



Effect of Restoring Missing Maxillary Primary Incisors on Speech of Children



Safa Akasha Mohamed Eltom¹, Ibrahim Hassan El kalla², Dr.Tamer Samir Abou Elsaad³, Hossam El-Sherbiny Hammouda⁴

1-BDS, Faculty of Dentistry, the National Ribat University (Sudan).

2- Professor of pediatric Dentistry, Faculty of Dentistry Mansoura university.

3- Professor of phoniatrics, ORL Department for postgraduate studies and research Faculty of Medicine Mansoura University

4- Lecturer of pediatric Dentistry Faculty of Dentistry Mansoura university.

Abstract:

Purpose: The purpose of this study was to evaluate the effect of restoring missing maxillary primary incisors on speech of children and parent satisfaction to restoration of speech.

Materials and methods: The present study was designed as a case control study. A total of 40 children in the age range of 3.3-5.5 years were selected and divided into two groups. Group A: Twenty children with normal anterior maxillary teeth. Group B: Twenty children with a history of premature loss of maxillary primary incisors. The second group will be evaluated by articulation test for every child to detect any articulation error. Each child was evaluated four times as follow: Before restoration of missing incisors, immediately after restorable with fixed appliance, at 2week after restorable with fixed appliance and finally at 4week after restorable with fixed appliance. After that a questionnaire was provided to the parents. It designed from seven questions to evaluate the effect of restoration of missing teeth on speech of studied children.

Results : The results of this study showed there was statistically significant difference between control and intervention group studied at pre denture and immediately after denture. On the other hand, there are no statistically differences between intervention and control group at 2 and 4 weeks of denture application. At the end of follow up period, (after 4 weeks), all intervention group children become normal in speaking the sound (/ب/, /ظ/, /ز/, /ص/, /س/).

Conclusions: Early intervention of early loss of primary maxillary anterior teeth can prevent speech problems in children and satisfaction of parent to restoration of missing maxillary anterior primary teeth with fixed appliance.

Keywords: Maxillary primary incisors, speech, fixed appliance.

Introduction

Speech is described as an act of producing speech sounds for putting thoughts into words for communication⁽¹⁾. Speech sounds (phonemes) are divided into the categories of consonants and vowels with respect to their production in the vocal tract, their acoustic transmission, and their auditory reception⁽²⁾. Speech sound disorders include problems with articulation (making sounds) and phonological processes (sound patterns)⁽³⁾.

Phonological disorders implicate a language disorder, whereas articulation disorders imply speech disorders⁽⁴⁾. Phonological disorders involve the linguistic aspect of speech production, which affects multiple speech sounds. On the other hand, articulation disorders involve the motor component of speech and are characterized by incorrect production of the speech sounds⁽⁵⁾.

The effect of teeth on the articulation of speech sounds has been the concern of researchers because the consonant speech sounds categorized as labiodental [f], linguo-alveolar ([n], [t], [d], [s], [z], [l], [r] and [z]) are formed with the aid of the anterior teeth⁽⁶⁾. Therefore, studies regarding the effects of tooth loss are focused on the production of those speech sounds⁽⁷⁾.

Various types of space maintainers (removable or fixed appliances) are fabricated depending on the child's stage of dental development, dental arch involved, primary teeth missing and which teeth they are⁽⁸⁾.

One of the important functions of the primary tooth is occupy the physiological space and guide the eruption of its permanent successor. Fixed space maintainers are always acceptable in children as they have less desire to wear removable one⁽⁹⁾.

The removable space maintainers cover large area of oral tissue causing irritation to ulcer. To improve patient acceptance aesthetic functional fixed appliance is reliable. The fixed space maintainer used to replace deciduous central incisor reveal a good success with improvement of aesthetic and function with fewer requirements of patient cooperation and less irritation to the oral tissue. Therefore, the central incisors, which are directly adjacent to the air current, were the central topic of this investigation. The aim of this study was to examine the influence of maxillary primary incisor tooth loss on sound production¹⁰.

Materials and Methods

A total of 40 children in the age range of 3.3-5.5 years were selected from Mansoura dental hospital clinic and divided in to two groups. (Figure 1)

Group A: Twenty children with normal anterior maxillary teeth.

Group B: Twenty children with a history of premature loss of maxillary primary incisors due to extraction or trauma.

The second group was evaluated by articulation test for every child to detect any articulation error. Each child was evaluated four times as follow:

1. Before restoration of missing incisors.
2. Immediately after restorable with fixed appliance.
3. At 2week after restorable with fixed appliance.
4. At 4week after restorable with fixed appliance.

The fixed functional appliance was cemented with glass ionomer cement then occlusion was finally checked for any premature contact

Statistical analysis and data interpretation (methodology)

Data were fed to the computer and analyzed using IBM SPSS software package version 22.



Figure (2): Children with loss of maxillary primary incisors.



