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Research article

Perception of Pain for Different Orthodontic Elastomeric Separators

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ABSTRACT:

To evaluate self-perception of pain for elastomeric separators at various time intervals. Ten patients who required fixed orthodontic treatment participated the study with Duraseps™ and Ring separators inserted

for two days on the inter-proximal surfaces of upper first permanent molar on both sides. Questionnaire was used before, upon insertion and upon removal of the separator to register the pain perceptions at chewing and rest using a ten point scale and questions about impact of pain on daily routines. The mean scores revealed no significant differences between both separators at chewing or rest during baseline, upon insertion and during removal ($p > 0.05$). The mean pain scores on the second day were higher in chewing than resting for both Duraseps™ ($p = 0.012$) and Ring ($p = 0.026$). (Wilcoxon Signed Rank Test). Among daily routines, none of the respondents was affected of leisure activities and work. One respondent was affected in sleep and one had taken analgesic to relieve pain. Four respondents had changed their diet to soft food. Both separators cause no statistically significant difference in pain experience throughout the period of separators placements. Patients should be advised to take soft diet to avoid unnecessary pain during the separation period.

KEYWORDS: Elastomers; Pain; Separators.

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INTRODUCTION

Pain and discomfort during orthodontic treatment is a major concern for patients. Approximately 90% of the Orthodontic patients report pain¹, and it has become a very commonly reported complaint during Orthodontic treatment and one of the reasons for discontinuing or avoidance of orthodontic treatment².

For orthodontic treatment with fixed appliances, it is invariable that the separation of the molars is one of the necessary steps in order to create sufficient space for band placement to anchor the

appliance. In order to widen the interproximal contacts, separators are placed in between the interproximal contact long enough for initial tooth movement to occur, so that the teeth are slightly separated and allow bands to be fitted³. There were many studies done previously to study the separation effect of different types of orthodontic bands, however, the perception of pain experienced by the patients during the separation period was not widely investigated. In the study by Hoffman⁴, he tested on the separation effects of

four types of separators, but the patient's pain experience was not studied.

A study performed by Bondermark et al. revealed that the spring type separator was considered less painful than the elastomerics, but the difference was not statistically significant⁵. Another study done by Pooja et al. revealed that brass separators were considered to be more painful than the Kesling wire separator and elastomeric. There were also seventy five out of ninety patients who changed their food habits, and sixty two who took analgesics due to pain⁶.

There are different types of orthodontic separators, such as Kesling (wire) separators, brass separators and the most commonly used elastomeric separator³. Anyhow, none of the studies that were done previously have tested the pain caused by different elastomeric separators.

Duraseps™ separator is the new elastomeric separator that provides faster separation than traditional separators. There are two types of Duraseps™ separators: one which requires 3 days separation and another which requires 8 days separation⁷. The separator that is used in our study is the orange coloured Duraseps™, which require 3 days to create an interproximal space between the teeth and the conventional Ring elastomeric separators.

MATERIALS AND METHOD

Ten new patients who required fixed orthodontic treatment from the Oral Health Centre, IMU were recruited. The selection criteria for these subjects were as below:

- Age of 15 years and above.
- Never undergone an orthodontic treatment.
- No caries or restorations on proximal surface of upper second premolars, first molars and second molars.
- No periodontitis or gingivitis

- Good interproximal tooth contacts at the site of separator placement.

- Selected patients are those who required extraction of the first premolars on the upper arch.

Explanations were given to the patients that the procedure was a part of their treatment and all of them had signed an informed consent. Prior to the placement of separators, a questionnaire is distributed as a baseline survey to rule out any dental pain during chewing and resting (Fig. 1 and Fig. 2). The two different elastomeric separators used were:

- Duraseps™ separators (orange)
- Ring separators

These elastomeric separators were inserted on these subjects using separating plier on the mesial and distal inter-proximal surface of upper 1st permanent molar on both left and right side (Fig. 3). For each subject, DuraSeps™ separators were placed on one side (right or left side) and ring separator on the opposite side and for the next subject, the separators were alternated to avoid left or right bias. The separators were only inserted at least one week after the extraction of the premolars.

The questionnaire was used again immediately after placement of the separator to record the pain score experienced immediately after placement of the separators. The patients were recalled after two days for removal of the separators (Fig. 4). Before the removal of the separators, the questionnaire was used to assess the pain score experienced and the impact of the pain on their daily routines. Visual analogue scale was used to record the pain perception in the questionnaire.

Part 1

Assessing the pain score experience at chewing and at rest using a ten point scale (10cm) with several descriptive terminologies, e.g. "no pain" versus "worst possible, unbearable, excruciating pain".

