Journal of Orthodontics/Vol. 27/2000/323–327

A Comparison Between Written, Verbal, and Videotape Oral Hygiene Instruction for Patients with Fixed Appliances

ADELE LEES, B.D.S., F.D.S.R.C.S. (ENG). M.ORTH. R.C.S. (EDIN), M.DENT.SCI. (ORTHODONTICS)

W. P. ROCK, D.D.S., D. ORTH., F.D.S.R.C.S. (ENG)

School of Dentistry, St Chads Queensway, Birmingham B4 6NN, UK

Abstract. *The objective of the study was to compare the effectiveness of written, videotape, and one-to-one instruction upon the knowledge, oral hygiene standard, and gingival health of subjects undergoing orthodontic treatment with a lower fixed appliance.*

Subjects for whom fixed appliances had been fitted recently were divided randomly into three groups of 21, 22, and 22, respectively. Group 1 received written oral hygiene instruction, group 2 a specially made videotape, and group 3 saw a hygienist for one-to-one instruction. Results were assessed in terms of improvement in knowledge concerning oral hygiene procedures, and of plaque and gingival index scores.

Analysis of variance revealed no significant main effects or interactions at P = *0·05, although the difference in the plaque index scores before and after instruction was close to significance.*

Index words: Fixed appliances, Oral hygiene, Video teaching.

Introduction

The presence of a fixed orthodontic appliance makes tooth cleaning more difficult and predisposes to plaque build-up, especially between the bracket and gingival margin (Ciancio *et al*., 1985). The greater the area of tooth covered by a bracket (Mitchell, 1992) and the greater the complexity of other appliance components (Zachrisson, 1974), the harder it becomes for the patient to clean the teeth properly.

Plaque build-up during orthodontic treatment may lead to chronic hyperplastic gingivitis with increased pocket depths (Alexander, 1991) and slight, but significant loss of periodontal support (Alstad & Zachrisson, 1979; Hamp *et al*., 1982, Alexander, 1991). However, long-term studies have not suggested that orthodontic treatment affects subsequent susceptibility to periodontal disease (Sadowski & BeGole, 1981).

Increased plaque formation also gives rise to more prolonged acid challenges to the enamel surfaces, which may produce white spot lesions (Gorelick *et al*., 1982) or, in more severe cases, widespread decalcification and cavity formation (Zachrisson & Zachrisson, 1971; Mitchell, 1992).

The importance of a high standard of oral hygiene during orthodontic treatment is such that the patient is expected to demonstrate it before treatment is begun. The policy in the authors' department is not to place on the waiting list for treatment any patient for whom disclosure shows the presence of plaque on more than 10 per cent of tooth surfaces.

Such patients are counselled and treated by hygienists before being placed on the waiting list. Despite this type of pre-treatment screening, there may have been a reduction in the effectiveness of oral hygiene by the time that the appliance is to be fitted, so that further instruction is needed. Once the appliance is in place it becomes more difficult to keep the teeth clean and plaque accumulation may again be a problem.

The three main methods of patient instruction used in medicine and dentistry are verbal, printed materials, and videotapes. Written instructions appear to be the least effective (Self *et al*., 1983). The advantages of video presentation have been described as convenience and clarity of demonstration of relevant material, with the opportunity for self-learning in privacy and comfort. A review of 33 medical studies supported the use of video material for increasing patient knowledge and skills, and for changing behaviour (Nielsen & Sheppard, 1988).

It has been suggested that instructional videos should be made by the clinicians responsible for treating the target group patients, so that precise information is incorporated (Guin & Donaldson, 1991). Perhaps the main advantage of a video over other instructional methods is that it can be used repeatedly at no additional cost, a suggestion made by McCulloch *et al*. (1983) who successfully developed a videotape for teaching dietary control to insulin dependent diabetics.

However, although actual usage costs of video instruction are low, the time taken to prepare good materials should not be under-estimated. A video made to prepare patients to face an operation took over a year to plan, although actual filming took only 3 days (Whiteley, 1992).

The aims of the present study were to make a videotape to teach oral hygiene to patients wearing fixed orthodontic appliances, and to test the effectiveness of such instruction against written instructions and one-to-one verbal instruction.

