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Chairman's Update

There has been a considerable amount of change in the Clinical Effectiveness Committee over the last year. I took over as chairman from John Muir at The British Orthodontic Conference in September 2002. John has led the Clinical Effectiveness Committee admirably for a number of years and his presence and humour are much missed. John has been innovative and has introduced a number of important audit initiatives.

Many thanks are also due to Helen Fellowes, who stepped down as secretary in April 2003. Helen's knowledge and experience have been invaluable to the committee. I am delighted that Ros McMullen, Consultant Orthodontist in Londonderry, has joined us as secretary. I am looking forward to Ros's contribution. After a number of years as editor, Steve Richmond has handed over to Gavin Barry, ably supported by Jeremy Knox. I know that the Clinical Effectiveness Newsletter is highly regarded, not only within our own group, but across the dental specialties and indeed in Europe. We look forward to continuing to produce a newsletter per year under Gavin's editorship. Two national audit projects have now been completed, and the results of the first project reported in the BDJ in January 2003. A number of publications are anticipated from the second outcome project. Three further national audit projects are now being planned which will keep us busy over the next few years.

Julian O'Neill *June, 2003*

In this issue.....

AN AUDIT TO ASSESS THE QUALITY OF LATERAL CEPHALOGRAMS

Moira Wong, Kiarash Banai, Stephen Powell, St Georges Hospital, London

AIM

To assess the quality of lateral cephalograms and identify factors that would make the radiograph of limited diagnostic value.

STANDARD

- All radiographs should be of diagnostic value with key cephalometric landmarks identifiable to aid diagnosis.
- All cephalograms should be taken in natural head posture

PROCESS OF AUDIT

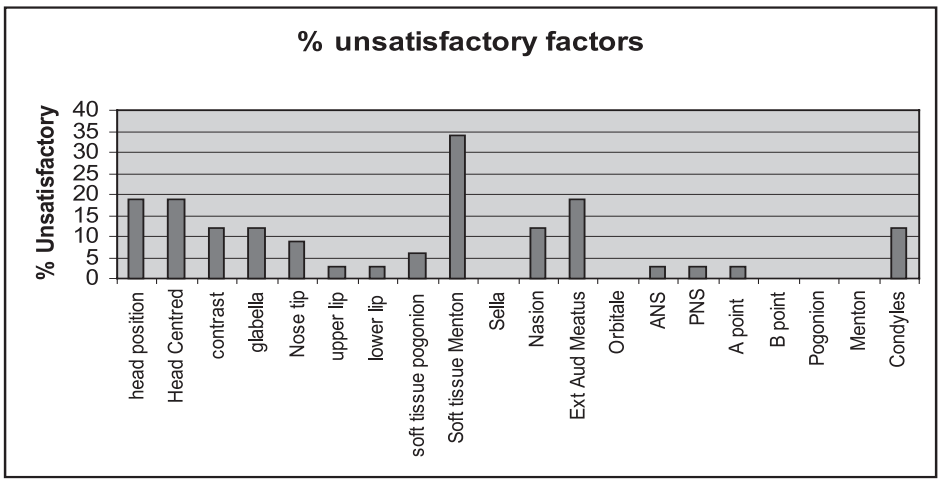
All new patients attending the department between March 2002 and September 2002 were identified. A 50% random sample of all lateral cephalograms was retrieved. The Overall quality of the radiographs was examined and scored using a defined proforma.

RESULTS

Thirty-two lateral cephalograms were examined. 12.5% of lateral cephalograms demonstrated technical errors indicating a retake. The main cause for rejection was due to patient positioning error. The most common unidentifiable soft tissue point was soft tissue menton (34%). The external auditory meatus was the most difficult hard tissue point to identify (19%).

DISCUSSION

The results demonstrated an expected level of technical error as reported by (Orthendal et al, 1994, 13.75%). This was mainly due to patient positioning error with the head either tilting down or up or the head not being in the centre of the film. Adoption of the natural head posture as suggested by Solow (1994) may improve the quality of cephalograms in the department. The use of soft tissue menton is limited in the cephalometric analysis, but its presence aids with outcome assessment after orthodontic treatment, especially those requiring surgical correction of their malocclusion. Lack of soft tissue detail was also due to overexposure of the soft tissues.



CONCLUSION

There was no single predictive factor that could be identified which might contribute to a poor quality cephalogram. There was a strong correlation between poor patient positioning and a poor cephalometric radiograph. In this study establishing a reliable method to achieve natural head position during radiography may reduce the need for retake radiographs.

IMPLEMENTATION OF FINDINGS

The outcome of the audit was presented to the department. The current method to attain the correct head posture is to ask the patient to look straight ahead. Discussion has led to the conclusion that the department will adopt the protocol recommended by Solow 1994 to encourage the patients to achieve natural head posture. Once the patient is relaxed he/she patient will be asked the tilt the head backwards and forwards with decreasing amplitude until a natural head balance is reached and then to look straight into his/her own eyes in a mirror mounted on the wall. The head holder will then be adjusted until the ear rods can be inserted into the ears and the radiograph taken. The audit will be repeated in one year.

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AN AUDIT OF THE CLINICAL FAILURE RATE OF BRACKETS BONDED WITH A RESIN MODIFIED GLASS IONOMER FOLLOWING ETCHING OF THE TEETH

S Whitehurst, Carlisle

Introduction

Clinical trials have shown that failure rates of brackets bonded with resin modified glass ionomer cements is significantly higher than with conventional composite adhesives (Fricker 1994 , Silverman 1995) The bond strength is shown to be increased when the teeth are acid etched prior to bonding, contrary to the manufacturers instructions (Lamour and Stirrups 2001). The glass ionomer in this audit is preferred by the author because of the ease of debond as well as the possible cariostatic effect due to fluoride release (Hallgren et al 1990)

Audit standard

To be viable clinically the failure rate of the resin modified glass ionomer should be comparable with reported failure rates for conventional composites, that is less than 10%.

