

Project title - Change in Orthodontic practice - A retrospective audit of orthodontic retention at the Eastman Dental Hospital

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Background

A primary focus of any retention regime following active orthodontic treatment is to prevent relapse. Relapse as defined by the British Standard Institute as the "The return, following correction, some of the original features of the malocclusion". Retention is based on the following principles 1) Reorganisation of periodontal apparatus¹, 2) Prevention of unwanted tooth movement during active craniofacial growth ², 3) Reducing the risk of unwanted tooth movement that have been positioned in an unstable position³.

While the need for retention following active orthodontic is uncontroversial, it is necessary to note that to this date, no particular retainer or wear regimes have been found to be superior in performance⁴ or quality⁵. Hence, the type of retainers provided, and wear regime prescribed is down to the individual treating clinician expertise and their relevant experience.

Aims and Objectives

The aim of this audit was to compare the historical (patients treated in the years of 2000 to 2003) practices of retention with our current (patients treated in the years 2017 to 2019) present-day practices at the Eastman Dental Hospital based on the following parameters;

1. Number of retainer review appointments
2. Type of retainers provided
3. Reported changes in prescribed retainer wear
4. Reported relapse
5. Emergency clinic attendance

Standards

We set our gold standards to be that 100 % of all patients audited were;

1. To be reviewed for approximately one-year post debond
2. To not have any reported relapse
3. To have documented prescribed retainer wear at all visits

Sample and data source

50 patients were identified via their electronic dental records. They were randomly (computer generated hospital numbers) selected based on the same consultant clinicians who supervised the treatment of the historical cohort & present-day cohort. Their soft copy clinical notes were retrospectively analysed via a data extraction proforma constructed by the authors.

Audit Type

A retrospective criteria-based audit of orthodontic patients treated at two different time periods at the Eastman Dental Hospital.

Methodology

A two-part auditor methodology was carried out with the auditors (MH & DP). The data was subsequently uploaded on Microsoft Excel and the relevant analyses were completed.

Inclusion criteria

All patients must have completed their first course of fixed orthodontic treatment only (extraction and non-extraction)

Historical patients - To have been treated between the year 2000 to 2003

Present-day patients - To have been treated between the year 2017 to 2019

Excluding criteria

Hypodontia, Orthognathic and Craniofacial patients

28 patients were categorised as historical patients and 22 patients were categorised as present-day patients. Both cohorts were treated under consultant supervision by the same consultant clinicians. Initially, there were equal numbers between the two cohorts recruited, however it was found that 6 of the present-day cohort patients had a transfer of care mid treatment to different consultant clinicians that did not supervise any treatment of patients in the historical cohort. They were subsequently excluded to prevent uncontrolled variability of data. It was decided not to equate the number of patients in the historical cohort as it was felt the loss of valuable information from this group would be greater than any benefit gained from having two similar sized sample groups. Likewise, a recent move to paperless hospital records prevented any further recruitment of patients in the present-day cohort due to a significant delay in retrieving hard copy hospital record.

Findings

The results of the Historical and Present-day cohorts are summarised in Table 1,2,3

Observations

The gold standard of 100 % of patients;

1. To be reviewed for approximately one-year post debond

2. To not have reported relapse
3. To have documented prescribed retainer wear at all visits

was **not** met in either the historical or the present-day cohort group.

Retainer review appointments

The range in the duration of monitoring patients is similar in present-day cohort and historical cohort, 6-18 months and 6-20 months respectively. However, there is a difference between the groups for patients that are seen for a 12-month period, 15 patients (59%) for present-day cohort compared with 13 patients (47%) for the historical cohort. There could be several potential reasons for this, for example, continued monitoring of growth, missed appointment or failure to bring retainers to appointments.

Relapse

Relapse was assessed by whether it was documented in the patient's hospital records during their retainer review appointments. There was difference in relapse rates between the groups, 3 patients (4%) in the present-day cohort compared with 1 patient (11%) in the historical group cohort. This may be due to a greater emphasis being placed in recent times on the importance of retainer wear aiding in improving compliance in patients.

Types of retainer provided

While the two groups were treated at minimum of 15 years apart, it was interesting to find that the most common retainers provided were vacuum formed upper and lower retainers in both the historical and present-day cohort. This was followed by the use of a bonded retainer as adjunct in either the upper and/or lower labial segments.