Correspondence: Dr W. P. Rock, School of Dentistry, St Chads Queensway, Birmingham B4 6NN, UK

0301-228X/00/040000+00$02.00

Materials and Methods

Sixty-five subjects who had been fitted with a lower fixed appliance during the previous 3 months were divided into three groups by a process of physical randomization in which numbers were drawn from a hat. Every patient had a similar Straight-Wire appliance (A Company) and all brackets were bonded by the same clinician using Right On (T.P. Company) orthodontic adhesive.

Group 1 with 21 subjects received a written information sheet. Group 2 with 22 subjects received a videocassette containing the specially made film *Brace Yourself*, which they took home. Group 3 with 22 subjects attended for an instructional visit with a dental hygienist.

Before instruction, each subject was examined for plaque and gingival index scoring on the basis of three teeth, lower right canine, lower left central incisor and lower left first or second premolar. Second premolars were scored for all cases, unless they had been extracted as part of orthodontic treatment, in which case first premolars were scored.

The plaque index was based upon that of Greene & Vermillion (1960). After applying disclosing solution and allowing the subject to rinse the presence of plaque was recorded by placing a tick into boxes imagined by dividing the tooth surface into vertical and horizontal thirds using the bracket as the centre (Figure 1). Plaque was scored for the five boxes alongside or gingival to the bracket to give a possible maximum mouth score of 15.

The gingival index was based upon that of Loe & Silness (1963) with grades of 0–3 denoting absent, mild, moderate, and severe inflammation, respectively. A spring-loaded periodontal probe was used to provide standard pressure when testing for grade 2, 'bleeding on probing'. The same three teeth were used as for the plaque index, three areas per tooth being scored: mesio-buccal, mid-buccal, and distobuccal, to give a possible mouth total of 9. Gingival index scores of 2 or 3, which indicated active disease, were coded 1 in the present study, whilst scores below 2 were coded as zero in order to facilitate statistical analysis.

Before the study proper the sole examiner underwent calibration training in both plaque and gingival index scoring. Six designated teeth were scored for five patients who were receiving treatment with the same type of fixed appliance as that in the study group. Subjects were examined on two occasions separated by 30 minutes.

On entry to the study and before one of the three instructional methods was allocated, the dental health knowledge of each subject was tested by means of a questionnaire which included open questions relating to diet and oral health care, especially in relation to fixed appliance wear. Answers were scored according to an aide-memoire prepared beforehand which listed 20 expected responses, each of which was to be mentioned specifically in the instructions given to the patient.

Group 1 subjects then received two sheets of written information, specially designed for the study. There were six main sections: possible problems in the early stages, appliance care and diet, plaque disclosure and cleaning, routine dental care, and emergency resolution. Ethical and legal advice was obtained from the Medical Protection Society in the preparation of the text.

Group 2 subjects were given a specially made videofilm 8 minutes long, which they took home and kept for the duration of the study. The title of the film was *Brace Yourself* and included in the introduction were shots of a theme park ride, rather like the 'train-tracks' analogy applied to fixed appliances by West Midlands children. Special effects and musical backing were also used to improve the presentation. The script was based upon information included on the written information sheets. Still frames from the video are shown as Figures 2–4.

Group 3 subjects were each seen by a dental hygienist on one occasion who gave oral health advice according to written instructions based upon those given to the Group 1 subjects. The visit was timed to last 30 minutes. Several hygienists took part in the study and to help the consistency of advice given to the subjects all of the hygienists had read the written instructions and watched the video.

