Intense pain due to separators in adolescent orthodontic patients

Abdullah M. Aldrees

ABSTRACT

Objective: To investigate the intensity of pain adolescent orthodontic patients experience following the insertion of separators.

Materials and Methods: Elastomeric separators were placed mesially and distally to the first molars in 62 adolescents (20 male, 42 female, age 12–15 years), and the participants were given self-administered questionnaires to document perceived pain, pain upon chewing, and the severity of pain affecting daily life, using a visual analog scale for seven days.

Results: The mean perceived pain scores out of 100 on the first 3 days were 54.6 ± 32.7, 51.7 ± 29.9, and 32.3 ± 28.4, respectively; chewing pain scores were: 61.9 ± 35.3, 52.6 ± 30.4, and 39.5 ± 32.1, respectively; the pain affecting daily life scores were 24.9 ± 35.5, 21.1 ± 30.9, and 11.9 ± 23.7, respectively. A Kruskal–Wallis test showed a statistically significant difference in the reported pain between the three studied parameters. A Mann–Whitney U-test showed an insignificant difference between male and female adolescents.

Conclusion: Pain perception varies among adolescent patients, but it decreases significantly after the first 2 days, with no gender differences.

Key words: Adolescents, orthodontic pain, separators

INTRODUCTION

Pain is a subjective response, has large individual variations, and depends on factors such as age, gender, individual pain threshold, present emotional state and stress, cultural differences, and previous pain experiences. In orthodontics, patients experience pain as a result of separator placement, insertion of aligning archwires, headgear wear, and rapid palatal expansion.1-3

Patients who experience frequent headaches and those who anticipate a greater effect of pain on their activities reported more pain within the first week after an archwire insertion.1 These results suggest that anxiety and a history of chronic pain lead to an exaggeration of the reported pain. The attitude toward orthodontic treatment has also been correlated with discomfort felt after appliance placement.4 Patients with previous knowledge of orthodontic treatment reported less pain, and those who experienced less pain had a more positive attitude toward treatment.5 Recently, psychological factors (dental anxiety, pain catastrophizing) have been shown to influence significantly the pain perceived following the insertion of orthodontic separators.6

Several methods were proposed to address the pain associated with orthodontic treatment. Among them, the administration of nonsteroidal anti-inflammatory drugs (NSAIDs) has been proven to be the most effective pain-control technique. It has been shown that the use of NSAIDs in low doses for 1 or 2 days does not cause interference with the inflammation process associated with tooth movement.7 When different

Access this article online

Quick Response Code:

Website: www.jorthodsci.org

DOI: 10.4103/2278-0203.173423

How to cite this article: Aldrees AM. Intensity of pain due to separators in adolescent orthodontic patients. J Orthodont Sci 2015;4:118-22.
types of analgesics taken before and after the placement of separators were tested, ibuprofen was shown to reduce the pain significantly more than the placebo in a sample of adult patients.[8] Clinical trials by Ngan et al. concluded that discomfort is associated with separator placement, starting within 4 h of insertion and increasing over the next 24 h, then decreasing to a preplacement level within 7 days.[9-11] In a sample of 12–18-year-old patients, pain felt after separator placement declined after 2 days for most of the studied individuals, but a number of patients, mainly female, experienced pain for a longer period.[12] Bonemark et al. evaluated the patient perception of pain and discomfort with orthodontic separators and reported that patients experienced the worst pain on day 2, and the pain subsided almost completely by day 5.[13] In a sample of children, the perception of pain peaked 1-day after separator placement and reduced to pretreatment level after 1-week. Interleukin-1 beta, substance P, and PGE2 have been detected in the gingival crevicular fluid and are associated with the pain intensity.[14] In adults, pain continues to increase after the 1st day and peaks on the 3rd day before decreasing. Elastomeric separators are more painful compared to springs from day 2 to day 4, after which all types of separators produce similar discomfort levels.[15] Few reports have documented adolescents' pain perception in relation to orthodontic treatment; therefore, the aim of this study was to investigate the intensity of pain adolescent orthodontic patients experience following the insertion of separators.

MATERIALS AND METHODS

Ethical approval to conduct the study was obtained from the College of Dentistry Research Center at King Saud University. Adolescents scheduled to have comprehensive fixed appliance orthodontic treatment at different governmental and private orthodontic clinics in Riyadh, Saudi Arabia, were asked to participate in this study. All patients were informed that their participation in the study was confidential and on a voluntary basis, and a signed consent form was obtained from their guardians.