Wear regimes

There is a marked difference in the wear regime prescribed to patients at their 3-month retainer review appointment. 14 (50%) patients were advised to wear their retainers on a full-time basis in the historical group compared with 19 (85%) patients in the present-day cohort.

At the 6-month retainer review appointment, a similar trend appears, as 6 (21%) patients in the historical cohort were prescribed to wear their retainers on a full-time basis compared with 8 (37%) patients in present-day cohort group. There was disparity in the prescribed night-time wear regime, as 5 patients (18%) in the historical group were prescribed night-time wear on their 2nd retainer appointment compared to 14 (63%) patients in the present-day cohort group.

The differences at the 9-month retainer review appointments were difficult to detect, as 18 (65%) patients' prescribed retainer wear in the historical group were not documented. However, with the limited data that we retrieved, we noted that only 8 (7%) patients in the historical group were prescribed night-time wear compared with 16 (71%) patients in the present-day cohort. Interestingly, no patients were prescribed alternative night-time wear in the present-day cohort compared with 4 (14%) patients in the historical data.

On the 12-month retainer review appointment, usually the appointment before being discharged back to the general dentist for long term retainer maintenance, it was surprising to note that 4 (14%) patients in the historical cohort group and 5 (22%) patients in the present-day cohort were still prescribed full-time retainer wear.

Emergency Clinic Attendance

12 (40%) patients in the historical group required the use of the emergency clinic compared with 4 (14%) patients in the present-day group. The most common reason was due to 'fractured retainers' in both the historical and present-day group. All the patients in the present-day cohort presented to the emergency clinic once. While in the historical group, 6 patients required the use of the emergency clinic once and 5 patients required its use twice with the remaining one patient attending thrice. While it is difficult to pinpoint exact causes for this positive finding, there has been active quality control initiatives dedicated to improving the quality of lab-made retainers at the Eastman Dental Hospital from the 2000 to 2017, which seems to have positive effect.

Documentation of prescribed retainer regime

There were much improved levels of note-keeping in the present-day cohort of patients when compared to the historical cohort. Only 1 (5%) patient's wear regime was not stated in the 3-month retainer review appointment in the present-day cohort. In the historical cohort, 8 (29%), 13 (47%), 18 (65%) and 16 (57%) patients' wear regime was not stated or described in unclear terms at the 3, 6, 9 and 12-month retainer reviews, respectively.

Recommendations

- ❑ It is not possible to recommend an ideal retainer regimen; hence all retention regimens must continue to be assessed on an individual basis backed by clinician experience & best available evidence.

- ❑ A departmental teaching session with aim of updating the clinicians of the importance to adhering to NHS guidance (reviewing retention patients up to 12 months post debond). This will allow the streamlining of NHS services & resources.

- ❑ Orthodontic clinicians will also be reminded by of the importance of good & comprehensive note keeping of all patients currently in retention. A retainer review electronic entry proforma (including prescription wear regime) is currently being developed to aid the clinician when seeing patients in retention.

References

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3. Moss J. The Soft Tissue Environment of Teeth and Jaws. An Experimental and Clinical Study: Part 1. *British Journal of Orthodontics*. 1980;7(3):127-137.
4. Al-Moghrabi D, Pandis N, Fleming P. The effects of fixed and removable orthodontic retainers: a systematic review. *Progress in Orthodontics*. 2016;17(1).
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Table 1 - Comparative results table between the Historical Cohort and Present-Day Cohort regarding relapse, length of retention review & type of retainers provided

Category	Historical Cohort	Present-Day Cohort
Relapse	<input type="checkbox"/> 3 patients - 2 of which had displacement of contact points in lower labial segment	<input type="checkbox"/> 1 patient - reopening space in the upper midline diastema
Length of retention review	<input type="checkbox"/> 1 patient was seen for 6 months <input type="checkbox"/> 2 patients were seen for 9 months <input type="checkbox"/> 15 patients were seen for 12 months <input type="checkbox"/> 3 patient was seen for 15 months <input type="checkbox"/> 7 patients were seen for more than 15 months	<input type="checkbox"/> 2 patients were seen for 6 months <input type="checkbox"/> 0 patients were seen for 9 months <input type="checkbox"/> 13 patients were seen for 12 months <input type="checkbox"/> 3 patients were seen for 15 months <input type="checkbox"/> 4 patients were seen for more than 15 months
Type of retainers provided	<input type="checkbox"/> 19 patients were provided with upper and lower vacuum formed retainers <input type="checkbox"/> 4 patients were provided with upper and lower vacuum formed retainers & upper or lower bonded retainers <input type="checkbox"/> 3 patients were provided with upper and lower Hawley retainers <input type="checkbox"/> 2 patients were provided with upper Hawley's & lower vacuum formed retainers	<input type="checkbox"/> 12 patients were provided with upper and lower vacuum formed retainers <input type="checkbox"/> 5 patients were provided with upper and lower vacuum formed retainers & upper or lower bonded retainers <input type="checkbox"/> 4 patients were provided with upper and lower Hawley retainers <input type="checkbox"/> 1 patient were provided with upper Hawley and lower vacuum formed retainer