Method
Standard straight wire brackets were bonded to the teeth anterior to the first molars with Fuji Ortho L.C. ™ following acid etching of the teeth for 20 seconds with 37% phosphoric acid. After washing, excess water was removed from the tooth surfaces which were damp rather than wet at bonding. The bond was strong enough to allow immediate archwire placement. If a bracket failed it was noted and excluded from the study.

Results
Of 1243 brackets placed on 78 patients, 41 (3.3 %) failed. Time to failure and distribution of failure is shown below.

0 to 90 Days (initial alignment stage)	11%
Over 90 days	89%
Upper labial segment	17
Lower labial segment	21
Upper buccal segment	3
Lower buccal segment	0

Conclusion
Fuji Ortho cement placed on etched teeth has a comparable failure rate to other composite resins investigated in this way by the author (Transbond 1.7%, Heliosit 5.2 %, Whitehurst 1996). This is in line with reports in the literature. Unfortunately most of the failures occur after the initial alignment stage. Due to the ease of cement removal at debond and the possible cariostatic activity, resin modified glass ionomer may be considered as a viable alternative to conventional composite resins

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AN AUDIT ON THE QUALITY OF STUDY MODELS PRODUCED IN THE ORTHODONTIC DEPARTMENT

Sirisha Ponduri, Roger Maggs, Peter Durning, Cardiff Dental Hospital

INTRODUCTION
Following discussions between orthodontic clinical staff and laboratory technicians, concerns were expressed regarding the varying quality of study models being produced.

There are three main stages in which inaccuracies can be introduced. i.e. impression stage, wax bite stage, casting of the study models.

AIMS
To assess the quality of orthodontic study models produced at Cardiff Dental Hospital

STANDARDS
These were agreed by a representative group of clinicians and technicians.

1) Impression stage
   - correct size of stock tray
   - no airblows
   - adequate sulcus depth
   - adequate anatomical detail
   - other

2) Wax bite stage
   - double thickness wax
   - posterior teeth incorporated in bite (premolar to molar)
   - superior surface marked for technician

3) Casting of models
   - accurate replication of impression
   - correct base thickness
   - heels of models cleared for occlusion
   - correct trimming angles
   - tray in central position in relation to base
   - tray parallel to occlusal plane
   - no broken teeth
   - correct labelling of study models

AUDIT PROCESS
100 consecutive impressions, wax bites and resulting study models were assessed using the standards set. A proforma was completed by the laboratory technicians to assess the impressions and wax bites taken, and the resulting study models were assessed by the clinicians using a separate proforma. Information was gathered, from a start date of March 2001 from patients being treated by Consultants, Registrars and Undergraduate students (whose work was being supervised by senior staff).

RESULTS
The results highlight the stages at which inaccuracies are being introduced, which in turn affect the quality of the resulting study models.

(We need to note that the working models and study models are produced from the same impression, which may result in a poorer quality of study model).

Impression stage	%		%
Wrong tray size	3	Inadequate anatomical detail	15
Airblows	30	other (drags, tray	2
Inadequate sulcus depth	50	too far forward)	

Wax bite stage	%		%
Wax too thin	3	Top surface not marked	78
Posterior teeth not included	58	No bite taken	1

Study model casting stage	%		%
Inaccurate replication of imp.	2	Broken teeth	10
Incorrect base thickness	25	Incorrect labels	4
incorrect trimming angles	16	Heels of models not cleared	44
inaccurate trimming angles	16		

ACTION PLAN
· The results were discussed and debated by all staff involved. A revised protocol was agreed and distributed to the orthodontic clinical and technical staff regarding standards.
· The protocol will be instituted and a re-audit is planned in the near future.

ASSESSMENT OF OCCLUSAL CHANGES AFTER RETENTION

Authors: Susana Dominguez-Gonzalez, Patricia M Jenkins, Ann Clarke Orthodontic Department, York Hospital.

AIM

To establish the difference between treatment outcomes within the Orthodontic Department at York Hospital at Completion of active treatment (CAT) and one year out of retention (IYAR).

BACKGROUND

The average standard of orthodontic treatment in England and Wales was reported in a sample of 1210 patients in 1992[1]. The PAR Index is a widely accepted method to measure the standard of orthodontic treatment improvement[2]. There is little quantitative evidence of changes following completion of orthodontic goals, but settling, as minor relapse can occur[3].

STANDARD

It is well established that the expected PAR score at completion of active treatment[4] should be equal to or less than 10, indicating an acceptable level of alignment and occlusion. At one year out of retention it is also expected that the PAR score may have changed with settling. There should therefore be no more than 5-10 points increase in PAR between CAT and 1YAR.

PROCESS OF AUDIT

Study models of patients who completed treatment in the calendar year of 1997 at York Hospital were assessed. The measurements were made by one observer, who was calibrated for the PAR Index. Cases of cleft lip and palate, severe hypodontia or needing orthognathic surgery were excluded.

RESULTS

40 cases were included. The mean PAR Index score at beginning of treatment was 33.65, PAR index score at CAT was 7.40, and at 1YAR was 8.10.

The PAR score increased in 24 cases at 1YAR (1 to 7), decreased in 9 (1 to 8) and there were no differences for 7 cases. All the cases that were classified as "great improvement" at CAT, remained as "great improvement" at 1YAR. The cases that were classified "improved" at CAT, remained "improved" at 1YAR, two that were considered "worse" at CAT, surprisingly improved at 1YAR.

CONCLUSION

All cases, except 2, achieved the set standard for PAR score at completion of active treatment (<10).

