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Evaluation of Forsus Fixed Functional Appliance Vs Advan Sync[2] Molar to Molar Appliance in Terms of Comfort, Functional Proficiency and Experiences during Class II Malocclusion Treatment a Questionnaire Dependent Study

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ABSTRACT

INTRODUCTION

The correction of Class II malocclusion is one of the most common problems in the field of Orthodontics.[1] It exists in about one third of the population.[2] Class II malocclusions are mainly depicted as possessing a dental, skeletal or functional characteristics. They are often expressed simultaneously and to varying degrees.[3]

METHOD

A cross sectional observational study was done from Febuary 2020 to July 2021 with a questionnaire survey on 30 patients undergoing treatment with FFRD appliance (group A-15 patients) and Advan Sync[2] Class II corrector (group B- 15 patients) assessing comfort, proficiency of functionality and experiences with the appliance. The study was done at the private clinical setup headed by the principal Author.

RESULTS

In group A, 40 % of cases indicated that their speech had worsened as compared to 26 % in group B. ($P < 0.05$). Values were statistically significant. 40 % of cases in group A indicated that their mastication worsened as compared to 33 % in group B. 46% of cases indicated that the appliance looked good in group B in comparison to 40% in group A.40% of cases indicated that they experienced extreme pain while using the appliance in group A in comparison to 26% in group B.26 % of cases depicted that their sleeping pattern worsened in group A compared to 20% in group B. In group B 11% of cases indicated that there was no drooling of saliva compared to 10% in group A.

CONCLUSION

Advan Sync[2] class II molar to molar appliance has better patient acceptance according to the survey conducted in this study compared to FFRD appliance with the additional benefit of saving treatment time using Advan Sync[2] since while using this appliance there is no need to wait until the alignment is completed as the appliance can be placed during the start of alignment stage of the fixed mechanotherapy.. Hence this can be considered as a better option in treating Class II malocclusion with fixed appliance treatment.

I. INTRODUCTION

The correction of Class II malocclusion is one of the most common problems in the field of Orthodontics.[1] It exists in about one third of the population.[2] Class II malocclusions are mainly depicted as possessing a dental, skeletal or functional characteristics. They are often expressed simultaneously and to varying degrees.[3] Skeletal class II malocclusion can be either due to mandibular retrognathia or maxillary prognathism. Mandibular retrognathism happens to be the main cause of class II malocclusion.[5] Removable or fixed functional appliances are effective in order to correct skeletal class II malocclusion.[6] Fixed appliances, such as Herbst, Jasper Jumper, and Forsus fatigue-resistant device (FRD) are popular due to their patient compliance.[1] Forsus FRD (3M Unitek, Monrovia, California) was developed by Bill Vogt in 2001.[7] Forsus FRD allows flexibility in comparison to the Herbst appliance which protrudes the mandible. The Forsus Fatigue Resistant Device (3M Unitek Corp, Monrovia, Calif) is one of the popular fixed functional appliances. It is a three-piece telescoping spring that is connected to the upper first molar and a push rod hooked up to the lower archwire, distal to the canine bracket.[8] Frequent breakage of canine brackets and soft tissue injuries have been reported with Forsus. It is available in numerous sizes, therefore a large inventory has to be maintained. Chairside application time is also increased as size selection is required. Advan Sync[2] Class II molar to molar corrector is a type of FFA, developed and patented by Dr. Terry Dischinger in 2008. AdvanSync2 is a fixed tooth-borne functional

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appliance comprising of crowns cemented on maxillary and mandibular permanent first molars, a location where orthopaedic forces are enforced.[9] It has the advantage of permitting simultaneous treatment with preadjusted edgewise appliances and hence leads to effective normalization of the occlusion.[9] There are multiple articles and meta-analysis that have established the efficacy of Forsus fixed functional appliance and its role as a fixed Class II corrector and patient's experience with FFRD. However, it has certain limitations such as its high cost and frequent breakages of the appliance. Therefore, Advan Sync Class II corrector appliance was used in the private clinical setup to overcome the drawbacks associated with Forsus fixed functional appliance and has been in use ever since. There are few studies published related to the skeletal and dental changes associated with Advan Sync Class II corrector. However, no research has documented the comparison of patient's experience with FFRD and Advan Sync^2 Class II corrector appliance. Therefore, a questionnaire survey was conducted to evaluate comfort, functional proficiency and experience of patients during treatment of Class II malocclusion with Forsus fixed functional appliance with those observed in Advan Sync^2 Class II corrector.

