but are unable to keep still for long enough to place brackets and bands. They

presented two cases of mentally retarded patients whose bonded appliances were placed under GA, but whose further maintenance was provided in the dental chair by behavioural modification techniques. That article described the bonding of brackets under GA in detail.

The present authors, in agreeing with this approach, strongly emphasize that the decision to perform the most difficult procedures under conscious sedation or GA should be taken solely on condition that the patient has proved to be able to undergo short visits, such as those needed for the appliance adjustments, by BM techniques alone.

Classification systems are aimed at providing a universal language between physicians and establish standardized treatment approaches. The FBRs for observed behaviour gained popularity because it is functional, quantifiable, and reliable in relation to paedodontic treatment. Its relevance to the handicapped child, however, is tenuous. Relating to handicapped children's orthodontic treatment, the sole existing classification divides the handicapped children into three groups from mild to severe, based on their diagnoses and not on their attitude to treatment (Owen and Graber, 1974).

With the development of different management modalities in orthodontics in recent years, a parallel need has arisen to classify the child's behaviour, as it relates to orthodontic treatment. The present study attempts to address this need.

Most of the patients in the present sample were diagnosed as moderately mentally retarded. In this context, defining the level and range of handicap in the sample of patients treated is important. Minimal levels of handicap may permit the patient to be included with normal orthodontic patients in one centre and not in another. Conversely, very difficult handicaps may result in some orthodontists classifying a patient as untreatable. In this way, examples will vary in their severity and other factors may therefore assume greater importance.

The specific factors evaluated in this study have been selected which, in the light of the author's clinical experience, are considered as being the most relevant in this context. Their exact clinical significance was not known at the

beginning of this study. From the prevalence ratios it can be seen that the most frequently occurring factor is a chronic inability to remain still. This finding supports the rationale for GA suggested by Chadwick and Asher-McDade (1997). Drooling occurred in 43 per cent of the sample and was evaluated as severe in five patients (10 per cent), three of whom suffered from cerebral palsy. This correlates well with the 33 per cent incidence of drooling reported by Orelan *et al.* (1989) in severely mentally retarded individuals. None of these factors alone could dictate the need for GA in preference to SED or BM techniques. The need for GA for other procedures directly or indirectly related to the orthodontic treatment (such as fillings, extractions, etc.), almost always dictated the use of GA for the concomitant bonding of brackets. Similarly, none of the factors could provide relevant information that could be used to justify recommending SED or BM alone.

An arbitrary scoring system was therefore designed and the ranges are shown in Table 3. A patient with a score under 45 can probably be treated in the dental chair by BM techniques alone. Scores of 50–85 indicate treatment by SED techniques, while scoring the patient more than 85 generally indicates a GA for long session appointments, such as bracket bonding.

Conclusions

This article describes a retrospective study of a small sample of patients with a variety of serious, handicapping diagnoses, and lacks a prospective evaluation of the validity of the score. However, it attempts to confront the considerable challenge of classifying management of the delivery of orthodontic treatment to handicapped children. In the light of on-going experience, the scoring system may require modification and a prospective study is presently being conducted to evaluate the validity of the system. The results will be reported on completion.

A need exists for firm guidelines that will be helpful in predicting the orthodontic management needs of disabled children, in the light of the unsuitability of existing classifications used in paedodontic practice.

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