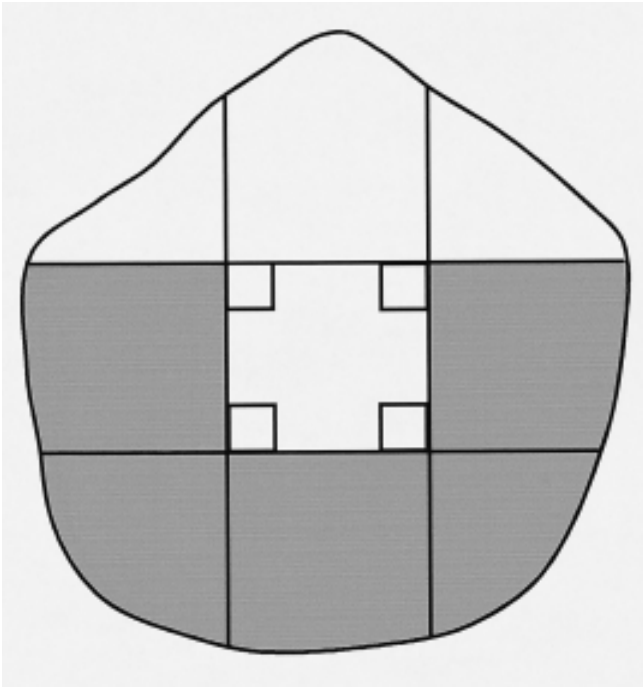

FIG. 1 The grid used to record plaque scores on the basis of five boxes per tooth.

FIG. 2 A still-frame from the video showing an orthodontic toothbrush.

Eight weeks after entry to the study subjects were re-examined blindly, plaque, and gingival scoring was repeated, and the questionnaire was used again to determine any change in knowledge.

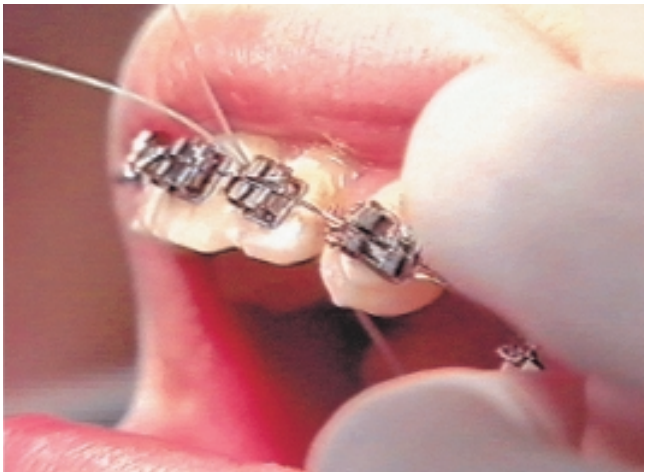

FIG. 3 A still-frame from the video showing use of a floss threader.

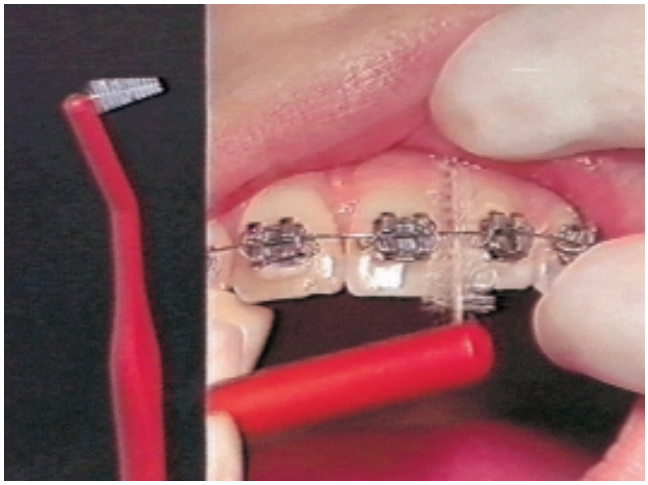

FIG. 4 A still-frame from the video showing an interspace brush.

Statistical Testing of Results

Numeric calibration data were compared using the Kappa statistic, whilst ordinal scores were compared by means of chi-square. GLM in Minitab was used for ANOVA of main study inter-group differences.

Results

Calibration

Results for plaque scoring agreed on 93 per cent of occasions, ($\chi^2 = 3{\cdot}99$ with one degree of freedom, $P < 0{\cdot}001$. Gingival index scores were similar for 87 per cent of first and second examinations, giving a Kappa value of 0·61 indicative of good agreement (Landis & Koch 1977).