II. METHOD

A cross sectional observational study was done from Febuary 2018 to July 2019 with a questionnaire survey on 30 patients undergoing treatment with Forsus FRD appliance (group A-15 patients) and Advan Sync^2 Class II appliance (group B- 15 patients) assessing comfort, proficiency of functionality and experiences with the appliance. The study was done at the private clinical setup headed by the principal author.The name of the clinic is Hajad Dental clinic situated at Awantipora Pulwama Kashmir. Informed consent was obtained from the patients. A questionnaire was prepared in paper based form and distributed to the entire sample size of thirty patients. Participation was voluntary and complete anonymity was undertaken. Data was arranged using spreadsheets. Gaussian fit of data was evaluated using Kolmogorov Smirnov test. Participants were not aware of the aim of the study or results to lessen the risk of any bias. Questions were divided to evaluate aesthetics, proficiency of functionality and comfort with the appliance (Table1). The question no (3) evaluated the aesthetics of the appliance and question numbers (1,2,6,8,9) evaluated the changes in the normal functions of the oral cavity being performed with the appliance in place. The questions (4,5,7,10,11,12) evaluated the comfort of wearing the appliance.The data was collected by principal author in person from the patients in writing.

III. STATISTICAL ANALYSIS

The data for the present study was entered in the Microsoft Excel 2010 and was analyzed using the Statistical Package for the Social Sciences(SPSS) statistical software 19.0 Version. The descriptive statistics included chi-square test and Fisher's exact test. The level of the significance for the present study was fixed at 0.5%.

IV. RESULTS

In order to evaluate functional evaluation, questions regarding changes in speech, mastication and changes in sleeping pattern were asked.In group A, 40 % of cases indicated that their speech had worsened as compared to 26 % in group B. ($P < 0.05$). Values were statistically significant. 40 % of cases in group A indicated that their mastication worsened as compared to 33 % in group B. 46% of cases indicated that the appliance looked good in group B in comparison to 40% in group A. 40% of cases indicated that they experienced extreme pain while using the appliance in group A in comparison to 26% in group B. 26% of cases depicted that their sleeping pattern worsened in group A compared to 20% in group B. In group B 11% of cases indicated that there was no drooling of saliva compared to 10% in group A. 80 % cases indicated that it took fourteen days to get accustomed to the appliance in group B compared to 73% in group A.11% of cases indicated that no injury was inflicted due to the appliance in group B compared to 10% in group A. 8% of cases in group A and group B indicated that they experienced mild difficulty while opening mouth. 8% of cases indicated that they had to visit orthodontic clinic more in group A compared to 6% in group B. When patients were asked about comfort level with the appliance 40 % patients in group A stated that they felt uncomfortable as compared to 26 % in group B. When overall rating of the appliance(feel good factor) was asked 46 % of the patients in group B rated it to be good compared to 26 % in group A.

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Table No 1 Comparison of Comfort, Functional Proficiency and Experiences during treatment of Class II Malocclusion with Forsus Fixed Functional appliance Vs Advan Sync[2]

SERIAL NO	QUESTION	RESPONSE	FORSUS Group A N (%)	ADVAN SYNC[2] Group B N (%)
1.	Changes in speech after placement of appliance	NORMAL IMPROVED WORSENED	4 (26) 5(33) 6(40)	5(33) 6(40) 4(26)
2.	Effect of appliance on mastication	NORMAL IMPROVED WORSENED	5(33) 4 (26) 6(40)	6(40) 4(26) 5(33)
3.	Esthetic effect of appliance after its placement	GOOD ACCEPTABLE NOT GOOD	6(40) 5(33) 4(26)	7(46) 6(40) 2(13)
4.	Appearance of pain in teeth while wearing the appliance	NO PAIN MILD PAIN EXTREME PAIN	4(26) 5(33) 6(40)	5(33) 6(40) 4(26)
5.	Change in sleeping pattern after the placement of appliance	NORMAL IMPROVED WORSENED	6(40) 5(33) 4(26)	7(46) 5(33) 3(20)
6.	Drooling of saliva after the placement of appliance	NO MILD CONSIDERABLE	10(66) 3(20) 2(13)	11(73) 4 (26) 1 (6)
7.	How long it took to get accustomed to appliance	SEVEN DAYS FOURTEEN DAYS THIRTY DAYS	2(13) 11(73) 2(13)	3(20) 12(80) 0(0)
8.	Did you experience any injury due to the appliance	SELDOM NO OFTEN	10(66) 3(20) 2(13)	11(73) 4(26) 1(6)
9.	Difficulty to open mouth due to the appliance	NO MILD EXTREME	4(26) 8(53) 3(20)	5(33) 8(53) 2(13)
10.	Number of visits to orthodontic clinic due to the appliance	NORMAL MORE LESS	5(33) 8(53) 2(13)	5(33) 6(40) 4(26)
11.	Comfort level with respect to the Orthodontic appliance	COMFORTABLE SLIGHTY COMFORTABLE UNCOMFORTABLE	6(40) 3(20) 6 (40)	7(46) 4(26) 4(26)
12.	Overall feel of the appliance	GOOD NORMAL BAD	6(40) 5(33) 4(26)	7(46) 5(33) 3(20)

