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Original Article

Evaluation of Adverse Effects Occurring in Patients Undergoing Fixed Orthodontic Treatment: A Clinical Study

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***ABSTRACT*:**

Background: Orthodontic treatment is associated with a number of adverse effects such as root resorption, pain, pulpal changes, periodontal disease and temporomandibular dysfunction (TMD). Hence, we planned the present clinical study to analyse various adverse effects occurring in patients undergoing fixed orthodontic treatment. **Materials & methods:** The present study included evaluation of adverse effects occurring patients undergoing fixed orthodontic treatment. A total of 25 patients planned to undergo fixed orthodontic treatment were included in the present study. Complete clinical and demographic details of all the patients were obtained. Regular follow-up of all the patients was done after every two weeks to record presence or absence of any form of adverse effects. All the adverse effects, as recorded by patient's clinical response and through radiographic examination were recorded on the Microsoft excel sheet and were analyzed by SPSS software. **Results:** Pain and periodontal diseases were the most common adverse effects found to be present in 48 percent and 40 percent of the patients undergoing orthodontic treatment. **Conclusion:** Orthodontic treatment is commonly associated with certain adverse effects, which an orthodontist must be aware of so that early recognition and treatment of such effects could be carried out.

Key words: Adverse effects, Orthodontic treatment, Pain

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INTRODUCTION

In the field of orthodontics there is a long standing recognition that malocclusion and dentofacial anomalies can produce immense physical, social and psychological upset. Increasingly patient centred measures are used to assess the orthodontic need and in determining the outcomes of orthodontic care.[1-3]

Patients presenting with severe dentofacial deformities may require a comprehensive orthodontic and surgical approach to their treatment. This treatment involves a course of fixed orthodontic appliances followed by surgery to correct the skeletal discrepancy which may extend upto 2 years for completion. These patients tend to be in the younger age group and currently lacking is any instrument to determine changes in quality of life as a result of this mode of treatment.[4-6]

Orthodontic treatment is associated with a number of adverse effects such as root resorption, pain, pulpal changes, periodontal disease and temporomandibular dysfunction (TMD).[7,8] Hence, we planned the present clinical study to analyse various adverse effects occurring in patients undergoing fixed orthodontic treatment.

MATERIALS & METHODS

The present study was planned in the department of orthodontics of the dental institute and it included evaluation of adverse effects occurring patients undergoing fixed orthodontic treatment. Written consent was obtained from all the patients after explaining in detail the entire research protocol. A total of 25 patients planned to undergo fixed orthodontic treatment were

included in the present study. Inclusion criteria for including the patients in the present study included:

- Patients with negative history of any systemic illness,
- Patients with negative history of any bone pathology,
- Patients less than 25 years of age,
- Patients planned to undergo non-extraction fixed orthodontic treatment

Complete clinical and demographic details of all the patients were obtained. Detailed clinical examination of all the patients was carried out, treatment planning was done and fixed orthodontic treatment was started. Regular follow-up of all the patients was done after every two weeks to record presence or absence of any form of adverse effects. All the adverse effects, as recorded by patient's clinical response and through radiographic examination, were recorded on the Microsoft excel sheet and were analyzed by SPSS software. Univariate regression curve was used for assessment of level of significance. P-value of less than 0.05 was taken as significant.

RESULTS

A total of 25 patients with mean age of 16.5 years were included in the present study. Among these 25 subjects, 15 were males while the remaining 10 were females. Commonly observed adverse effects in the present study were root resorption, pain associated with orthodontic treatment, pulpal damage, periodontal diseases, TMJ problems etc. Pain and periodontal diseases were the most common adverse effects found to be present in 48 percent and 40 percent of the patients undergoing orthodontic treatment.

