SCIENTIFIC SECTION

An audit of 'early debond' cases in the national outcomes audit of patients treated with upper and lower fixed appliances by Consultant Orthodontists in the UK

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Objective: To audit the outcomes of the 'early debond' cohort of the national outcomes audit carried out by the Consultant Orthodontic Group of the British Orthodontic Society.

Design: Multi-centre, retrospective national audit.

Standards: Seventy-five per cent of cases should exhibit a reduction in PAR greater than 70% with 3% or less with a PAR score reduction of less than 30% (i.e. worse/no different).

Method: Analysis of consecutively completed cases treated by upper and lower fixed appliances that were noted by the operator as having discontinued treatment early.

Main outcome measures: Incidence of early debond, PAR outcome.

Results: The 'early debond' cohort constituted 11% of the total 823 patients and fell below previously published standards for orthodontic treatment outcomes. They were less likely to be in the 'greatly improved' category, more likely to be in the 'improved' category and only slightly more likely to be in the 'worse/no different' category. There was a 67% reduction in PAR and 50% exhibited a reduction in PAR greater than 70%, with 6.5% having a reduction in PAR score lower than 30%.

Conclusion: Discontinuation of orthodontic treatment is associated with a reduced level of treatment outcome.

Key words: Audit, discontinuation orthodontic treatment, incidence, PAR outcomes.

Discontinuation of orthodontic treatment is a well-known adverse outcome that may be influenced by both patient and operator risk factors. The term, however, does cover a large gradation, in that it may range from debonding one visit earlier than would otherwise be ideal to leaving a malocclusion virtually untreated.

The Consultant Orthodontists Group survey of hospital waiting lists and treated cases published in 1995 by Willmot et al.[1] quoted a discontinuation rate of 9.2%. They concluded that the more senior and experienced the operator, the less the rate of discontinuation and a greater rate of early debond was seen in removable appliance cases when compared with fixed appliance cases.

Turbill et al.[2] showed that lower social class and the older patient may be risk factors in the early termination of treatment, but Patel[3] discounted age at start of treatment as a predictive factor. Trenouth[4] indicated that the number of failed appointments was significantly greater in this group of patients.

Very few studies have investigated PAR outcomes in early termination of orthodontic treatment. Richmond and Andrews[5] examined discontinued treatment in the General Dental Services in England and Wales over the period 1990–1991, and they found that discontinued treatments tended to have a low pre-treatment PAR score, were more likely to have received non-extraction treatment with removable appliances and they were only left worse off by two PAR points on average. The sample in this study was, by the nature of the investigation, diverse and included removable, as well as fixed appliances, and qualified,

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as well as unqualified orthodontists carrying out the treatments.

This audit intended to assess the outcome of the 'early debond' cohort of the national outcomes audit carried out by the Consultant Orthodontic Group of the British Orthodontic Society.

Method

A national outcomes audit of orthodontic treatment was carried out by the Clinical Effectiveness Committee of the British Orthodontic Society and funded by the Consultant Orthodontist Group.[6] For this prospective project, each consultant was asked to submit six consecutively debonded cases from 1 August 1999. Consultant orthodontists had treated these 823 patients with upper and lower fixed appliances (some may have had a pre-fixed removable or functional appliance), and so the sample is much less diverse than that of Richmond and Andrews.[5] The only cases excluded were:

- children born with cleft lip and palate;
- cases undergoing orthognathic surgery;
- severe oligodontia cases.

Before and after PAR was scored independently for each case by the Bristol Dental School Orthodontic Laboratory.

As part of the audit, the consultants were asked to record if the case was an 'early debond' and, if so, the reason for appliance removal. As this was a subjective judgement that was not calibrated throughout the group, the results should be accepted cautiously. In addition, the stage of treatment at which debond occurred was not recorded. It was felt that despite these shortcomings, it would be worth investigating the outcomes of this particular subgroup of completed cases.