Plaque scores are shown as Table 1. For the written instruction group scores changed little over the study period. Total plaque scores fell in the other two groups, especially for plaque gingival to the bracket where reductions were around double those found higher up the teeth. However, ANOVA revealed no significant main effects or interactions at $P = 0{\cdot}05$, although the main effect 'Before and after instruction' had $P = 0{\cdot}058$, very close to significance.

Gingival index scores (Table 2) increased by 28 per cent in the written instruction group and fell in the other two groups ANOVA showed no significant main effects or interactions.

Pre- and post-study questionnaire scores are in Table 3. The overall average score before instruction was 7·5 (38 per cent). In the group who received written instructions questionnaire scores were actually lower at the end of the study than at the beginning. In the video and hygienist groups scores improved by 18 and 23 per cent, respectively, although neither increase was significant, $P > 0{\cdot}05$.

Discussion

It is recognized that no single instructional method suits all learners (Yoder, 1994). In the present study baseline knowledge provided only 38 per cent correct responses, leaving considerable scope for improvement. Improvements in questionnaire scores of 18 and 23 per cent, respectively, against pre-education values were recorded

TABLE 1 *Pre- and post-study plaque scores*

Tooth surface	Maximum score	Pre-education		Post-education		Percentage change
		Mean	SD	Mean	SD	
Written education						
Adjacent to bracket	6	5	1·48	5	1·41	0
Gingival to bracket	9	5·14	2·94	5·29	2·72	+2·9
Total buccal	15	10·14	3·66	10·9	3·29	+1·48
Video education						
Adjacent to bracket	6	5·55	0·86	5·09	1·38	–8·29
Gingival to bracket	9	6·23	2·37	5·23	2·76	–16·1
Total buccal	15	11·77	2·33	10·32	3·33	–12·32
Hygienist education						
Adjacent to bracket	6	5·05	1·46	4·41	1·53	–12·7
Gingival to bracket	9	6·14	2·98	4·68	3·32	–23·8
Total buccal	15	11·18	3·63	9·09	4·05	–18·7

TABLE 2 *Pre- and post-study gingival index scores*

Type of education	Maximum score	Pre-education		Post-education		Percentage change
		Mean	SD	Mean	SD	
Written	9	2·05	1·86	2·62	1·96	+27·8
Video	9	2·32	1·76	1·91	2·2	–17·68
Hygienist	9	2·73	2·43	2·14	1·58	–22·62

TABLE 3 *Pre- and post-study questionnaire scores*

Type of education	Maximum score	Pre-education		Post-education		Percentage change
		Mean	SD	Mean	SD	
Written	20	7·93	2·65	7·36	3·35	–7·2
Video	20	7·84	2·41	9·23	1·39	+17·2
Hygienist	20	6·8	3·1	8·34	3	+22·6

for the video and hygienist groups, although neither change reached the level of statistical significance. Other workers using video instruction in the dental situation have found videotapes effective for improving the attitude of young children towards dental treatment (Machen & Johnson, 1974; Fields & Pinkham, 1976).

In the present study, subjects in Groups 1 and 2 had access to either written or video material during the whole period of the study. No attempt was made to measure the extent to which either was used since it would have been difficult to do this reliably, and the whole object of the study was to measure the effectiveness of three instructional methods that were designed to be used in different ways.

Gingival index scores fell by 18 per cent in the video group and by 22 per cent in the hygienist group. These findings give some cause for encouragement, although neither reached the level of statistical significance.

There was no improvement in plaque control for the written instruction group. Plaque score reductions of 12 and 19 per cent, respectively, were found in the video and hygienist-educated groups, whilst questionnaire scores were higher for these subjects at the end of the study than at the start. The trends towards improvements in both knowledge and conduct of oral hygiene procedures following video instruction are encouraging.

Although much less costly than one-to-one instruction at each visit, the time and expense of making a suitable video film should not be under-estimated. In a television age anything less than a slick and sophisticated production is unlikely to hold the attention of young people, even for a relatively short time. Much time and effort went into producing the video for this study.

Note

The video *Brace Yourself* was awarded a Diplome D'Honneur at the 14th Festival International du Film et de la Video Dentaires at the Congress de l'Association Dentaire Francaise. Copies are available from Dr Adele Lees, Malvern Orthodontic Centre, Imperial Road, Great Malvern, Worcestershire WR14 3AT, UK.