Graph 1: Demographic and clinical details of the subjects

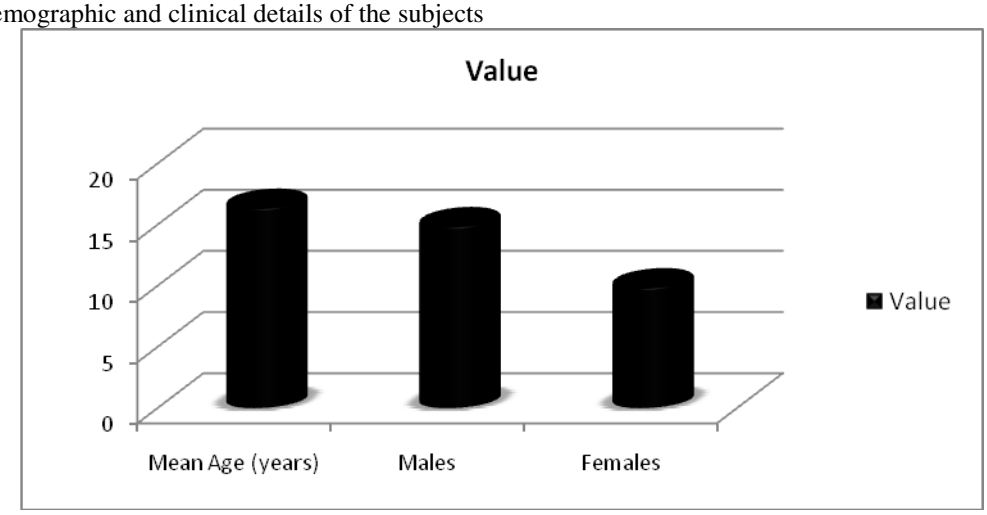
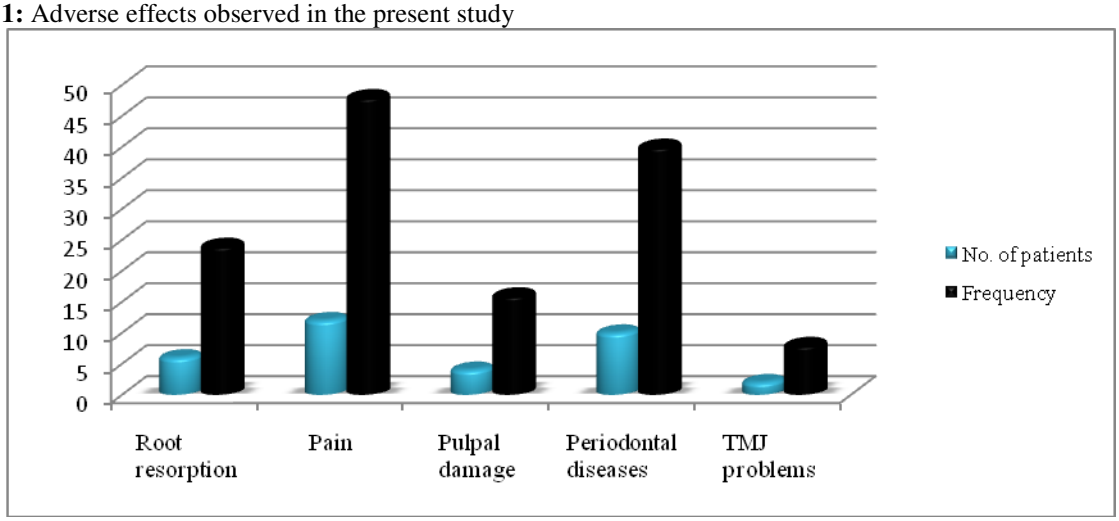


Table 1: Prevalence of type of adverse effect

Adverse effect	No. of patients	Frequency
Root resorption	6	24
Pain	12	48
Pulpal damage	4	16
Periodontal diseases	10	40
TMJ problems	2	8

TMJ: Temporomandibular joint

Graph 1: Adverse effects observed in the present study



DISCUSSION

In the present study, we observed that pain and periodontal diseases were the most common adverse effects found to be present in 48 percent and 40 percent of the patients undergoing orthodontic treatment. Paulsen HU et al followed-up one hundred and eighteen premolars transplanted at a stage with 3/4 to 4/4 root development with a wide open apical foramen with standardized clinical and radiographic techniques for signs of pulpal and periodontal ligament healing and root development. Pulp healing, evaluated first by radiographic presence of pulp canal obliteration, appeared to be an earlier sign of pulp healing than the detection of pulp vitality with an electrometric test. Continued root growth of premolars was seen in some cases. Complete arrest of root development was usually followed by development of the missing root structure at the donor site, indicating a separation of the Hertwig's epithelial root sheath. Orthodontic rotation performed on 11 premolars induced slight surface resorption and a significant shortening of tooth length (mean 1.2 mm), compared with nontreated but transplanted control teeth. However, the extent of the apical root resorption is of minor clinical importance, and is equivalent to what has been found in previous investigations of orthodontic treatment of nontransplanted premolars. Late pulp necrosis occurred in 2 of the 11 treated cases 6 years after transplantation and 5 years after orthodontic rotation. To prevent late pulp necrosis, orthodontic rotation is recommended after periodontal healing and before total pulp canal obliteration has taken place, i.e., 3 to 9 months after transplantation.[10]