1. Do your upper molars (back teeth) hurt when you chew on the right side?
2. Do your upper molars (back teeth) hurt when you chew on the left side?
3. Do your upper molars (back teeth) hurt at rest on the right side?
4. Do your upper molars (back teeth) hurt at rest on the left side?

Figure 1. Sample Questionnaire Part 1.

Part 2 Fixed answers questions (YES/NO)		
5.	Has it hurt so much that you have changed your diet to soft food? (Example : Yogurt, banana, etc?)	YES / NO
6.	Has it hurt so much that your leisure activities were influenced? (Example : Music, sports, time with friends?	YES / NO
7.	Has it hurt so much that your schoolwork was influenced?	YES / NO
8.	Has it hurt so much that you have been awake in the night?	YES / NO
9.	Has it hurt so much that you had to take pain killers?	YES / NO

Figure 2. Sample Questionnaire Part 2.



Figure 3: Placement of orthodontic separators at maxillary permanent first molar. Left: Duraseps™ separator; Right: Ring separator.



Figure 4. Spaces created after removal of the orthodontic separators. Left: Ring separator; Right: Duraseps™ separator.

Table 1. Analysis of mean pain score difference between two elastomeric separators (Duraseps™ vs Ring) at baseline.

Baseline:	Mean	SD	Sig Diff (P)
Chewing			
Duraseps™	0.10	0.21	1.000
Ring	0.10	0.21	
Resting			
Duraseps™	0.10	0.21	1.000
Ring	0.10	0.21	

Table 2. Analysis of mean pain score difference between two elastomeric separators (Duraseps™ vs Ring) upon insertion.

Immediate:	Mean	SD	Sig Diff (P)
Chewing			
Duraseps™	1.15	1.81	0.317
Ring	0.65	1.23	
Resting			
Duraseps™	0.25	0.35	1.000
Ring	0.25	0.35	

Table 3. Analysis of mean pain score difference between two elastomeric separators (Duraseps™ vs Ring) at day two.

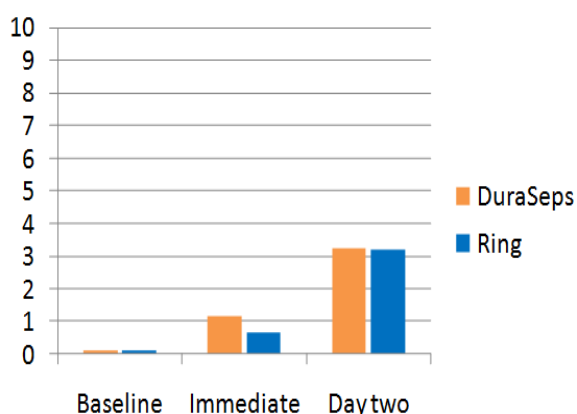
Day Two:	Mean	SD	Sig Diff (P)
Chewing			
Duraseps™	3.25	2.55	0.916
Ring	3.20	3.05	
Resting			
Duraseps™	1.05	0.95	0.705
Ring	0.95	0.83	

Table 4. Analysis of mean pain score difference between chewing and at rest for Duraseps separator.

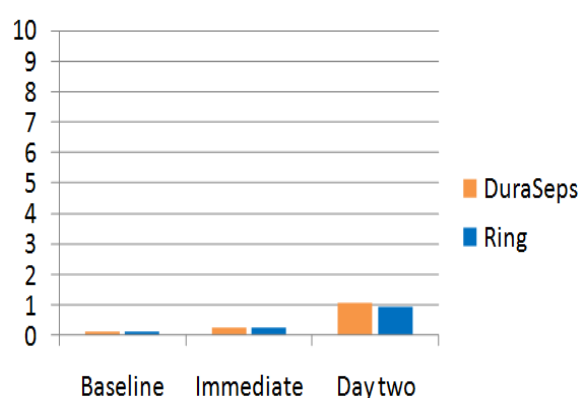
Duraseps™:		Mean	SD	Sig Diff (P)
Baseline	Chewing	0.10	0.21	1.000
	Resting	0.10	0.21	
Immediate	Chewing	1.15	1.81	0.109
	Resting	0.25	0.35	
Day Two	Chewing	3.25	2.55	0.012
	Resting	1.05	0.96	

Table 5. Analysis of mean pain score difference between chewing and at rest for Ring separator.