Elastomeric separators were placed mesially and distally to the upper and lower first permanent molars in 62 adolescents (age range 12–15 years; 20 males and 42 females). Following separator placement, the patients were given self-administrated questionnaires in the form of logbooks to take home, and they were instructed on how to answer the questions. The questionnaire consisted of three questions that documented the perceived “pain,” “pain upon chewing,” and “severity of pain’s affecting daily life activities,” using a visual analog scale (VAS) along a 100 mm line. The participants were asked to mark spots on the line that they believed best represented the pain they perceived at that time. On the right end of the line, the phrase “no pain at all” was written, while on the left end, the phrase “very severe pain” was written. The VAS score was measured to the nearest mm from the right end of the line to the patient’s mark. The evaluation of pain started on the 1st day, 4 h after the placement of the elastomeric separators, and continued daily for seven days.

The data were analyzed using IBM® SPSS® Statistics, version 20 (International Business Machines Corporation, Armonk, New York, USA), and the level of significance was set at P < 0.05. Descriptive statistics and comparisons between male and female perceptions of pain and pain scores of the parameters were calculated.

RESULTS

The mean age of the participants was 13.82 years ± 1.17. The average scores of the three parameters during the study period (7 days) are illustrated in Figure 1. The mean perceived pain scores out of 100 on the first 3 days were 54.6 ± 32.7, 51.7 ± 29.9, and 32.3 ± 28.4, respectively, while chewing pain scores were 61.9 ± 35.3, 52.6 ± 30.4, and 39.5 ± 32.1, respectively, and the pain’s affecting daily life scores were 24.9 ± 35.5, 21.1 ± 30.9, and 11.9 ± 23.7, respectively. A Kruskal–Wallis test showed a statistically significant difference between the three studied parameters (P < 0.01). “Pain” and “pain upon chewing” scores were significantly higher than the “pain’s affecting daily life” scores. Pain scores started to decrease significantly after the 2nd day when each of the three parameters was studied over the study period.

The mean perceived pain scores of the three parameters reported by the male and female adolescents are shown in Table 1. A Mann–Whitney U-test shows insignificant differences between male and female adolescents. Figure 2 shows the percentage of male and female patients who reported feeling any pain over the study period. More female patients reported feeling pain on the 3rd day until the 7th day than the male patients.

The variations in the perceived pain scores are illustrated in Figure 3. The median perceived pain scores in the first 3 days reported by the entire sample during the seven-day period.
Aldrees: Intensity of pain due to separators

Journal of Orthodontic Science  ■  Vol. 4  |  Issue 4  |  Oct-Dec 2015

120

were 50, 50, and 20, respectively; however, the ranges of pain scores are wide, as can be seen on each day.

DISCUSSION

Pain resulting from orthodontic procedures has been previously documented, and methods to manage it were suggested. In addition to the use of NSAIDs, other methods were reported, including the application of anesthetic gel,[16] the use of vibratory stimulation,[17] and the application of continuous wave low-level laser therapy.[18]

The current study utilizes the VAS for documentation of pain perception. As a subjective method of measuring pain, the VAS has been used extensively in many studies and has been described as an easy and reliable way to demonstrate small variations in pain intensity.[9,19‑22] The validity of the VAS for reporting pain has been demonstrated in young children,[23] and it was previously utilized to record pain intensity induced by orthodontic separators in child and adolescent samples.[13,14]

The adolescents studied perceived the most severe pain within the 1st day of separators placement. Ngan et al.,[9,10] Wilson et al.[11] and Giannopoulou et al.[14] reported the same findings. However, different samples of adults reported experiencing the peak of separator pain on day 2[13] or day 3.[15] The decline in the perceived pain was evident in the current study after the 2nd day, and the decline continued with a few patients after the 4th day. This tendency toward a reduction in the average pain intensity and the number of patients experiencing pain was in agreement with many studies that investigated pain experiences associated with orthodontic treatment.[9,12,21,24,25]

In this study, the gender difference did not statistically influence pain perception. However, more female patients reported feeling pain on the 3rd day until the 7th day. Beck et al. also reported a similar finding, with no significant difference in the pain level felt in the first 48 h following separator placement in adults.[6] Several other studies found no difference in pain perception between males and females.[9,13,24,26,27] However, other studies in the orthodontic literature confirmed the correlation between gender and pain perception, with girls reporting higher pain scores than boys.[5,7,12,21,28,29] Variations in the studies’ sample sizes, participants’ ages, treatment interventions, and methods of pain measurement can explain the differences in the reported effect of gender on pain perception. Because of the contradictions between these studies, one cannot draw conclusions about the role of gender as a predictor of the pain experience in orthodontics.