The standard set for PAR Index between CAT and 1 year after all retention has ceased was also achieved in all cases (<5-10 points of increase in PAR Index).

This study shows that there is a minor settling of the occlusion and/or relapse 1 year after the period of retention has ceased, being less than 8 points. This is regarded as occlusal settling which is within an acceptable range for alignment and occlusion.

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BOND FAILURE RATES – MINI-TWIN VERSUS STANDARD BRACKETS -15/07/03

Phil Banks – Burnley General Hospital

INTRODUCTION

Clinical impressions were of increased failures for mini-twin brackets in comparison with standard brackets. Two previous clinical trials in our department showed failure rates for A-Company Roth 0.022" standard twin brackets bonded with no-mix chemically-cured composite to average 3.2% from a total of 587 teeth investigated (failure rates for each study 3.1%, 3.2%).

AIMS

To compare the first-time bond failure rates for standard and mini-twin pre-adjusted edgewise brackets.

STANDARD

A failure rate of 5% or less was defined as satisfactory for this audit.

AUDIT PROCESS

The audit was undertaken in the orthodontic department at Burnley General Hospital. Twenty consecutive patients completing fixed appliance treatment with one operator were investigated. These all had mini-twin A-Company straight-wire Roth 0.022" brackets bonded using a no-mix chemically-cured composite (Rely-A-Bond – the same as used in our previous studies). First-time bond failures were recorded over the treatment period. Molar teeth and previous bond failures were excluded.

RESULTS

From a total of 305 teeth investigated, there were 15 first-time bond failures (4.9%).

DISCUSSION

The bond failure rate for the mini-twin brackets was lower than anticipated and fell within the standard set. From this no change in clinical practice is required.

CONCLUSIONS

Mini-twin brackets performed well clinically and first-time bond failures were acceptable when used with our current bonding system.

PLAN FOR IMPLEMENTING FINDINGS

We will continue to use both bracket types in the department as required clinically.

TREATMENT EFFICIENCY OF CONVENTIONAL VERSUS SELF-LIGATING BRACKETS WITH EFFECTS OF ARCHWIRE SIZE AND MATERIAL

N R Turnbull

INTRODUCTION

The suggested advantages of self-ligating (SL) brackets include low friction [1], full and secure wire ligation [2], improved oral hygiene [3], chairside time savings/improved ergonomics [3,4,5], quicker treatment times and longer appointment intervals [5,6]. Modest savings in chairside time were demonstrated by Harradine [5] using the "mark 1" original Damon bracket. However, Berger & Byloff [4] found significantly reduced wire ligation times with the Speed bracket, but they assessed exclusively non-extraction cases and only one wire type.

AIM

To assess archwire ligation time for a range of cases and wire size/material using the new Damon2 (D2) bracket compared with a conventional twin bracket (Orthos, sdsOrmco).

STANDARD

A pilot study suggested that the mean time for ligation of archwires using conventional elastomeric rings for an experienced operator is approximately 70secs per arch.

AUDIT PROCESS

Prospective consecutive part-matched cases were utilised.

Using a stopwatch, the time to open slides/remove ligatures and close slides/ replace ligatures was measured for 70 D2 and 70 conventionally bonded arches in consecutive and similar cases. The audit was carried out by a single experienced operator. A proforma also recorded the arch (U or L), number of brackets engaged, number of tubes or bands engaged, and wire size/material.

The wires used were divided into 4 groups:

1) 014 niti
2) 014 x 025 ; 016 x 025 ; 016 x 022 niti
3) 019 x 025 niti
4) 019 x 025 steel

[Statistics: analysis of variance, t test and 95% CIs for difference of the means]

Results

For Damon2 the mean time to *open slides* per bracket (figure 1) was 3.7secs compared to 4.7secs for ligature removal with the Orthos brackets ($p<0.01$, 95% CI 0.28-1.77). There was no difference for upper versus lower arch, or for any of the 4 wire groups.

When closing slides the mean time per bracket was 5.7secs, compared to 7.6secs for elastic ligation ($p<0.001$). The mean ligation time per arch for closing/religating was 51.3 ±24secs for Damon2 and 64.4 ±19secs for Orthos ($p<0.001$). The 95% CI for the difference between the means was -20.3 to -5.8.) The wire group had a significant effect ($p<0.001$) for groups 2, 3 and 4. Figure 2 shows that for closing slides there were greater relative savings in ligation time with the Damon system compared to the Orthos brackets for larger wire sizes (both nickel-titanium & stainless steel).

Conclusions

The ligation times show mean savings of 2 seconds per bracket for *closing* slides with the D2 system, and 1 second per bracket for *opening* slides when compared with elastomeric use. These time savings are more significant than those reported by Harradine[5], with ligation times markedly less than the audit standard. For a non-extraction case the average time saving with the self-ligating system is 1 minute per visit. This represents a 20% time saving in a 5minute appointment. The new Damon brackets appear to be relatively more efficient for larger wire sizes and for steel wires. Therefore, there are 2 main predictors for wire ligation time, bracket type and wire size/type. The decreased reliance on nurse support produces "hidden" efficiency savings, which are potentially greater for therapists who may not enjoy the chairside support of DSAs for help with elastic ligation. Chairside time savings are welcome, but the other reported advantages of self-ligating systems, such as decreases in treatment duration and greater healing/less root resorption with longer appointment intervals, are probably more important. A significant outcome, however, is not only the more efficient use of time, but also the removal of the most tedious and repetitive process in modern orthodontic care; the passing back and forward of elastomeric rings!

