

Original Research

Nickel titanium wires and clear aligners in management of mandibular incisor crowding

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ABSTRACT:

Background: Esthetic orthodontic appliances such as esthetic labial appliances plastic brackets, ceramic brackets, esthetic coated arch wires, lingual appliances and clear aligners are very popular among patients which are outcome of new advances in orthodontics. The present study compared nickel titanium wires and clear aligners in management of mandibular incisor crowding. **Materials & Methods:** 40 patients with mandibular incisal crowding of both genders were divided into 2 groups. Group I patients were treated with nickel- titanium arch wires and group II patients with clear aligners. Crowding was assessed using little's irregularity index. The linear horizontal linear displacement of the anatomic contact points of mandibular anterior teeth is measured and added which denotes total irregularity score. Patients were recalled regularly at 4 weeks, 8 weeks and 12 weeks. **Results:** At baseline, the mean score in group I was 2.94 mm and in group II was 2.70 mm, at 4 weeks in group I was 1.68 mm and in group II was 1.50 mm, at 8 weeks in group I was 0.94 mm and in group II was 1.4 mm and at 12 weeks in group I was 0.64 mm and in group II was 0.56 mm. The difference was non- significant ($P > 0.05$). The mean change in little's irregularity index score at 4 weeks in group I was 1.28 mm and in group II was 1.21 mm, at 8 weeks was 0.75 mm in group I and 0.46 mm in group II and at 12 weeks was 0.37 mm in group I and 0.74 mm in group II. The difference was significant ($P < 0.05$). **Conclusion:** Both nickel titanium wires and clear aligners were equally efficient in managing mandibular anterior crowding.

Key words: Clear aligners, Nickel titanium, malocclusion

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INTRODUCTION

Esthetic orthodontic appliances such as esthetic labial appliances plastic brackets, ceramic brackets, esthetic coated arch wires, lingual appliances and clear aligners are very popular among patients which are outcome of new advances in orthodontics.^{1,2} Among recent advancement, clear aligners are frequently used in patients having allergy from nickel which is component of stainless steel wires and brackets.³ Moreover, these can be used in patients with mild to moderate crowding, spacing, non-skeletal constricted arches and in relapsed cases after fixed appliance therapy. These aligners demand less oral hygiene because these can be easily removed by patients itself and hence cleaning is not the issue.⁴ Nickel titanium wires are indicated in cases with lower anterior teeth crowding. These are very efficient as compare to stainless steel wires and save time also.

These are placed labially and useful in alignment of teeth.⁵ Successful results of mild to severe malocclusions have been achieved with the use of clear aligners. Better esthetics, oral hygiene and comfort are advantages of clear aligners however, clear aligners had some shortages in controlling tooth movement. Thus the choice of treatment option is solely the decision of the orthodontist.⁶ The present study compared nickel titanium wires and clear aligners in management of mandibular incisor crowding.

MATERIALS & METHODS

The present study consisted of 40 patients with mandibular incisal crowding of both genders. All patients were informed regarding the study and written consent was obtained.

Data such as name, age, gender etc. was recorded. A thorough oral examination was done and dental impressions were made and casts were prepared. Patients were divided into 2 groups. Group I patients were treated with nickel- titanium arch wires and group II patients with clear aligners. Crowding was assessed using little’s irregularity index. The linear

horizontal linear displacement of the anatomic contact points of mandibular anterior teeth is measured and added which denotes total irregularity score. Patients were recalled regularly at 4 weeks, 8 weeks and 12 weeks. Results were analyzed statistically. P value less than 0.05 was considered significant.

RESULTS

Table I Assessment of little’s irregularity index

| Duration | Group I | Group II | P value |
|----------|---------|----------|---------|
| Baseline | 2.94 | 2.70 | 0.91 |
| 4 weeks | 1.68 | 1.50 | 0.94 |
| 8 weeks | 0.94 | 1.4 | 0.15 |
| 12 weeks | 0.64 | 0.56 | 0.27 |