Table 2 - Comparative results table between the Historical Cohort and Present-Day Cohort regarding prescription of wear regime in the initial 12 month period

Category	Historical Cohort	Present-Day Cohort
<p>Wear regime at each retainer review</p>	<p><u>3 Month Review</u></p> <ul style="list-style-type: none"> <input type="checkbox"/> 14 patients were advised to wear their retainers on a full-time basis <input type="checkbox"/> 6 patients were advised to wear their retainers on a night-time basis <input type="checkbox"/> 8 patient's wear regime was not stated or described in unclear terms <p><u>6 Month Review</u></p> <ul style="list-style-type: none"> <input type="checkbox"/> 13 patients wear regime was not stated or described in unclear terms <input type="checkbox"/> 6 patients were advised to continue wearing their retainers on a full-time basis <input type="checkbox"/> 5 of patient were advised to wear their retainers on a night-time basis <input type="checkbox"/> 4 patients were advised to wear their retainers on an alternative night-time basis <p><u>9 Month Review</u></p> <ul style="list-style-type: none"> <input type="checkbox"/> 18 patients wear frequency was not recorded <input type="checkbox"/> 8 patients were prescribed alternating night-time wear <input type="checkbox"/> 2 of patients were still prescribed full time wear, night-time wear and unclear terms <p><u>12 Month Review</u></p> <ul style="list-style-type: none"> <input type="checkbox"/> 16 patients wear regime was not stated or described in unclear terms <input type="checkbox"/> 5 patients were still advised to wear their retainers on a night-time basis <input type="checkbox"/> 4 patients were still prescribed full time wear <input type="checkbox"/> 3 patients were prescribed alternating night-time wear 	<p><u>3 Month Review</u></p> <ul style="list-style-type: none"> <input type="checkbox"/> 19 patients were advised to wear their retainers on a full-time basis <input type="checkbox"/> 2 patients were advised to wear their retainers on a night-time basis <input type="checkbox"/> 1 patient's wear regime was not stated or described in unclear terms <p><u>6 Month Review</u></p> <ul style="list-style-type: none"> <input type="checkbox"/> 8 patients were advised to keep wearing their retainers on a full-time basis <input type="checkbox"/> 14 patients were advised to wear their retainers on a night-time basis <p><u>9 Month Review</u></p> <ul style="list-style-type: none"> <input type="checkbox"/> 16 patients were advised to wear their retainers on a night-time basis <input type="checkbox"/> 6 patients were advised to keep wearing their retainers on a full-time basis <p><u>12 Month Review</u></p> <ul style="list-style-type: none"> <input type="checkbox"/> 10 patients were advised to wear their retainers on a night-time basis <input type="checkbox"/> 7 patients were advised to wear their retainers on an alternative night time basis <input type="checkbox"/> 5 patients were keep wearing their retainers on a full-time basis

Table 3 - Comparative results table between the Historical Cohort and Present-Day Cohort regarding emergency clinic attendance & reason for attendance

Category	Historical Cohort	Present-Day Cohort
Emergency clinic attendance	<ul style="list-style-type: none"> <input type="checkbox"/> 6 patients attended the emergency clinic once <input type="checkbox"/> 5 patients attended the emergency clinic twice <input type="checkbox"/> 1 patient attended the emergency clinic thrice 	<ul style="list-style-type: none"> <input type="checkbox"/> 4 patients attended the emergency clinic once
Reason for attending emergency clinic	<ul style="list-style-type: none"> <input type="checkbox"/> 7 patients attended the emergency clinic due to broken or fractured retainers <input type="checkbox"/> 5 patients attended the emergency clinic due to ill-fitting retainers 	<ul style="list-style-type: none"> <input type="checkbox"/> 4 patients attended due to fractured retainers