

Brief Communication

Perception of pain and discomfort from elastomeric separators in Saudi adolescents

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ABSTRACT

Objectives: To examine the patient's perception of pain and discomfort following the placement of elastomeric separators in Saudi adolescents.

Methods: The study was conducted on 38 adolescent patients who received fixed orthodontic treatment. The data was collected through the use of a self-administrated questionnaire that was distributed to the patients by one investigator in a non-clinical setting. The evaluation of pain started from the fourth hour after placement of elastomeric separators, and continued until the fifth day.

Results: The data showed that after 4 hours from separator placement, 94.7% of patients reported pain. There was a daily decrease in these percentages starting from the third day. The type of pain during the first 2 days was continuous, then continued to be intermittent pain. Most of the patients reported pain during eating and chewing, changed their food habit, and used analgesics. No statistical differences were observed between male and female patients in pain perception, type of pain, analgesic consumption, and influences on chewing and food consistency.

Conclusion: The pain associated with orthodontic separation starts and peaks within 4-48 hours from separator placement, then starts to decline to reach the lowest level on fifth day.

Pain is the major cause for discontinuing orthodontic therapy.¹ It is usually a result of pressure, ischemia, inflammation, and edema occurring in periodontal ligament due to the exerted orthodontic forces.² Separators, arch-wires, bands, and other fixed appliance components produce pressure, tension, soreness, and pain in patients.³ Separation is usually the first step in fixed orthodontic appliance treatment. There are different types of separators used in orthodontics, which include latex elastics, brass wires, spring-type steel, and elastomeric separators. It is well known that the placement of orthodontic separators is a painful step for the patient.⁴ Ngan et al⁵ concluded that there was

discomfort associated with separator placement, which usually starts within 4 hours of insertion. The level of discomfort increases over 24 hours and decreases within 7 days. Bondemark et al⁶ evaluated pain perception to 2 types of separators (spring-type and elastomeric), and he found that there were no differences in pain effect of both types of separators. Pain was mostly reported upon eating by almost all patients and considered as a major side effect of orthodontic treatment.⁷ In addition, Scheurer et al,⁷ and Erdinc and Dincer⁸ found a correlation between pain experience and analgesics consumption. It has been reported that the pain perception of the patients is influenced by their gender, age, and culture. Feinmann et al⁹ found that pain is related to gender and social class. Further, Unruh¹⁰ and Bergius et al¹¹ reported that females experience higher degrees of pain more frequently than males. Brown and Moerenhout¹² compared pain perception in pre-adolescents, adolescents, and adults. They found that the adolescents differed from the pre-adolescents and adults in the quality of the pain experience reported during treatment. Pain perceptions are also influenced by culture, and the sociocultural context of patients.¹³ Zborowski¹⁴ concluded that each culture has its own language of distress when experiencing pain. Therefore, the aim of this study is to investigate the orthodontic pain aroused from elastomeric separators used in fixed orthodontic appliances among Saudi adolescents.

Methods. This study was conducted in Riyadh, Kingdom of Saudi Arabia (KSA) in April 2012, on a sample of 38 adolescent patients (18 males, 20 females) treated at private orthodontic clinics. The ages ranged from 12-15 years. The study was reviewed and approved by the Research Center at the College of Dentistry (CDRC), King Saud University (Research Project # FR 2281), Riyadh, KSA. All patients were informed that their participation in the study was confidential and on a voluntary basis. The criteria for sample selection were: (1) all patients were scheduled to have a fixed appliance orthodontic treatment, (2) no proximal restoration and caries in the first and second permanent molars, (3) good gingival health. Elastomeric separators (3M Unitek Inc., St. Paul, Minnesota, USA) were placed

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mesial and distal to the upper and lower molars in both arches/all quadrants. The elastomeric ring was placed by one operator using 2 loops of dental floss. The dental floss is snapped through the contact then the doughnut snapped into position. Following separator placement, the patients were given a self-administrated questionnaire based upon original questionnaires from Bondemark et al⁶ and Aslihan et al.⁸ The original English questionnaire was modified and translated into Arabic and validated by the investigators.