Bracket	Open slides/remove ligs	Close slides/replace ligs
	Time (secs)	Time (secs)
Damon2	3.7	5.7
Orthos	4.7	7.6
	(p<0.01)	(p<0.001)

Figure 1: Mean wire ligation times *per bracket*

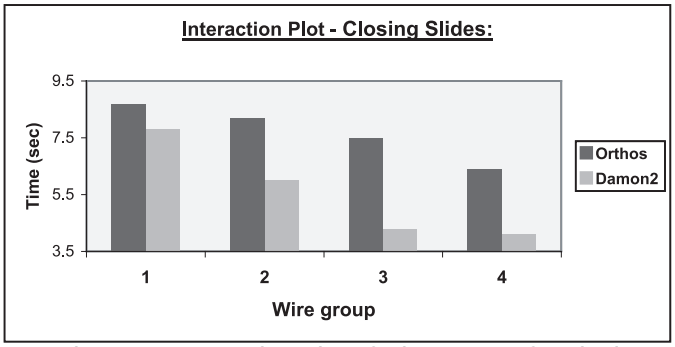

Figure 2: Interaction plot of wire groups for closing slides/replacing ligatures

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‘HOW LONG WILL YOUR TREATMENT TAKE?’ PARENTS’ UNDERSTANDING OF LENGTH OF ORTHODONTIC TREATMENT TIME

S Patel and P Ilori, High Wycombe

Aims

To identify the proportion of parents who did not know or were unsure of how long their child’s orthodontic treatment would take.

Standard

100% of parents should be aware of the length of orthodontic treatment time.

Audit process

This audit was undertaken in specialist orthodontic practice in Buckinghamshire. A questionnaire was designed to elicit the following information:

Whether or not parents were aware of,

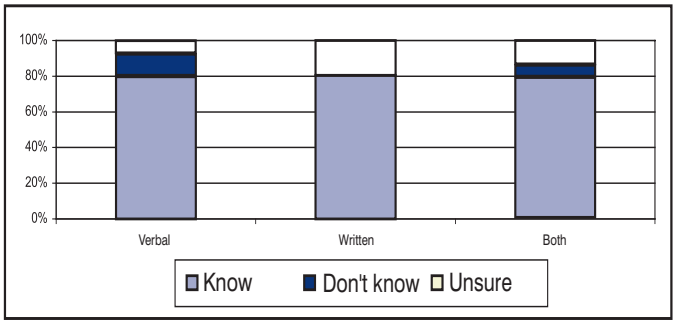
- the type of appliance being worn
- the likely length of treatment time

Parents were asked how the information was conveyed to them and in what ways they felt that this could be improved.

Results

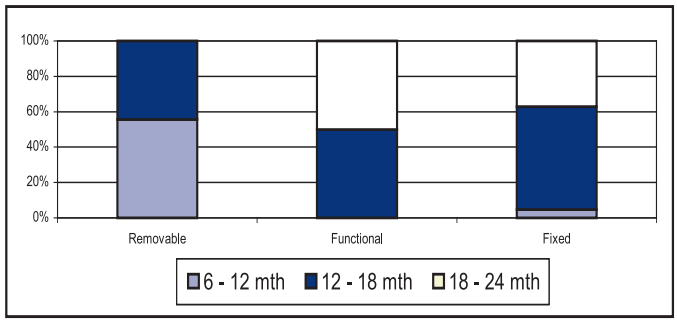
Method of communication	No. of patients
Written only	11
Verbal only	40
Both	27

For each of these catergories of communication, the graph below shows the proportions of parents that did know, did not know and were not sure of the lengh of time of treatment.



Appliance type	No. of patients
Removable	15
Functional	2
Fixed	59

For each of these appliance types, the graph below shows the proportions of parents who thought that the lengh of treatment would be between 6 -12 months, 12 - 18 months, and 18 - 24 months



Told:	Removable	Functional	Fixed
6-12	5		2
12-18	4	1	25
18-24	0	1	16

DISCUSSION

On the whole, parents seemed to be well informed. The mode of communication does appear to make a difference. From a sample of 78, 13 were unsure and 5 did not know how long treatment would take. This was due mostly to information given verbally, after which the parent either forgot or was not clear about it in the first place. Of those with removable appliances 56% thought that the treatment would take 6 - 12 months and the remainder thought 12-18 months. Of those with fixed appliances 58% thought that the treatment would take 12-18 months and the remainder thought 18-24 months.

We also looked to see whether the type of treatment has an impact on the parents’ level of awareness. The results show that regardless of the type of treatment, approximately 80% of parents know the time it expected to take. Generally, uncertainty seems to arise most when information is given only verbally.

To ensure that all patients receive written information following verbal explanation of treatment.

Both patients and parents encouraged to ask questions just prior to signing the consent form.

To patients who require both functional and fixed appliances, greater emphasis to be placed on increased length of treatment time.

A REGIONAL AUDIT OF CONSENT FORMS PRIOR TO COMMENCING ORTHODONTIC TREATMENT IN YORKSHIRE.

Sat Bhopal and David Morris, Orthodontic Department, Leeds Dental Institute, Leeds.

To investigate the number of clinicians who consent patients prior to commencing a course of orthodontic treatment in the West Yorkshire region.