Results

Consultants recorded 92 of the 823 patients (11.2%; 95% confidence limit intervals 9–13.3%) as having their treatment discontinued early. The reasons for early debond are listed in Table 1. Most frequently cited was at the request of the patient, 41 (45%), 22 (24%) were at the request of the orthodontist and 16 (17%) were due to poor oral hygiene. Less frequent reasons given included repeated breakages and joining the armed forces. One case was a patient who, during orthodontic treatment in preparation for orthognathic surgery, decided against proceeding with the operation. The consultant involved attempted to give the patient as good a result as possible

Table 1   Reasons cited for termination of treatment in a total of 92 cases (NB. For some patients more than one reason was cited)

Early debond	Number of cases	Percentage
Request of patient	41	45%
Request of orthodontist	22	24%
Poor oral hygiene	16	17%
Repeated breakages	7	8%
Refused orthognathic surgery	3	3%
Going abroad	3	3%
Unable to tolerate	2	2%
Joining armed forces	2	2%
Pregnant	1	1%
Debond by patient	1	1%

before an early debond and included the case in their submission. It was agreed to include this in the audit data, as it was a case treated without surgery and with an early debond. For some patients more than one reason was cited.

The mean pre- and post-treatment PAR scores of discontinued cases were 33 and 10, respectively. As in the original audit, the results did not follow a normal distribution and median and interquartile range analysis of the data was carried out and compared with the original audit (see Table 2). The data was compared to the total audit minus the 'early debond' cohort, i.e. completed cases, $n = 731$ (see Table 3).

Using the description suggested by Richmond[7] for the 92 cases reported as being 'debonded early', patients were less likely to be in the 'greatly improved' category (48% as opposed to 63%). They were, however, more likely to be in the 'improved' category (46% versus 34%) and only slightly more likely to be in the 'worse/no different' category (6% versus 3%; see Table 4). Only six of the total of 25 cases in the 'worse/no different' category in the total audit of 823 cases were in this 'early debond' cohort.

Table 2   Peer Assessment Rating (PAR) scores (values in brackets are for the total audit of 823 cases)

	Median	Range	Interquartile range
Pre treatment PAR score	33	6–58	27–40
	(34)	(5–68)	(26–41)
Post treatment PAR score	8	1–45	4–14
	(5)	(0–45)	(3–9)
Change in PAR score	22	–2 to 54	16–29
	(27)	(–10 to 61)	(19–34)
Percentage change	71	–33 to 97	58–85
	(84)	(–73 to 100)	(71–91)

Table 3   95% confidence intervals for the difference in means of 'early debond' versus completed treatment data

	Early debond	*n*	Mean	SD	Mean difference	95% CI of difference	
						Lower	Upper
Pre treatment PAR score	Yes	731	32.9	11.0	−0.267	−2.658	2.125
	No	92	33.2	10.7			
Post treatment PAR score	Yes	731	6.1	4.8	−4.039	−5.147	−2.931
	No	92	10.1	7.1			
Change in PAR score	Yes	731	26.9	11.5	4.098	1.615	6.581
	No	92	22.8	11.1			
Percentage change	Yes	731	79.4	18.5	12.315	8.207	16.424
	No	92	67.1	22.1			

On average, there was a 67% reduction in PAR, 50% exhibited a reduction in PAR greater than 70%, with 6.5% having a reduction in PAR score lower than 30%. This is below the recommended standard derived from the original audit of a minimum of 75% of cases having a reduction in PAR greater than 70%, with 3% or less in the 'worse/no different' category of a PAR score reduction of less than 30%.[6]

Discussion

This audit found that the 'early debond' cohort (11.2% of the total 823 patients) fell below previously published standards for orthodontic treatment outcomes. However, a notable shortcoming of this audit was that it was a subjective judgement by the operator to mark the case as an 'early debond' and no record was made of what the stage of treatment was at the time of appliance removal. On the other hand, this audit provides an overview of treatment outcome when treatment is discontinued. This will hopefully be useful for future comparisons especially as this area has received limited attention in the literature (and it seems only in the UK), yet may have implications for changing practice, early debond not being an unusual occurrence.