The questionnaire consisted of 7 questions (Table 1) with a tick box layout for provision of the appropriate answer. All questions were answered as "yes" or "no" except the question regarding the type of pain, which allowed the patient to answer as "continuous" or "intermittent". The evaluation of pain started from the fourth hour after placement of elastomeric separators and continued until the fifth day. Patients who had accidentally lost the separators before the fifth day was excluded from the study.

Descriptive statistics of different factors for pain perception were assessed using the Statistical Package for Social Sciences for Windows version 16 (SPSS Inc., Chicago, IL, USA). Student's t-test was used to investigate any significant differences between gender groups within the studied sample. The significant difference level was set at the 5% level ($p < 0.05$).

Results. All the patients completed all questions until the fifth day with no loss of the separators, and the response rate was excellent. No statistical differences were observed between male and female patients in pain perception, type of pain, analgesic consumption, and influences on daily activities, chewing, and food consistency. Therefore, the findings were evaluated without gender discrimination. Four hours after separator placement, 94.7% of patients reported pain that continued to the second day (Table 2). There was a daily decrease in these percentages starting from the third day. Most of the patients felt a continuous pain on

Table 1 - The questionnaire used among patients in a study evaluating pain and discomfort at King Saud University, Riyadh, Saudi Arabia.

| Questions | First day | | Second day | | Third day | | Fourth day | | Fifth day | |
|--|--------------|----|--------------|----|--------------|----|--------------|----|--------------|----|
| 1. Have you got pain? | Yes | No | Yes | No | Yes | No | Yes | No | Yes | No |
| 2. What is the type of pain you experienced? | Continuous | | Continuous | | Continuous | | Continuous | | Continuous | |
| | Intermittent | | Intermittent | | Intermittent | | Intermittent | | Intermittent | |
| 3. Was it painful during eating/biting/chewing? | Yes | No | Yes | No | Yes | No | Yes | No | Yes | No |
| 4. Was it so painful that you have changed your food consistency to a finer food like banana, yoghurt, and so forth? | Yes | No | Yes | No | Yes | No | Yes | No | Yes | No |
| 5. Was it so painful that your leisure activities influenced, for example, music, sport, time with friends? | Yes | No | Yes | No | Yes | No | Yes | No | Yes | No |
| 6. Does the pain awakened you at night? | Yes | No | Yes | No | Yes | No | Yes | No | Yes | No |
| 7. Have you consumed any pain relief? | Yes | No | Yes | No | Yes | No | Yes | No | Yes | No |

Table 2 - Patients' response to the questionnaire evaluating pain and discomfort at King Saud University, Riyadh, Saudi Arabia.

| Response | First day | Second day | Third day | Fourth day | Fifth day |
|--|-----------|------------|-----------|------------|-----------|
| | n (%) | | | | |
| Patients reported pain | 36 (94.7) | 36 (94.7) | 22 (57.0) | 15 (39.4) | 11 (28.9) |
| Patients reported continuous pain | 20 (52.6) | 17 (44.7) | 7 (18.4) | 4 (10.5) | 4 (10.5) |
| Patients reported intermittent pain | 16 (42.1) | 19 (50.0) | 15 (39.4) | 11 (29.9) | 7 (18.4) |
| Patients reported pain during eating | 33 (86.8) | 22 (57.8) | 28 (73.6) | 20 (52.6) | 15 (39.4) |
| Patients changed their food habit to soft diet due to pain | 27 (71.0) | 24 (36.1) | 17 (44.7) | 16 (42.1) | 12 (31.5) |
| Patients reported influences on their daily activities | 19 (50.0) | 15 (39.4) | 5 (13.0) | 2 (5.2) | 1 (2.6) |
| Patients had been awake at night because of the pain | 11 (28.9) | 9 (23.8) | 3 (7.8) | 2 (5.2) | 1 (2.6) |
| Patients used analgesic for relieving the pain | 28 (73.6) | 23 (60.5) | 8 (21.0) | 1 (2.6) | 1 (2.6) |

the first day, and then it continued to be intermittent pain on the following days (Table 2). Thirty-three (86.8%) patients reported pain while eating on the first day, while 71% of patients had to change their food consistency (Table 2), and then this decreased day by day. On the first day, 28.9% patients were awake at night because of the pain, and 50% of patients stated that their daily activities were influenced (Table 2). The highest consumption of analgesics (73.6% of patients) was reported on the first day. There was a decrease in the number of patients reporting these effects on the following days (Table 2).