Acknowledgements

We are grateful for the technical and artistic skills of Mike Sharland, who shot and edited the film, and was a constant source of encouragement and expertise. Verona Needham prepared the manuscript for submission. John Rippin gave statistical advice.

References

Alexander, S. (1991)
Effects of orthodontic attachments on the gingival health of permanent second molars,
American Journal of Orthodontics, **100,** 337–340.

Alstad, S. & Zachrisson, B. (1979)
Longitudinal study of periodontal condition associated with orthodontic treatment in adolescents,
American Journal of Orthodontics, **76,** 277–286.

Ciancio, D. G., Cunat, J. J., Mather, M. L. & Harvey, D. N. (1985)
A comparison of plaque accumulation in bonded versus banded teeth,
Journal of Dental Research, **64,** Special Issue, 325, Abstract 1664.

Fields, H. & Pinkham, J. (1976)
Videotape modelling of the child dental patient,
Journal of Dental Research, **55,** 958–963.

Gorelick, L., Geiger, A. & Gwinnett, A. J. (1982)
Incidence of white spot formation after bonding and banding,
American Journal of Orthodontics, **81,** 93–98.

Green, J. C. & Vermillion, J. R. (1960)
The oral hygiene index: a method for classifying oral hygiene status,
Journal of the American Dental Association, **61,** 172–179.

Guin, J. & Donaldson, R. (1991)
Making your own videotapes for patient instruction,
Seminars in Dermatology, **10,** 123–128.

Hamp, S., Lundstrom, F. & Nyman, S. (1982)
Periodontal conditions in adolescents subjected to multiband orthodontic treatment with controlled oral hygiene,
European Journal of Orthodontics, **4,** 77–86.

Landis, J. & Koch, G. (1977)
The measurement of observer agreement for categorical data,
Biometrica, **33,** 159–174.

Loe, H. & Silness, J. (1963)
Periodontal disease in pregnancy,
Acta Odontologica Scandinavica, **21,** 533–551.

Machen, J. & Johnson, R. (1974)
Desensitisation, model learning and the dental behaviour of children, *Journal of Dental Research*, **53,** 83–87.

McCulloch, D. K., Mitchell, R. D., Ambler, J. & Tattersall, R. B. (1983)
Influence of imaginative teaching of diet on compliance and metabolic control in insulin dependent diabetes, *British Medical Journal*, **287,** 1858–1961.

Meade, C., McKinney, P. & Barnas, G. (1994)
Educating patients with limited literacy skills. The effectiveness of printed and videotaped materials about colon cancer, *American Journal of Public Health*, **84,** 119–121.

Mitchell, L. (1992)
Decalcification during orthodontic treatment with fixed appliances—an overview, *British Journal of Orthodontics*, **19,** 199–205.

Nielsen, E. & Sheppard, M. (1988)
Television as a patient education tool. A review of its effectiveness, *Patient Education and Counselling*, **11,** 3–16.

Sadowsky, C. & BeGole, E. A. (1981)
Long term effects of orthodontic treatment on periodontal health, *American Journal of Orthodontics*, **80,** 156–171.

Self, T. H., Brooks J. B., Lieberman, P. & Ryan, M. R. (1983)
The value of demonstration and the role of the pharmacist in teaching the correct use of pressurised bronchodilators, *Canadian Medical Association Journal*, **128,** 129–131.

Whiteley, M. (1992)
'So you're going to have an operation?' The making of a video, *British Journal of Theatre Nursing*, **2,** 4–7.

Yoder, M. (1994)
Preferred learning style and educational technology, *Nursing and Health Care*, **15,** 128–132.

Zachrisson, B. (1974)
Cause and prevention of injuries to teeth and supporting structures during orthodontic treatment, *American Journal of Orthodontics*, **69,** 285–300.

Zachrisson, B. & Zachrisson, Z. (1971)
Caries incidence and oral hygiene during orthodontic treatment, *Scandinavian Journal of Dental Research*, **79,** 394–401.