Although the overall rate of discontinued treatment was higher than that found by Willmot,[1] it is not at a significant level. However, when this study excluded

Table 4   Distribution of data by 'greatly improved', 'improved' and worse/no different'

	Number (*n*)	Percentage (in total data of 823 cases)
Greatly improved	44	48 (63)
Improved	42	46 (34)
Worse/no different	6	6 (3)

Values in brackets are for the total audit of 823 cases

cases treated with removable appliances and consultant orthodontists personally treated all cases, removing two of the factors identified in that study associated with discontinuation, a lower incidence of 'early debond' would have been expected in this cohort. It could be speculated that this may be a result of increased reporting caused by a feeling of insecurity by the operator, and it is worth noting that prospective audits and studies may put perceived pressure on participants, no matter how meaningless the results are for the individual. For example, one consultant marked all of his/her six cases as 'early debond', a fact that was not borne out by the PAR results.

The most frequent reasons cited for the early debond are 'request of the patient' and/or 'orthodontist', and often it is by mutual consent that orthodontic appliances are removed early. In January 2004 the Defence Dental Agency advised that 'although active orthodontic treatment is not a contra-indication to recruitment … potential new entrants who are undergoing active orthodontic treatment with fixed or removable appliances should be strongly encouraged to complete the course of treatment prior to entry',[8] explaining this reason given in two cases. Most orthodontists will try and transfer patients if they are moving abroad, but the logistics of doing this can be difficult and, as well as the financial penalties of completing treatment in other countries, often means that these patients are debonded early. One person removed their fixed appliances themselves, not an unknown phenomenon in orthodontics, but thankfully rare.

This audit did not show any difference in the mean pre-treatment PAR between the discontinued treatment cohort and the total outcomes audit (33), but final PAR mean scores are 10 and 7, respectively. Comparison of the median and interquartile ranges with the original audit confirms that overall there is less improvement in PAR scores in the discontinued treatment group (see

Table 2) and the difference in means of post treatment PAR between cases debonded early and completed cases is significant (see Table 3).

Only six of the total of 25 cases in the whole audit in the 'worse/no different' category were described as 'early debond'. Although, on first sight, this may be a surprising finding, it was already suspected by the authors of the original audit, as the worst case in the data of –73% change in PAR, was not discontinued, but was in fact a compromise case that produced a planned increased overjet, heavily penalized by PAR scoring. This illustrates the limitations of PAR used in isolation as a measure of outcome. Before removing a patient's fixed appliance, orthodontists will usually try and 'jolly' the patient along until a minimum of treatment objectives have been achieved. It is rare to finish a case early with a worse overjet than that with which the patient started, and as many of the patients in this sample had Class II malocclusions, it is not surprising that nearly all cases finished early will have had a reduction in PAR on this factor alone. Orthodontists on the other hand will be less concerned about leaving some residual spacing in a patient with poor compliance, a fact that is not penalized by PAR scoring.

There was a mean reduction of 67% in PAR in the sample compared to 78% in the total 823 cases. Although the difference in means between the 'early debond' cohort and the completed cases is significant, clinically this is a relatively good outcome for these cases and concurs with that found by Richmond and Andrews[5] who in a much more diverse sample found that discontinued cases were only left worse off by 2 PAR points on average. However, when we use the benchmark previously described by McMullan *et al.*,[6] those cases described as 'early debond' fall below the expected standard.

In this audit, it was a subjective judgement by the operator to mark the case as an 'early debond', but no record was made of what the stage of treatment was at time of appliance removal. Future assessments of Class II/1 cases in the national audit and comparative success in reducing overjet in the 'early debond' cohort may help clarify these issues.

Conclusions

- Discontinued treatments constitute 11.2% of cases treated with upper and lower fixed appliances in this sample.
- The case is less likely to be finished in the 'greatly improved' category and more likely to be finished in the 'improved' category. It is only slightly more likely to be finished in the 'worse/no different' category.
- Those cases described as 'early debond' in the national outcomes audit fall below the accepted standard. As part of assessing clinical outcomes, PAR scoring against a recognized standard should be only one aspect of the assessment and adverse incidents, such as discontinuation of treatment and failure to attain some or all of the treatment goals should also be monitored.
- This audit has highlighted some shortcomings in data collection, which could be used to improve future audits.
- Prospective audits and studies such as this can put perceived pressure on participants, no matter how innocuous and meaningless the results are for the individual; this may be a potential disadvantage of prospective, rather than retrospective projects.

Contributors

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