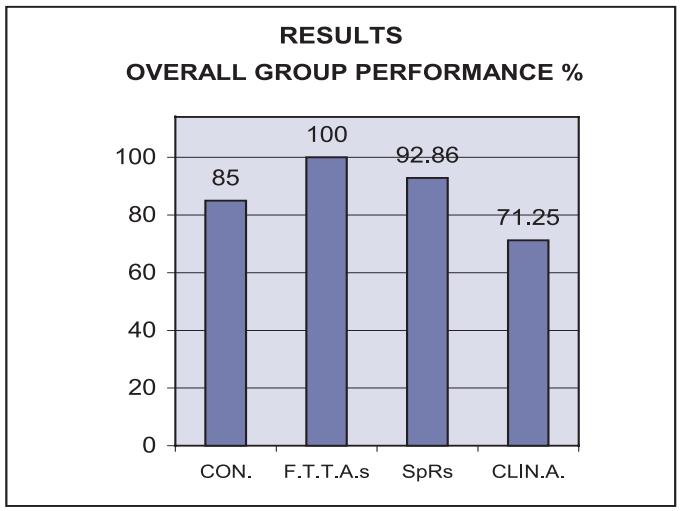
Any treatment, investigation or deliberate touching without consent may constitute the offence of battery[1, 2]. A patient has the right to say what may be done to him or her. For consent to be valid it has be informed; that is to say the patient must be given sufficient information to make an informed judgement[3]. The patient must be competent to give consent and it should be given freely without any duress. The patient is free to withdraw consent at any time and hence withdraw from treatment[2].

The "Gold standard" used in this investigation was that all patients undergoing treatment should have been properly and identifiably consented. This is the advice given by the BOS[4] guidelines and the Medical Defence Union[5] and hence one would expect a 100% consent record for every clinician.

Audit protocol and data collection sheets were distributed at the June 2002 meeting of the Yorkshire region orthodontic audit group. Clinicians present at that meeting were requested to distribute the data collection sheets in their respective orthodontic departments. Each clinician was requested to audit 20 consecutive patients in treatment, record whether written consent was present, and that the consent form were completed correctly. If consent was not present the clinician should try and identify the reason for this and record it in the data collection sheet. It was assumed all clinicians were honest in their responses. To encourage this, clinicians were advised that any results would be kept anonymous.

A total of 32 clinicians (14 consultants, 3 FTTAs, 7 SpRs and 8 clinical assistants) completed the data collection forms. There was a wide variation between clinicians the best achieving 100% and the lowest being 40%. 15 clinicians achieved our gold standard of 100%. It failed to reach the standard and 3 had a 'consent taken' record of 50%.

FTTAs had the best consent rate of 100%, SpRs with 92.86%, consultants with 85%, and clinical assistants with 71.25%. On a regional basis the overall consent taken prior to commencing orthodontic treatment was 87.28%.



The common reasons given for consent not being present were the following in ranking order from the most popular to least popular:

1. Transfer case.
2. No reason given.
3. Treatment commenced prior to consent form introduction.
4. Early treatment start.
5. Long-term patient, e.g. cleft, lip and palate.
6. Joint speciality treatment patients, e.g. Orthodontic/ Restorative cases.
7. Incorrect form completion, e.g. forms not signed by patient and/or clinician.
8. Consent form lost.

1. All patents undergoing a course of orthodontic treatment should have written consent.
2. Ensure the consent form is completed and stored properly
3. All transfer patients should be consented.
4. In the case of joint treatment patients, the orthodontist should accept responsibility for obtaining consent for the orthodontic part of the treatment plan.
5. All long-term patients should be consented, e.g. cleft, lip and palate patients. Consent should be obtained for each course of treatment.

After the above recommendations have been implemented the audit will be repeated in approximately 2 years.

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ORTHODONTIC FRICTION, A LITERATURE REVIEW

Alex Cash, Guy's Hospital, Queen Victoria Hospital, East Sussex

The use of sliding mechanics in preadjusted brackets is widely utilised when moving either individual or blocks of teeth under orthodontic forces[1-3]. As the teeth translate, forces that resist sliding (RS) develop and inhibit tooth movement. RS forms as a result of the dynamic relationship between archwires, brackets and ligation in the oral environment. The force required to overcome RS, has been quoted as 50%[4] of the total orthodontic force. This may need to be increased 500%[3] to 600%[5] when using archwires constructed from Beta-titanium (• -Ti) (Ormco, Glendora, CA, USA). Efficiency of orthodontic systems is reported as 40-88%[6] and relates the fraction of force delivered to the teeth, to the total force applied.

RS must be considered when translating teeth so that 'optimum biological forces' are used to produce tooth movement without compromising the vitality of teeth and periodontium. If RS is not considered, there may be anchorage taxation, however, the clinician may encourage this to achieve the desired result. The absolute value for the optimum biological force is difficult to quantify and increasing it only increases rate of tooth movement up to a point[5-8,10]. It has been demonstrated that the forces required to overcome RS *in vivo* are much less than those in *in vitro* experiments[11], illustrating the variability of the components of RS.

Friction is defined as 'the resisting force tangential to the common boundaries between two or more bodies when, under the action of an external force, one body moves or tends to move relative to the surface of the other'[12] and kinetic friction is always less than static friction[3,6]. It is disputed whether the classic laws of friction alone apply when tooth movement occurs *in vivo*[3,13] and it is postulated that binding and notching[7]; galling and fretting[14] are also involved. As a tooth is translated, there is a 'stick and slip' between the bracket slot, archwire and ligature interface that is described as the 'tip-upright' mechanism [3,5,6,13,15,16] (Figures i–iv). As orthodontic force is applied, a couple is set up between the archwire and the bracket[8] (Figure ii+iii). The force causes binding and this may be released by wire displacement, tooth mobility or alveolar bone remodelling[13] (Figure iv).

As archwire dimension increases, so does RS[2,5,7,9,10,17,18]. It appears that the vertical dimension of rectangular archwire is most important[9]. There is dissent[3], as this is the antithesis of the classic law of friction. Friction is independent of the area of the materials in contact.

Although there is dissent[6], round wire of any material produces less RS than rectangular[2,5,7,9,18] and those of braided or co-axial steel show a lesser RS than nickel titanium[19] (NiTi) or 0.016-inch stainless steel (SS) and NiTi[20].

