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# Patient Compliance to Two Treatment Modalities for Tongue Thrust Habit-A Comparative Clinical Study.

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## Abstract

**Aim:** To evaluate and compare the patient's compliance between the tongue crib and modified lingual spur in patients with tongue thrusting habit undergoing orthodontic treatment.

**Methods:** The study participants consisted of 60 patients (12-15 years), who were divided equally into 2 groups (Group I=Tongue crib appliance; group II=modified lingual spurs). Patient's feedbacks were collected in the form of the questionnaire at two intervals, one at the end of the first week after the appliance insertion (T1) and second at the end of 10 months (T2). The questionnaire consisted of questions regarding speech problems, aesthetics, sleep discomfort, tongue space problem, oral hygiene maintenance problems. Data obtained was subjected to statistical analysis.

**Results:** Group I had more problems in all the measured aspects than group II at T2 ($p=0.011$). Group I showed statistically significant difference ($p<0.001$) in mean response level at T1 and T2 whereas in group II comparison between T1 and T2 showed no statistically significant difference ($p=0.072$).

**Conclusion:** Modified lingual spur was found to be a more patient-friendly appliance for correction of tongue thrust habit than tongue crib appliance.

**Keywords:**

Begg brackets, Lingual spurs, Orthodontic appliance, Tongue crib, Tongue thrust.

## Introduction

The etiology of open bite mostly lies within factors such as unfavourable growth pattern, heredity, digital sucking habits, retained infantile swallow, abnormal tongue function and posture [1]. Dental open bite caused due to tongue thrusting habit is one of the most frequently seen malocclusion. Orthodontics has long recognised that anterior open bite is difficult to treat and tends to relapse post-treatment [2]. Many authors have emphasised that a skeletal open bite should be treated early in the mixed dentition [3]. Traditionally tongue crib appliance was the first line of treatment option for patients with tongue thrust habit, along with or without fixed treatment therapy. Various problems have been reported in associated with tongue crib appliance namely tongue discomfort, speech problems, oral hygiene maintenance problems, etc. An alternative tongue crib appliance is the modified lingual spurs or bonded lingual spurs. Nogueira et al. [4] stated that bonded lingual spurs have apparent advantages such as small size, low cost, esthetics, no laboratory preparations, easy installation and reduced clinical time for bonding.

To our knowledge, there are no studies reported in the literature that has compared the patient compliance between tongue crib appliances and modified lingual spurs. Thus this study was aimed to compare the patient compliance between tongue crib and modified lingual spurs in patients with tongue thrusting habits undergoing orthodontic treatment.

## Methods

The approval for the study protocol was obtained from the Institutional Ethics Committee. Informed written consent was obtained from all study subjects who volunteered for the study. The study subjects comprised of patients with anterior open bite (skeletal and dental) and tongue thrust habit (assessed clinically) who was seeking orthodontic treatment at Department of Orthodontics. The study was carried over a period of 2 years starting from patient enrolment to completion of treatment.

The sample size was calculated based on the patient statistics of the department (Based on previous departmental records of past 3 years of how many patients have reported or diagnosed for treatment of tongue thrust) and it was estimated that a total of 60 patients (12-15 years) was the minimum requirement for the study. The study participants were randomly allocated to the two groups based on a computer generated sequence. The group I consisted of 30 patients (14 males, 16 females) with fixed tongue crib appliance and group II consisted of 30 patients (18 males, 12 females) with modified tongue crib appliance (Lingual spurs). Tongue crib appliance was made of 21-gauge SS wire which is soldered into the molar bands (Figure 1) and for modified lingual spurs, Begg brackets (TP orthodontics) were bonded lingually onto the upper anterior teeth (canine to canine) and Begg lock pins were inserted into it (Figure 2).

A 10-item-questionnaire was prepared which consisted of questions regarding speech problems, aesthetics, sleep discomfort, tongue space problem and oral hygiene maintenance. This was pre-tested and validated (Cronbach's alpha value=0.91) among 10 patients who had already begun their treatment and were not part of the present study. This questionnaire was given to the study participants after a week of appliance insertion (T1) and at the end of 10 months (T2) for both the groups and feedbacks were collected at two time intervals and subjected to statistical analysis.

**Figure 1.** Tongue crib appliance.

**Figure 2.** Modified lingual spurs with Begg brackets.

To test the normality of the data obtained, Shapiro-Wilk's test was employed. Shapiro-Wilk's test ($p>0.05$) and a visual inspection of histograms, normal Q-Q plots and box plots showed that the measured values were approximately normally distributed for group I. Data obtained for group II showed deviation from normality. For comparison of data between T1 and T2 in group I paired-t-test was used and for group II Wilcoxon signed rank test was used. For inter-group comparison, Mann-Whitney U test was employed.