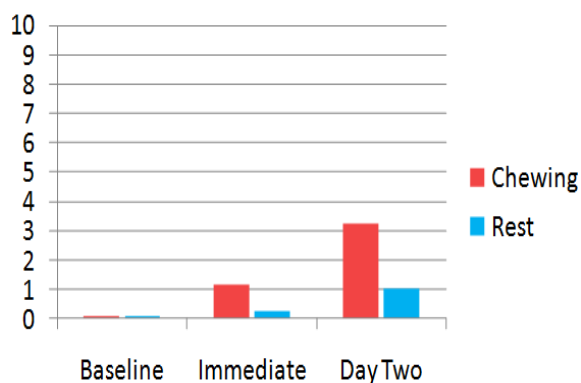
Ring:		Mean	SD	Sig Diff (P)
Baseline	Chewing	0.10	0.21	1.000
	Resting	0.10	0.21	
Immediate	Chewing	0.65	1.23	0.180
	Resting	0.25	0.35	
Day Two	Chewing	3.20	3.05	0.026
	Resting	0.95	0.83	



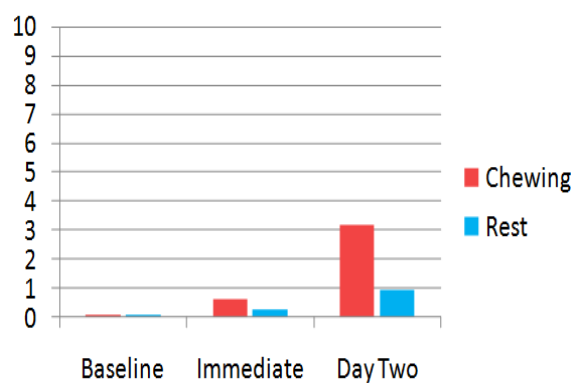
Graph 1. Mean pain score for Duraseps™ and Ring separators at chewing.



Graph 2. Mean pain score for Duraseps™ and Ring separators at rest.



Graph 3. Mean pain score for Duraseps™ separator at chewing and at rest.



Graph 4. Mean pain score for Ring separator at chewing and at rest.

RESULTS

The response rate out of the ten patients was excellent as all patients were able to answer all the questions on the questionnaires. The baseline survey, which is before the beginning of the treatment, revealed that none of the patients had experienced any pain or discomfort at the posterior maxillary arch on the left and right side when chewing (Graph 1) and at rest (Graph 2).

The pain intensity for both separators showed minimal increment immediately after the placement of the separators. Both separators caused moderate to mild pain at chewing on day two (Graph 1).

As to compare, the mean scores revealed no significant differences between both Duraseps™ and ring separators at chewing or rest during baseline, upon insertion and during removal ($p > 0.05$) (Table 1-3).

Meanwhile, within the same separators, the mean pain scores on the second day were significantly higher in chewing than resting for both Duraseps™ ($p=0.012$) (Table 4) and Ring ($p=0.026$) (Table 5). (Non-parametric Wilcoxon Signed Rank Test for related samples).

Among the daily routines, none of the respondents was affected in regards of leisure activities and schoolwork. One respondent was affected in sleep and one had taken analgesic to relieve pain. Four respondents had changed their diet to soft food (Table 6).

DISCUSSION

It was found that the patients had experienced a range of pain from mild to moderate intensity with both DuraSeps™ and ring separators during the separation period. This finding is in accordance with the previous study by Jones ML, where there is varying degree of individual pain and discomfort in response to application of orthodontic forces⁸. Although DuraSeps™ separators are marginally more painful than the ring separators, the difference were non-statistically significant ($p>0.05$). Therefore, both elastomeric separators were regarded as equal.

The pain intensity was higher on chewing as compared to rest, especially on day two ($p<0.05$) for Duraseps™ separator and Ring separator. It was in accordance with our findings where food habit change was the most affected daily activity; with 4 out of 10 patients revealed that they have changed their food habit during the separation period in order to avoid pain.

Only one out of ten patients took analgesic to relief pain after placement of separators. Anyhow, according to previous studies, the rate of consumption of analgesics was significantly high⁶. Other daily routines such as leisure activities, schoolwork and interference with sleep were less affected and negligible.

The VAS was used to measure pain intensity, since it is one of the most commonly used tools to measure pain and discomfort intensity and is easy to administer and score⁹. It is also a valid and reliable method of measuring discrete pain, being able to discriminate pain intensity. It had been also found that the VAS is a useful tool when

patients have to discriminate between pain in the posterior and anterior teeth after initial placement of an archwire⁸. Therefore, VAS was the choice of pain assessment tool in our study for evaluating pain in the left and right posterior teeth on chewing and rest when two different separators were placed blindly on the right and left side respectively, similar to the study carried out by Bondemark et al.

CONCLUSIONS

Since both Duraseps™ and ring separators are regarded as clinically equal in the perception of pain, the separation effect of both separators should be evaluated in order to compare which separator is more efficient and require less time to create space for molar band.

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The case was taken after the due consent of patient's mother.

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