Vertical deflection[7,9,13] and angulation[21,22] produces an increase in RS for rigid wires. Flexible wires may permit sliding at greater angulations/deflections[20,22] but they may deform and bind[5]. Stiffer archwires[19] and shorter inter-bracket span increases binding[23].

The widely accepted ranking [5,6,10,16-18,22,26] showing the least RS to the most RS is as follows: •-Ti, NiTi, Cobalt chrome, SS. Epoxy coated wires loose their coating[20] and although composite glass wires show RS similar to SS, they are unsuitable for orthodontics[15]. •-Ti has been shown to cold weld in SS brackets[26]

Archwire Surface Modification
Ion-implantation reduces RS of NiTi[24] and •-Ti[24,25] to levels similar to SS *in vitro*.

RS is reduced when using sintered SS brackets as opposed to standard SS brackets[17,18]. SS brackets and ceramic brackets with metal slots[16] show less RS than all types of ceramic bracket[14,15,26]. Although not universally accepted, titanium brackets have been shown to have similar RS as SS brackets but also are more biocompatible being nickel-free[27].

RS is independent of slot dimension[3,23,26]. Reduced bracket dimension increases inter bracket span and archwire flexibility[4]. This has been related to increased RS in small brackets[3]. Orthodontic materials may not be the dimensions stated by the manufacturers but this has not been shown to affect RS[21,25].

Elastomeric ligatures increase RS[3,15,28] but the initial high force subsides over time. Large dimension brackets may increase RS, as ligatures must stretch more[15,17]. SS ligatures may increase RS if over tightened[3]. Self-ligating brackets produce less RS than conventional and if the clip/slide is not active on the archwire, lower still[28,29].

The pellicle, plaque, calculus, food, bacteria and sugars may all influence RS[6,18]. The effects of occlusion may help to release the forces of binding that contribute to RS[2,5,8,16]. Several workers have constructed experimental apparatus to simulate this force[2,13,16]. Occlusal forces may damage appliances and increase RS.

There is little evidence that conclusively shows salivary lubrication reduces RS[2,3,5-8,10,15,19,27]. Indeed, saliva is thought to be excluded from the contact between bracket and archwire[6].

There is a significant volume of published research on the contributions to resistance to orthodontic tooth movement but much of it incompletely reports experimental methodologies. It is probable that RS occurs as a result of the combined effects and specific relationships between the orthodontic materials chosen and as a result of friction, binding and notching in the oral environment. As yet, the precise and individual contributions of each element to RS, remains undetermined, but workers have illustrated the main sources and material conflicts. It is beneficial if one allows complete levelling[3,9,15] prior to sliding mechanics and if these fail, the clinician may select 'friction-free' space closure using looped archwires.

et al.,

Figure i.

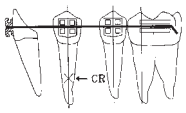


Figure ii.

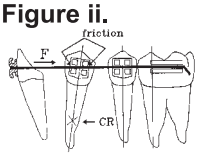


Figure iii.

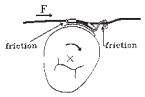
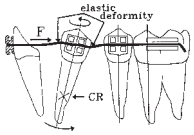


Figure iv.



CR = centre of rotation
F = orthodontic force

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PRACTITIONER KNOWLEDGE OF IOTN ASSESSED THROUGH REFERRAL PATTERNS IN CUMBRIA

R Tyrell, Orthodontic Department, Carlisle

A record is taken of the IOTN of patients referred to the Department to assess the quality of the referrals. It is hospital policy to take on for treatment only those patients in the highest category of need, using the IOTN as our indicator. This includes grades 4 and 5 of the DHC and those in grade 3 who have aesthetic index of 6 or above. Ideally, all cases referred for treatment should fall in these categories and the aim of the audit was to compare the actual referral pattern with this standard.

Two courses had been held for practitioners in the area over the previous year and a comparison was made between those who had attended one of our courses and those who had not. 15 entering practitioners had attended one of the courses.

The scores were kept over a 6 month period from May to October 2002 where the documentation was complete. The practitioner's name and IOTN score of each patient were recorded.

49 practitioners made 1 or more referrals with the greatest number from a single practitioner being 19.

As can be seen from Table 1, the referrals falling in IOTN grades 4 and 5 were almost identical for both referral groups at 76% and 79% respectively. If we include IOTN 3, 4 and 5 grades, these figures adjust to 91% and 92%. The top six practitioners making the highest individual numbers of referrals also conform to this general pattern.
With regard to those referrals in IOTN 2, many come with a comment from the practitioner that they are aware that the patient falls in this grade and they simply wish someone else to confirm this to the patient or parent. The percentage in this grade may be artificially high.

The practitioners are sending in good quality cases, which for the most part fall in the 3 highest grades of IOTN, and which would qualify for treatment within the hospital dental service.

There was very little difference between our course attendees and the others, some of whom may have attended other courses.

TABLE 1

	IOTN 2	IOTN 3	IOTN 4	IOTN 5
Total Group	7.5%	14.5%	47.5%	30.5%
Course Referrers	8%	16%	49%	27%
Other Referrers	7%	14%	47%	32%
Top 6 Referrers	9%	16%	55%	20%

AUDIT OF COMPLIANCE WITH BOS RADIOGRAPHY GUIDELINES

Caroline W. Mwangi and Rachel E. Moss, Royal Glamorgan and Prince Charles Hospitals, South Wales.

To assess compliance with the British Orthodontic Society radiography guidelines.

100% of radiographs should only be taken when clinically justified. All radiographs should be evaluated in the patient's notes.

Two clinicians examined randomly selected case notes of 64 patients who had treatment carried out by the registrars within the two departments from 1994 onwards. Information gathered included the type of radiograph taken, whether there was an obvious indication, the stage at which the radiograph was taken during management and whether it was reported.