## Results

The present conducted study showed that in group I (Tongue crib appliance) at time point T1 study participants had more difficult in all the measured aspects (Table 1) than group II (Modified lingual spurs). Difficulties observed were in the order, tongue discomfort followed by speech problem, oral hygiene maintenance problems, mentally affected because of the appliance, sleep problem and finally the problems for tongue and palate. In group I, 70% of patients rated the appliance to be very bad at the end of T1. After 10 months (T2) some improvement in all these above-mentioned aspects were seen but 60% of patients still rated the appliance as bad.

| Questions | Response | Group I | | Group II | |
|---|---|---|---|---|---|
| | | T1 | T2 | T1 | T2 |
| Do you have any problem with appliance | Yes | 83.30% | 50% | 30% | 10% |
| | No | 16.70% | 50% | 70% | 90% |
| Can you do swallow as you normally do | Yes | 40% | 46.70% | 86.70% | 93.30% |
| | No | 60% | 53.30% | 13.30% | 6.70% |
| Does it hurt your oral structure | Yes | 50% | 30% | 10% | 6.60% |
| | No | 50% | 70% | 90% | 93.40% |
| Is your sleep affected because of the appliance | Yes | 50% | 40% | 20% | 13.30% |
| | No | 50% | 60% | 80% | 86.70% |
| Whether your speech has affected | Very much affected | 33.30% | 13.30% | 3.30% | - |
| | Affected | 50% | 36.70% | 16.70% | 6.70% |
| | Not affected | 16.70% | 50% | 80% | 93.30% |
| Are you worried about the appliance look | Very much worried | 23.30% | 26.70% | - | - |
| | Worried | 46.70% | 26.70% | - | - |
| | Not worried | 30% | 46.60% | 100% | 100% |
| Do you feel, your tongue space has affected because of the appliance | Very much affected | 26.70% | 3.30% | 16.70% | 3.30% |
| | Affected | 53.30% | 60% | 10% | 10% |
| | Not affected | 20% | 36.70% | 73.30% | 86.70% |
| Have you faced any problem with the food chewing | Very much problem | 3.30% | 3.30% | 6.70% | - |
| | A bit problem | 26.70% | 16.70% | 10% | 6.70% |
| | No problem | 70% | 80% | 83.30% | 93.30% |
| Have you ever been mentally affected or hurt because of the appliance | Very much affected | 10% | 6.70% | 3.30% | - |
| | Affected | 56.70% | 43.30% | 30% | 10% |
| | Not affected | 33.30% | 50% | 66.70% | 90% |
| How do you rate the appliance | Very bad | 30% | 40% | - | - |
| | Bad | 70% | 60% | 50% | 30% |
| | Good | - | - | 50% | 70% |
| Group I: 30 patients with fixed tongue crib appliance; Group II: 30 patients with modified tongue crib appliance (Lingual spurs); T1: A week after appliance insertion; T2: At the end of 10 months after appliance insertion. | | | | | |

**Table 1.** Frequency distribution of various responses as reported by study participants.

Modified lingual spurs (Group II) with Begg brackets was found to be a more patient-friendly appliance in terms of speech, appliance look, tongue comfort and oral hygiene maintenance (Table 1). At the end of 10 months (T2) improvement was seen in terms of speech problem (Only 7% reported), sleep problem (13.3% of study participants reported), tongue discomfort was reported by 13.3% and only 10% were affected mentally or hurt because of the appliance. Overall, 70% of the study participants rated the appliance as good at T2.

Comparison of mean responses at T1 and T2 of group I showed a statistically significant difference ($p<0.001$) with lesser mean values at T1, indicates that patients require a longer time to adjust with the tongue crib appearance. A statistically insignificant difference ($p=0.072$) in the mean response levels of T1 and T2 in group II with lesser mean rank values at T2 is indicative of the fact that the patient can very well adapt with the modified lingual spars as early as one week. Comparison between the two groups at T2 time point showed a greater mean response value for group I which implies that modified lingual spurs were more patient friendly in the treatment of tongue thrust ($p=0.011$).

## Discussion

The tongue is a powerful muscular organ that exerts strong pressure at frequent intervals during the day and night time. In tongue thrusting habit, the tongue thrusts between the upper and lower teeth each time the patient swallows [5]. Anterior open bite is one of the most challenging malocclusion for orthodontist as it causes psychological problems and difficulties related to function, health and stability. Various authors have proposed that anterior tongue rest posture is an etiological factor that has largely been overlooked both in conventional orthodontic treatment and in surgical treatment. Some authors believe that tongue crib appliance to be a successful treatment tool [6].