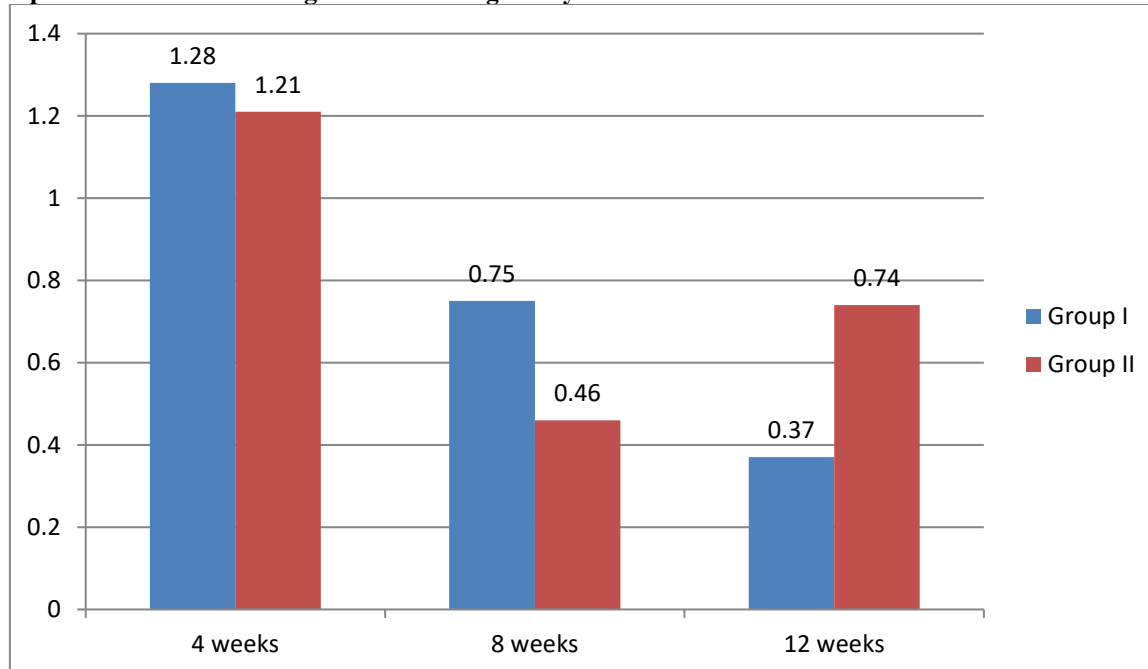
Table I shows that at baseline, the mean score in group I was 2.94 mm and in group II was 2.70 mm, at 4 weeks in group I was 1.68 mm and in group II was 1.50 mm, at 8 weeks in group I was 0.94 mm and in group II was 1.4 mm and at 12 weeks in group I was 0.64 mm and in group II was 0.56 mm. The difference was non-significant (P> 0.05).

Table II Assessment of change of little’s irregularity index score

| Time interval | Group I | Group II | P value |
|---------------|---------|----------|---------|
| 4 weeks | 1.28 | 1.21 | 0.91 |
| 8 weeks | 0.75 | 0.46 | 0.12 |
| 12 weeks | 0.37 | 0.74 | 0.01 |

Table II, graph I shows that mean change in little’s irregularity index score at 4 weeks in group I was 1.28 mm and in group II was 1.21 mm, at 8 weeks was 0.75 mm in group I and 0.46 mm in group II and at 12 weeks was 0.37 mm in group I and 0.74 mm in group II. The difference was significant (P< 0.05).

Graph I Assessment of change of little’s irregularity index score



DISCUSSION

Fixed orthodontics has been used extensively in the management of malocclusions. Nickel titanium wires are super-elastic wires having higher torsional strength and stress constancy.⁷ As comparison to other wires, their physiological compatibility, shape memory, dynamic interference and wear resistance

hysteresis is superior. All these properties make these wires useful in shorter inter-bracket span, such as mandibular lower incisors.⁸ Advent of new orthodontics techniques have been proved helpful in management of various orthodontic malocclusion. These treatment options have resulted in improved esthetics and are comfortable for the patient. Factors

such as treatment period, cost, appearance after treatment and comfort etc. determine whether the patients will opt treatment or not.⁹ Successful results of mild to severe malocclusions have been achieved with the use of clear aligners. Better esthetics, oral hygiene and comfort are advantages of clear aligners however, clear aligners had some shortages in controlling tooth movement. Thus the choice of treatment option is solely the decision of the orthodontist.¹⁰ The present study compared nickel titanium wires and clear aligners in management of mandibular incisor crowding.

We found that the mean score in group I was 2.94 mm and in group II was 2.70 mm at baseline, at 4 weeks in group I was 1.68 mm and in group II was 1.50 mm, at 8 weeks in group I was 0.94 mm and in group II was 1.4 mm and at 12 weeks in group I was 0.64 mm and in group II was 0.56 mm. Ong et al¹¹ in their study 132 patients were divided into archwire sequence groups and Ormco corporation. Discomfort level was recorded at 4 hours, 24 hours, 3 days and 7 days after the insertion of each arch wire. There was no significant difference in the reduction of irregularity between the arch wire sequences at any time point or in the time to reach the working archwire. No significant differences were found in the overall discomfort scores between the archwire sequences.

We found that mean change in Little's irregularity index score at 4 weeks in group I was 1.28 mm and in group II was 1.21 mm, at 8 weeks was 0.75 mm in group I and 0.46 mm in group II and at 12 weeks was 0.37 mm in group I and 0.74 mm in group II. Bhatia et al¹² included 20 patients who had mild to moderate crowding which were divided into two groups-Aligner group & NiTi group. Records were taken at 4 week intervals till 12 weeks in both the groups. Results showed that over a fixed time the mean for Little's irregularity index scores, the difference was found to be statistically significant for both the groups. The maximum change in the score was observed between baseline to 4 weeks of treatment for both modalities. West et al¹³ compared two arch wires 0.0155-inch diameter multiple-stranded stainless steel wire and 0.014-inch diameter nickel-titanium alloy wires in 74 arches. The degree of initial alignment found with the two wires was similar over this 6-week period. Lower labial segment showed some difference in interbracket span which was usually reduced and where the superelastic nickel-titanium wire was found to give improved alignment. No threshold of crowding was found where one arch wire performed better than the other.

The shortcoming of the study is small sample size.

CONCLUSION

Authors found that both nickel titanium wires and clear aligners were equally efficient in managing mandibular anterior crowding.

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