Radiographs taken included OPTs, lateral cephalograms and anterior occlusals. The tables below demonstrate the numbers of each type of radiograph taken, the stage at which they were taken during management, those with an obvious indication, and those that were reported.

OPTs

Stage of treatment	Assess-ment	Pre-treatment	Mid-treatment	Pre-debond	Post debond	Total
Number taken	72	37	6	2	23	140
Indication	70	27	5	1	7	110 (79%)
Reported	53	8	2	0	3	66 (47%)

72 OPTs were taken at the assessment stage because some patients were assessed on more than one occasion, for example, when interceptive measures had been taken. The overall percentage of OPTs that had an obvious indication, as interpreted from the notes, was 79%. The overall proportion with a written evaluation was poor, at 47%. Compliance was better during the initial stages of management. Of the OPTs taken later in treatment, very few had an obvious indication, and most did not have a written evaluation.

Lateral Cephalograms

Stage of treatment	Assess-ment	Pre-treatment	Mid-treatment	Pre-debond	Post debond	Total
Number taken	42	37	11	1	10	101
Indication	36	31	9	0	10	86 (85%)
Reported	22	20	5	0	0	47 (47%)

The total number of cephalograms taken was 101, of which 85% had an obvious indication. 47% had cephalometric evaluations. The compliance rate also decreased during the latter stages of treatment.

Anterior Occlusals

Stage of treatment	Assess-ment	Pre-treatment	Total
Number taken	24	5	29
Indication	20	5	25 (86%)
Reported	15	3	18 (62%)

Out of 29 anterior occlusals, 86% had an obvious indication whereas 62% were reported. These views tended to be taken during the assessment and pre-treatment stages.

This audit reveals poor compliance through all stages of treatment with regard to reporting, with the indication for the radiographs missing in almost 50% of the patients' notes. In a few cases, radiographs taken during the assessment stage were repeated before treatment, when a clear indication had not been recorded in the notes. Lateral cephalogram tracings were not present in the records of 53% of the sample. The most recent guidelines emphasise that taking radiographs after debond is not indicated except in special circumstances. Practice within the two departments has now been changed, and post-debond films are no longer taken routinely.

- Radiographs requested during the assessment stage should be limited to those required for screening and diagnostic purposes, with additional views taken only when clearly indicated.
- Radiographs requested during assessment should only be repeated pre-treatment if clinically justified and likely to be of added value in the overall management of the patient.
- Indications for radiographs requested should be clearly documented in the patient's records.
- Reporting should be carried out for all radiographs taken by entering an evaluation into the patient's notes or including a tracing of the lateral cephalogram.
- Pre-debond films may be justified to check that treatment objectives have been reached and for planning of retention, but post-debond films are not, unless a clear indication exists. This should be documented in the patients' records.

The results of this audit have been discussed at a regional audit meeting. It is proposed to repeat this audit after one year.

British Orthodontic Society: Guidelines for the use of radiographs in clinical orthodontics, Second Edition, 2001.

ROCHESTER ORTHODONTIC CENTRE
PATIENT SATISFACTION AUDIT

Dr A McCance, The Rochester Orthodontic Centre, Kent

The purpose of this audit was to assess the patient and parent satisfaction with treatments provided, and the manner and clinical setting in which they were provided.

Greater than 80% of patients happy with all aspects of the service provided.

Five clinicians at the Orthodontic Centre determined to assess the general satisfaction of the quality of the service we provide to the patients referred for specialist orthodontic treatment and opinion.

Three different questionnaires were distributed over a 6 month period to100 randomly selected patients and parents. The questionnaires were completed in the surgery on routine visits of the patient for treatment. It was decided that this method of data collection would ensure a good sample return and would not inconvenience the patient or parent.

The three questionnaires were designed to assess:
1)The standard and quality of the clinic itself, and how well the patient was treated and informed on their first visit.
2)To assess the appearance of their teeth and facial appearance prior to treatment.
3)To assess the appearance of their teeth and facial appearance post treatment.

The results to each questionnaire were collected and analysed and the percentages calculated for each question posed. The findings are shown within the 3 questionnaires below.

Overall, most patients and parents were happy to participate in the audit.
The consensus view was that the patients were keen to be given formal opportunity to express their opinion on the service we provide at the practice.
We successfully collected the sample defined in our protocol. The aims and objectives were achieved in that we now have a realistic feedback on the quality of service our patients receive. In all areas investigated we surpassed our set standard of 80% or higher being happy with the service provided

We have been made aware of patient difficulty with contacting the Centre by phone. This has primarily arisen due to the sheer volume of calls received. The main problem times were;

- Monday morning
- Daily between the hours of 8.30a.m. - 10.00a.m.
- Daily after children get home from school. 3.30p.m. - 5.00p.m.

continued on back page

Questionnaire A

		Poor	Satisfactory	Good	Excellent
1.	What were your first impressions of the appearance of the reception area?	3%	17%	62%	18%
2.	Was it easy to check-in?	0%	17%	51%	32%
3.	How long did you wait beyond your appointment time before you were seen (minutes)?	+30 17%	20-30 9%	10-20 32%	0-10 42%
4.	Would you consider this waiting time to be acceptable for a NHS practice?	12%	40%	12%	36%
5.	Did you find the waiting room comfortable?	6%	48%	18%	28%
6.	What were your first impressions of the surgery?	0%	29%	51%	20%
7.	Did the Doctor put you/your son or daughter at ease?	6%	14%	31%	51%
8.	Was the Doctor clear in explaining your/your son or daughter s treatment plan?	3%	46%	17%	34%
9.	Did you feel you spent a reasonable amount of time in the surgery with the doctor relevant to your appointment?	3%	37%	37%	23%
10.	Did you feel able to discuss any reservations or issues relevant to the treatment?	17%	14%	40%	29%
11.	Did you find it easy to obtain the appointment time you wanted for your next visit?	14%	40%	3%	37%
12.	Was the appointment time you were given acceptable, considering the centre s hours of opening?	0%	11%	78%	11%
13.	Were the staff friendly and helpful?	0%	14%	25%	63%
14.	Were the staff of smart appearance?	3%	12%	36%	49%
15.	Do we provide a good range of oral hygiene products for sale?	3%	14%	37%	46%
16.	What was your overall rating on the Centre?	0%	14%	29%	57%

Other comments/suggestions that you would like to make?