Discussion. This study was performed on 38 patients (18 male subjects, 20 female subjects) who were asked to complete a questionnaire concerning pain after the insertion of elastomeric separators in molar areas. The evaluation of pain started from the fourth hour after placement of elastomeric separators, and continued until the fifth day. Several investigations have reported that pain began a few hours after application of orthodontic force and lasted around 5 days.^{3,6,8,15}

It was found that most of the patients reported continuous pain after 4 hours from separators placement, which continued to the second day. Then, the pain became intermittent associated with a decrease in the number of patients reporting pain in the following days to reach the least on the fifth day. This is in agreement with the findings of Juneja et al,¹⁵ who reported that the pain was worst on day 2, and declined on the following days. In addition, Bondemark et al⁶ found that the pain was perceived as worst during day 2 then almost completely subsided by the fifth day. Most of the patients in the present study reported pain during eating and chewing, and accordingly they changed their food habits. Various studies stated that the pain was mostly reported upon eating by almost all patients, which caused them to change the consistency of their diet.^{6,7,11,12}

The daily activities of 50% of the patients in the present study were influenced by separator placement on the first day, and then there was a significant decrease in a number of patients reporting this effect on the following days. These findings are in accordance with those found by Aslihan et al,⁸ and Brown and Moerenhout.¹² On the other hand, Bondemark et al⁶ found that the influence on daily activity was small or negligible. The results showed that the highest consumption of analgesics was reported in the first day then decreased in the following days. It has been reported that orthodontic patients often use analgesics to control pain.^{6,8,11,12} Ngan et al³ suggested the use of non-

steroidal anti-inflammatory agents to relieve pain after application of orthodontic force. On the other hand, Kafle and Rajbhandari¹⁶ recommended pre-procedural administration of analgesics to significantly reduce the level of pain. In addition, Law et al¹⁷ reported that pre-procedural ibuprofen administered one hour before separator placement results in a significant decrease in pain on chewing 2 hours after the procedure.

In this study, the results displayed that there was no significant difference between male and female patients in pain or discomfort experience during separation, which is in agreement with findings of Juneja et al,¹⁵ Bondemark et al,⁶ and Sandhu et al.¹⁸ On the other hand, Feinmann et al⁹ reported that pain is related to gender and social class. In addition, Unruh¹⁰ and Bergius et al¹¹ found that females experience a higher degree of pain more frequently than males during fixed appliance treatment. These conflicting results between different studies could be due to the differences in sample size, subjects' age, and culture.

In general, the findings of this study and previous studies tend to support the presence of an association between pain and orthodontic separation. Nevertheless, pain management has been largely neglected, and orthodontic education lacks pain management training as reported by Keim.¹⁹ Further, Otasevic et al²⁰ found that a total of 30% of orthodontic patients discontinue their treatment because of the experienced pain. Therefore, patients should be informed that the pain arises from the elastomeric separators, and they should be educated on proper management by changing food consistency or using analgesics.

In conclusion, the pain associated with orthodontic separation starts and reaches the peak level within 4-48 hours from separator placement, and then starts to decline to reach the lowest level on the fifth day. Therefore, patients should be educated on proper management by changing food consistency or using analgesics. Further, it is recommended that molar band fitting should be carried out at least 3 days after separator placement to minimize discomfort to patients.

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Ethical Consent

All manuscripts reporting the results of experimental investigations involving human subjects should include a statement confirming that informed consent was obtained from each subject or subject's guardian, after receiving approval of the experimental protocol by a local human ethics committee, or institutional review board. When reporting experiments on animals, authors should indicate whether the institutional and national guide for the care and use of laboratory animals was followed.