Rogers [7] and Parker [8] have used intraoral spurs to modify tongue rest posture to close anterior open bite. Both the authors concluded a dramatic closure of anterior open bite. The intra-oral cribs (spurs) force a change in anterior tongue rest posture, which in turns arrows incisors to erupt, closing the anterior open bite malocclusion using spurs. Spurs worn during orthodontic treatment of anterior open bite improves post-treatment stability [9]. Speech difficulties, aesthetics, sleep discomfort, reduction in tongue space are some of the common difficulties faced by the patients undergoing orthodontic treatment for an anterior open bite with tongue cribs. The spurs might be an excellent treatment option to allow normal development of the anterior dentoalveolar region since they prevent thumb sucking and anterior tongue rest posture [10].

In the present study, the modified lingual spurs (Group II) with Begg brackets showed superior patient compliance in terms of measured parameters after 10 months as compared to tongue crib appliance (Group I). Study participants of group I reported more problems than the study participants of group II, especially in terms of tongue discomfort, speech problem, oral hygiene maintenance, mentally affected because of the appliance, sleep problem and finally the problems for tongue and palate. Comparison of mean responses between T1 and T2 in group I showed a statistically significant difference between the two-time points, with higher mean values at T2. This finding is indicative of lesser patient compliance of tongue crib appliance. In group II mean response rank values were lesser at T2 as compared to T1, which indicates that the patients had more acceptable levels for the modified lingual spurs after 10 months of appliance insertion.

Haryett et al. [11] in a 3-year follow-up study, found a 91% success in arresting thumb sucking habit when a cemented intra-oral spur appliance was worn for 10 months as compared to a 64% success rate when the appliance was worn only for 3 months. For a long time, they considered the bonded spurs to be extremely traumatic and dropped for the fear of provoking psychological problems and alienating parents and patients [12].

Comparison of response values between groups I and II after 10 months of appliance insertion (T2), showed higher mean responses for group I than group II which was statistically significant. The study results suggest that modified lingual spurs with Begg brackets can be used instead of tongue crib appliance for treatment of tongue thrust habit owing to its superior acceptance and compliance. To our knowledge, there have been no studies reported that have compared the two treatment modalities in terms of patient compliance. Owing to the cross-sectional nature of the presently conducted study, further research with long-term clinical studies in this area of clinical therapy is recommended.

## Conclusion

The modified lingual spurs proved to be a better patient friendly appliance in comparison to the palatal crib in terms of tongue discomfort, speech problem, swallowing problems, appliances appearance and sleep problems.

## References

1. Taslan S, Biren S, Ceylanoglu C. Tongue pressure changes before, during and after crib appliance therapy. Angle Orthod 2010; 80: 533-539.
2. Lo FM, Shapiro PA. Effect of presurgical incisor extrusion on stability of anterior open bite malocclusion treated with orthognathic surgery. Int J Adult Orthodon Orthognath Surg 1998; 13: 23-34.
3. Cassis MA, de Almeida RR, Janson G, de Almeida-Pedrin RR, de Almeida MR. Treatment effects of bonded spurs associated with high-pull chincup therapy in the treatment of patients with anterior open bite. Am J Orthod Dentofac Orthop 2012; 142: 487-493.
4. Nogueira FF, Mota LM, Nouer PRA, Nouer DF. Nogueira® lingual bonded spur: supporting treatment of atypical swallow by lingual pressure. Rev Dent Press Ortod E Ortop Facial 2005; 10: 129-156.
5. Tulley WJ. A critical appraisal of tongue-thrusting. Am J Orthod 1969; 55: 640-650.
6. Subtelny JD, Sakuda M. Open-bite: Diagnosis and treatment. Am J Orthod Dentofacial Orthop 1964; 50: 337-358.
7. Rogers AP. Open bite cases involving tongue habits. Int J Orthod 1927; 13: 837.
Parker JH. The interception of the open bite in the early growth period. Angle Orthod 1971; 41: 24-44.
9. Huang GJ, Justus R, Kennedy DB, Kokich VG. Stability of anterior openbite treated with crib therapy. Angle Orthod 1990; 60: 24-26.
10. Meyer-Marcotty P, Hartmann J, Stellzig-Eisenhauer A. Dentoalveolar open bite treatment with spur appliances. J Orofac Orthop 2007; 68: 510-521.
11. Haryett RD, Hansen FC, Davidson PO. Chronic thumb-sucking. A second report on treatment and its psychological effects. Am J Orthod 1970; 57: 164-178.
12. Justus R. Correction of anterior open bite with spurs: Long term stability. World J Orthod 2001; 2: 219-231.