The individual variations in the pain perception observed in this study confirm the previously published responses to
orthodontic procedures such as separator placement and insertion of initial archwires.\textsuperscript{[13,22,24]} Chewing was the most painful experience among the three studies’ parameters. This was in agreement with the results of Bondemark \textit{et al}., who found that eating was the most affected activity during the separation study period.\textsuperscript{[13]} Scheurer \textit{et al}.
 also reported that the influence of fixed orthodontic appliances on eating/chewing was significantly higher than the influence on daily life.\textsuperscript{[21]} Bondemark \textit{et al}.
 showed that the effect of separator placement on leisure activities was small.\textsuperscript{[13]}

Several studies have investigated the reasons for the variable levels of pain reported during orthodontic treatment in patients of the same sex, race, and age. Beck \textit{et al}.
 found that dental anxiety and pain catastrophizing significantly influenced the pain level reported after the insertion of orthodontic separators.\textsuperscript{[8]} Psychological factors such as previous traumatic experience have also been linked to perceived pain levels and patient adaptation to discomfort.\textsuperscript{[24,30,31]} Patients’ expectations concerning pain and anxiety were correlated with the perception and the level of reported pain.\textsuperscript{[1,8]} However, personality traits were not associated with pain perception and cannot serve as a predictor of a patient’s compliance during orthodontic treatment.\textsuperscript{[5,32]} Firestone \textit{et al}.,\textsuperscript{[1]} and Bergius \textit{et al}.,\textsuperscript{[16]}
 reported that the patients’ perceptions of the severity of their malocclusions were not related to their feeling of discomfort during orthodontic treatment; this disagrees with the findings of Sergl \textit{et al}.,\textsuperscript{[4]}
 who reported that patients who perceive their orthodontic irregularities as severe report less pain.\textsuperscript{[4]}

**CONCLUSION**

Pain due to orthodontic separator placement varies among adolescent patients, but it decreases significantly after the first 2 days. No significant difference in the perception of pain was found between male and female adolescent patients.

**Acknowledgment**
The author would like to thank Prof. Sahar F. Albarakati for her major contribution to and help with the study design and data collection.