36% of patients and parents made comments

Questionnaire B

	Very unhappy	Slightly worried	Not worried	Quite pleased	Very pleased
1) How concerned are you about your facial appearance?	9%	27%	45%	19%	0%
2) How concerned are your parents about your appearance?	6%	28%	44%	14%	8%
3) How concerned are you about the appearance of your teeth?	17%	33%	30%	10%	10%
4) How concerned are your parents about the appearance of your teeth?	11%	43%	23%	9%	14%

* *

		Yes	No
5)	Are you worried about people making fun of you?	23%	77%
6)	Do you get teased at school?	23%	77%
7)	Are you happy to wear a brace?	73%	27%
8)	Do you have any problems eating?	27%	73%
9)	Can you eat easily?	66%	34%
10)	Is it difficult to bite or chew?	59%	41%
11)	Do you have jaw problems?	13%	87%
12)	Do you have any limitations in in opening your mouth?	17%	83%
13)	Do you feel any pain in your jaw or on opening your mouth?	15%	85%
14)	Do you have any problems with breathing through your nose?	4%	96%

Questionnaire C

1.	Following your treatment at the Orthodontic Centre how would you rate the appearance of your teeth on a rising scale (1 being best and 5 being worst)?	To Be Filled in by: Patient: (1) 65% (2) 34% (3) 1% (4) 0% (5) 0% Parent: (1) 63% (2) 36% (3) 1% (4) 0% (5) 0%							
2.	Are you pleased with the result?	Very pleased	82%	Pleased	17%	Okay	1%	Unhappy	0%
3.	Do you feel that there is a great improvement in appearance compared to your teeth before active treatment?	Perfect	49%	Great	43%	Better	8%	No difference	0%
4.	Do you feel you have a more confident smile?			Yes	89%	No	3%	Don t know	8%
5.	How would you rate the overall care given to you by the Dentists?	Excellent	62%	Very Good	32%		Good 5%	Poor	0%
6.	How would you rate the overall given service to you by the Centre?	Excellent	62%	Very Good	32%		Good 5%	Poor	0%
7.	Would you feel confident to recommend the Rochester Orthodontic Centre to your friends?			Yes	94%	No	0%	Don t know	6%

Please outline any comments you would like to make about your treatment?

30% of patients and parents expressed appreciation of treatment received *f*

.....
.....
.....

NAME:.....
D.O.B:.....
VISIT DAY:.....

We already had an answer machine as well as our standard telephone lines, but found that time spent ringing patients back became unworkable during an average day. It was decided therefore to install a four line mini- exchange phone system. This has a BT message informing patients that we know they are calling and advising them of the queuing system. A further step we have taken is to install a fax machine in reception to allow anyone to fax their messages.

Parking facilities at the practice will always be cause for patient concern, even though we have a car park attached to the Practice.

Our policy for delays in appointment times has been addressed, and any clinic that may be running behind time will ask the nurse to keep reception informed of any delay, who in turn will inform incoming patients. This we find helps to placate any possible problems, and the patient can decide their most appropriate course of action.

Waiting room reading material
The minor criticism regarding reading matter in the waiting room for teenagers is very easily rectified.

EDITOR'S CUT

Dear readership, it is indeed an honour to be asked to take over the editorship of this newsletter. May I firstly thank the previous editor, Professor Steve Richmond, who you will all agree has done a first rate job over the past years of his tenure. The form and quality of this publication is due in no small part to him, and of course the presenting authors.

Mention is also needed at this point of Jeremy Knox, Consultant Orthodontist at Cardiff and Swansea, who steps into the role of associate editor. His expertise and support are definitely appreciated.

The format of this newsletter is special in presenting a national forum for the publication of short audit reports and clinical effectiveness articles. This provides an excellent opportunity for training grades, and others so inclined, to publish work they have carried out locally, and for which no other journal may exist. Jeremy and I both agree the format should remain the same, but there would be an obvious advantage in peer review. This process will be started for next year's issue with each submitted article having the benefit of two independent reviewers, initially from the FTTA section of the Training Grades Group.

This issue contains a good cross section of articles from a variety of sources. It is very gratifying to be able to publish reports from both hospital and specialist practice. This shows how active we are and sets an example of which we can be proud. The topics covered reflect different aspects of clinical practice and it is interesting to note that patients are becoming active participants, whether this is by satisfaction surveys, or in the ever important area of informed consent.

A word from the new boy

The other exciting area to mention is the BOS website. New developments under construction within the clinical effectiveness section include a national database of audit activity across the regions. It is also hoped to post up an indexed archive of audit articles from previous newsletters to which prospective authors can refer.

So, whatever project you have covered in the interests of clinical effectiveness, put pen to paper (or fingers to keyboard), and share it with us. Feel free to communicate with the editors regarding how to publish and the recommendations for authors.

Gavin Barry
Editor

Please send articles for Newsletter 17 to:

Gavin Barry
Orthodontic Department
Arrowe Park Hospital
Upton
Wirral CH49 5PE
0151 604 7492
gavin.barry@whnt.nhs.uk