Bauss O et al retrospectively study was to examine the effect of orthodontic extrusion on the pulpal vitality of maxillary incisors with a history of trauma. Pulpal condition was examined clinically (rating of crown color and sensitivity testing with a cryogenic spray) and radiologically (periapical and panoramic radiographs) after orthodontic extrusion of previously traumatized (Orthodontics/Trauma group, n = 77) and nontraumatized teeth (Orthodontics group, n = 400) and after previous dental trauma without subsequent orthodontic treatment (Trauma group, n = 193). Dental traumata were divided into hard tissue injuries (fracture of enamel and enamel chipping, fracture of enamel-dentin without pulpal involvement, fracture of enamel-dentin with pulpal involvement, root fracture, crown-root fracture) and periodontal injuries (concussion, subluxation, intrusion, extrusion, lateral luxation, and avulsion). Teeth in the Orthodontics/Trauma group showed a significantly higher frequency of pulp necrosis than teeth in the Orthodontics group ($P < .001$) or teeth in the Trauma group ($P < .009$). In addition, teeth in the Orthodontics/Trauma group with periodontal injuries showed a significantly higher rate of pulp necrosis than teeth in the Orthodontics group ($P < .001$) or the corresponding teeth in the Trauma group ($P = .004$). No significant differences were observed between teeth in the Orthodontics/Trauma group with previous hard tissue injuries and teeth in the Orthodontics group or the corresponding teeth in the Trauma group. In addition, no statistically significant differences were determined between central and lateral incisors. The results indicated that maxillary incisors with a history of severe periodontal injury have a higher susceptibility to pulp necrosis during orthodontic extrusion than non traumatized teeth.[11] The factor that determines the condition of the periodontium during orthodontic treatment is the level of oral hygiene. Therefore, oral hygiene instructions should be given before the initiation of orthodontic treatment and reinforced during every visit. Regularly brushing the teeth is the first line of defense in controlling dental plaque. The use of electrical and ultrasonic tooth brushes has been shown to be superior to manual brushing in controlling bacterial plaque on the buccal surfaces and reducing gingival inflammation. The use of an interproximal brush in addition to the orthodontic brush is necessary. The fluoride concentration in the toothpaste used for brushing should not be less than 0.1%. The use of toothpaste with stannous fluoride produced a higher inhibitory effect on dental plaque and gingivitis development. The use of fluoride and chlorohexidine varnishes reduces the levels of bacterial plaque. Oral hygiene during orthodontic treatment is the key to maintenance of a healthy periodontium.[12, 13] Bauss O et al examined the influence of orthodontic intrusion on pulpal vitality of traumatized maxillary permanent incisors. Pulpal condition was examined clinically and radiologically after orthodontic intrusion of previously traumatized (OT group) and nontraumatized teeth (O group), and after previous dental trauma without orthodontic treatment (T group). Inclusion criteria for the OT and O groups were Class II Division 1 malocclusion with deep bite and orthodontic intrusion of the maxillary incisors, no extractions of maxillary teeth, and no additional lateral tooth movement of the maxillary incisors. All teeth in the OT group had a positive sensitivity test before orthodontic therapy. Teeth in the OT group, and especially those with severe periodontal injuries, showed a significantly higher frequency of pulp necrosis than teeth in the O and T groups. The occurrence of pulp necrosis was significantly higher in lateral than in central incisors. Traumatized maxillary incisors, and especially lateral incisors, with severe periodontal injuries have a higher susceptibility to pulp necrosis during orthodontic intrusion than nontraumatized teeth.[14]

CONCLUSION

Under the light of above mentioned data, the authors conclude that orthodontic treatment is commonly associated with certain adverse effects, which an orthodontist must be aware of so that early recognition and treatment of such effects could be carried out. However, future studies are recommended.

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