**Financial Support and Sponsorship**
Nil.

**Conflicts of Interest**
There are no conflicts of interest.

**REFERENCES**

1. Firestone AR, Scheurer PA, Bürgin WB. Patients’ anticipation of pain and pain-related side effects, and their perception of pain as a result of orthodontic treatment with fixed appliances. \textit{Eur J Orthod} 1999;21:387-96.
2. Cureton SL. Headgear and pain. \textit{J Clin Orthod} 1994;28:525-30.
3. Needleman HL, Hoang CD, Allred E, Hertzberg J, Berde C. Reports of pain by children undergoing rapid palatal expansion. \textit{Pediatr Dent} 2000;22:211-6.
4. Sergl HG, Klages U, Zentner A. Pain and discomfort during orthodontic treatment: Causative factors and effects on compliance. \textit{Am J Orthod Dentofacial Orthop} 1998;114:684-91.
5. Abu Alhaija ES, Alalikki A, Al-Omairi MK, Al-Khateeb SN. The relationship between personality traits, pain perception and attitude toward orthodontic treatment. \textit{Angle Orthod} 2010;80:1141-9.
6. Beck VJ, Farella M, Chandler NP, Kieser JA, Thomson WM. Factors associated with pain induced by orthodontic separators. \textit{J Oral Rehabil} 2014;41:282-8.
7. Krishnan V. Orthodontic pain: From causes to management – A review. \textit{Eur J Orthod} 2007;29:170-9.
8. Patel S, Maggiori SP, Yezierski R, Fillingim R, Logan H, Wheeler TT. Effects of analgesics on orthodontic pain. \textit{Am J Orthod Dentofacial Orthop} 2011;139:e53-8.
9. Ngn P, Kess B, Wilson S. Perception of discomfort by patients undergoing orthodontic treatment. \textit{Am J Orthod Dentofacial Orthop} 1989;96:47-53.
10. Ngn P, Wilson S, Shanfeld J, Amini H. The effect of ibuprofen on the level of discomfort in patients undergoing orthodontic treatment. \textit{Am J Orthod Dentofacial Orthop} 1994;106:88-95.
11. Wilson S, Ngn P, Kess B. Time course of the discomfort in young patients undergoing orthodontic treatment. \textit{Pediatr Dent} 1989;11:107-10.
12. Bergius M, Berggren U, Kilariidis S. Experience of pain during an orthodontic procedure. \textit{Eur J Oral Sci} 2002;110:92-8.
13. Bondemark L, Fredriksson K, Ilors S. Separation effect and perception of pain and discomfort from two types of orthodontic separators. \textit{World J Orthod} 2004;5:172-6.
14. Giannopoulou C, Dedic A, Kilariidis S. Pain discomfort and crevicular fluid changes induced by orthodontic elastic separators in children. \textit{J Pain} 2006;7:367-76.
15. Cureton SL, Bice RW. Comparison of three types of separators in adult patients. \textit{J Clin Orthod} 1997;31:172-7.
16. Keim RG. Managing orthodontic pain. \textit{J Clin Orthod} 2004;38:641-2.
17. Marie SS, Powers M, Sheridan JJ. Vibratory stimulation as a method of reducing pain after orthodontic appliance adjustment. \textit{J Clin Orthod} 2003;37:205-8.
18. Elsamian L, Borzabadi-Farahani A, Hassan zadeh-Azhiri A, Badiei MR, Fekrazad R. The effect of 810-nm low-level laser therapy on pain caused by orthodontic elastomeric separators. \textit{Lasers Med Sci} 2014;29:559-64.
19. Scott J, Huskinson EC. Graphic representation of pain. \textit{Pain} 1976;2:175-84.
20. Seymour RA. The use of pain scales in assessing the efficacy of analgesics in post-operative dental pain. \textit{Eur J Clin Pharmacol} 1982;23:441-4.
21. Scheurer PA, Firestone AR, Bürgin WB. Perception of pain as a result of orthodontic treatment with fixed appliances. \textit{Eur J Orthod} 1996;18:349-57.
22. Fernandes LM, Ogaard B, Skoglund L. Pain and discomfort experienced after placement of a conventional or a superelastic NiTi aligning archwire. A randomized clinical trial. \textit{J Orofac Orthop} 1998;59:331-9.
23. Scott PJ, Ansell BM, Huskinson EC. Measurement of pain in juvenile chronic polyarthritis. \textit{Ann Rheum Dis} 1977;36:186-7.
24. Jones M, Chan C. The pain and discomfort experienced during orthodontic treatment: A randomized controlled clinical trial of two initial aligning arch wires. \textit{Am J Orthod Dentofacial Orthop} 1992;102:373-81.
25. Steen Law SL, Southard KA, Law AS, Logan HL, Jakobsen JR. An evaluation of preoperative ibuprofen for treatment of pain associated with orthodontic separator placement. \textit{Am J Orthod Dentofacial Orthop} 2000;118:629-35.
26. Bergius M, Broberg AG, Hakeberg M, Berggren U. Prediction of prolonged pain experiences during orthodontic treatment. \textit{Am J Orthod Dentofacial Orthop} 2008;133:339.e1-8.
27. Erding AM, Dinger B. Perception of pain during orthodontic treatment with fixed appliances. \textit{Eur J Orthod} 2004;26:79-85.
28. Kvam E, Gjerdet NR, Bondevik O. Traumatic ulcers and pain during orthodontic treatment. \textit{Community Dent Oral Epidemiol}
1987;15:104-7.
29. Bergius M, Kiliaridis S, Berggren U. Pain in orthodontics. A review and discussion of the literature. J Orofac Orthop 2000;61:125-37.
30. Maggirias J, Locker D. Psychological factors and perceptions of pain associated with dental treatment. Community Dent Oral Epidemiol 2002;30:151-9.
31. Brown DF, Moerenhout RG. The pain experience and psychological adjustment to orthodontic treatment of preadolescents, adolescents, and adults. Am J Orthod Dentofacial Orthop 1991;100:349-56.
32. Bos A, Hoogstraten J, Prahl-Andersen B. On the use of personality characteristics in predicting compliance in orthodontic practice. Am J Orthod Dentofacial Orthop 2003;123:568-70.

“Quick Response Code” link for full text articles

The journal issue has a unique new feature for reaching to the journal’s website without typing a single letter. Each article on its first page has a “Quick Response Code”. Using any mobile or other hand-held device with camera and GPRS/other internet source, one can reach to the full text of that particular article on the journal’s website. Start a QR-code reading software (see list of free applications from http://tinyurl.com/yzh2tc) and point the camera to the QR-code printed in the journal. It will automatically take you to the HTML full text of that article. One can also use a desktop or laptop with web camera for similar functionality. See http://tinyurl.com/2bw7fn3 or http://tinyurl.com/3ysr3me for the free applications.