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V. DISCUSSION

The Forsus appliance is one of the non-compliance appliances used for the correction of Class II malocclusion. It has a reasonable active treatment time with an average of six months. Forsus has an advantage of its ability to be used in combination with comprehensive fixed appliance. Frequent breakage of canine brackets and soft tissue injuries have been reported with Forsus. It is available in numerous sizes, therefore a large inventory has to be maintained. Chairside application time is also increased as size selection is required. More over this appliance is expensive. If any part of the device breaks or is lost, a new appliance has to be procured which again compromises the cost effectiveness and time is lost till new appliance is received. To overcome the disadvantages of FFRD Advan Sync^2 Class II molar to molar appliance was administered to the patients in the clinical setup. A research on comparison of before and after treatment results of Advan Sync ^{2} Class II corrector with FFRD in skeletal Class II division 1 malocclusion with retro positioned lower arch has shown considerable hard as well as soft tissue outcomes, stability of the effects of Advan Sync ^{2} Class II corrector, which are similar to skeletal, dental as well as soft tissue outcome of the FFRD. A study was conducted in 2013 by Bowman et al[10] to evaluate patient's experience with FFRD. But there is lack of data about patient's perspective and experience with Advan Sync^2 class II corrector appliance. Hence, a questionnaire survey was conducted to evaluate and compare comfort, proficiency of functionality and experiences during treatment of Class II malocclusion with Forsus fixed functional appliance and Advan Sync^2 Class II corrector. Question no.1, Question no.2 and Question no. 3 evaluated change in speech, changes in mastication and look of the appliance respectively. It was found that in all the three parameters, patients improved in Advan Sync^2 Class II appliance as compared to patients treated with FFRD. When Bowman et al. evaluated the speech with FFRD, they stated that 2.9 % of the patients responded as improved whereas in our study 33 % patients reported as improved. 40% patients with Advan Sync^2 Class II appliance responded that speech improved after wearing the appliance. Hence, significant difference exists between the 2 groups (P < 03.05). Mastication worsened in 40% of cases using Forsus appliance compared to 33% cases using Advan Sync^2 appliance. Cases in Advan Sync^2 Class II appliance group noticed improved appearance after placement of the appliance as compared to FFRD group. 27.5 % patients in a study[10] reported that sleeping pattern worsened after wearing of FFRD appliance which was in accordance to our findings (26%) more than that of Advan Sync^2 Class II appliance group which was placed at 23%. According to the study done by Bowman et al[10] 62.9 % and 28.6 % FFRD patients experienced a mild and extreme pain in teeth respectively whereas in our study 33% experienced mild pain and 40% extreme pain respectively in forsus group and in Advan Sync^2 group 40% experienced mild pain and 26% experienced extreme pain . It is interesting to note that pain in teeth after appliance wear decreased to 26 % in patient's wearing Advan Sync^2 Class II appliance. Result of Question number 6 suggest that the drooling of saliva is less in patient's using Advan Sync^2 Class II corrector as compared to FFRD group, 73 % and 66 % respectively. This may be due to the better design and smaller size hence less bulkiness of Advan Sync^2 Class II appliance. Patients in both the groups were used to the appliance within 4 weeks and findings were in harmony with those reported by Tian XG et al.[11] No significant results were found when extra visit for the appliance breakage was enquired. Advan Sync^2 Class II molar to molar appliance seem to hurt the patients less as compared to FFRD. 8% of cases in Forsus group A and Advan Sync ^{2} group B indicated that they experienced mild difficulty while opening mouth. When patients were asked about comfort level with the appliance 40 % patients in group A stated that they felt uncomfortable as compared to 26 % in group B. 40% cases in Forsus A group and 46% Advan Sync^2 B group stated that they felt comfortable whilst using the appliance.

VI. CONCLUSION

Advan Sync^2 class II molar to molar appliance has better patient acceptance according to the survey conducted in this study compared to FFRD appliance with the additional benefit of saving treatment span using Advan Sync^2 since while using this appliance there is no need to wait until the alignment is completed as the appliance can be placed during the start of alignment stage of the fixed mechanotherapy.. Hence this can be considered as a better option in treating Class II malocclusion with fixed appliance treatment.

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