Results:

Sound (/ف/ and /ظ/, /ز/, /ص/, /س/).

Table 1: Demonstrates that there is statistically significant difference between control and intervention group studied at pre denture and immediately after denture. On the other hand, there is no statistically a difference between intervention and control group at 2 and 4 weeks of denture application. At the end of follow up period, (after 4 weeks), all intervention group children become normal in speaking the sound (/س/, /ص/, /ز/, /ظ/ and /ف/).

The sound (/س/, /ص/, /ز/, /ظ/ and /ف/). demonstrated significant improvement at all periods of follow up. However, there is non-significant change between 2 and 4 weeks follow up.

Table (1): Comparison between control and intervention groups with assessment of change in intervention group during follow up for sound /س/.

Sound س	Control group n=20(%)	Intervention group n=20(%)				test of significance
	T	T0	T1	T2	T3	Fischer Exact test
Abnormal	0(0.0)	20(100.0)	11(55.0)	2(10.0)	0(0.0)	P1<0.001* P2<0.001* P3=0.48 P4=1.0
Normal	20(100.0)	0(0.0)	9(45.0)	18(90.0)	20(100.0)	
Difference between T0 & follow up periods (MC Nemar test)			p=0.004*	p<0.001*	p<0.001*	
Difference between T1 & follow up periods (MC Nemar test)				p=0.004*	p<0.001*	
Difference between T2& T3 (MC Nemar test)					p=0.5	

P1: difference between control group & intervention group during pre-denture (T0)

P2: difference between control group & intervention group immediately after denture (T1).

P3: difference between control group & intervention group at 2 weeks (T2)

p4: difference between control group & intervention group at 4 weeks (T3).

Table (2): effect of anterior teeth compensation questionnaire among studied group.

	Questionnaire	N =20	%
Q1	Child accommodates his missing teeth Little Very good	2 18	10.0 90.0
Q2	Speaking becomes better after denture application	20	100.0
Q3	Positive effect of speaking on the child	20	100.0
Q4	Specific sound are affected after denture application	20	100.0
Q5	The affected sound become better after application of denture	20	100.0
Q6	Satisfied with denture	20	100.0
Q7	Advice other children with compensating missing teeth	20	100.0

Discussion

The results of the present study showed that the sound /س/ demonstrated significant improvement at all periods of follow up. However, there is non-significant change between 2 and 4 weeks follow up. This result was in agreement with *Giovannetti et al (2011)*¹¹ who found that the child who loses his or her teeth will have problem in correctly pronouncing certain sounds such as /s/, /z/, / and /v/. This result was also proved by *Snow (1961)*¹² who found that the articulation of consonant speech sounds [s], and [z]) were better in children with intact primary maxillary incisors than without incisors.

While comparing change in speaking sound /ز/ during follow up, demonstrated that there is a statistically significant improvement at all periods of follow up. The result due to the sound /ز/ was created by air which escapes from the median groove of the tongue when the tongue is just behind the upper incisors teeth so all intervention group children become normal in speaking sound /ز/. This results in agreement with *Waggoner et al (2001)*¹³ who found that if extraction of the primary maxillary anterior teeth was done before 4 years of age, articulation of the [ز] speech sounds could get affected.

The same results was found for speaking sound /ف/ as it was a statistically significant improvement

during follow up by comparing change in at all periods of follow up. This due to when the child was pronouncing the sound /ف/, the incisal edge of the maxillary teeth act as a valve seat and the lower lip as the valve so all intervention group children become normal in speaking sound /ف/. These result is in agreement with *Chakraborty et al (2015)*¹⁴. Who found that pronunciations of certain consonants such as labial sounds “f” and “v” are altered during speech if early tooth loss in anterior incisal segment occurred. This result was also proved by *Jain et al (2018)*¹⁵. Who found that incisal edges of maxillary central incisors affect the size and shape of the air flow for “F” and “V” sounds.

In the present study, all children in the intervention group become normal in speaking /س/, /ص/ and /ظ/sounds. Our results revealed that there is a statistically significant improvement at all periods of follow up when compared with control group. The results also showed similar findings with *Kalia, et al. (2018)*¹⁶ and *Snow (1961)*¹² who found that the loss of maxillary incisors in children have more pronounced effects on sound [f], [v], [d], [z], [s], [s.].

Therefore, treatment of children with anterior teeth loss should not be restricted to esthetic and functional oral rehabilitation, but instead must also comprehend speech; as

premature loss of the primary maxillary incisor appears to have long-term effect on the speech development of most children whose speech was tested at 3.5–5.5 years of age

Conclusion

Within the limitation of this study we can concluded that:

- Early intervention of early loss of primary maxillary anterior teeth can prevent speech problems in children.
- Improvement in articulation errors of the sounds after insertion of fixed functional space maintainer.
- Satisfaction of parent to restoration of missing maxillary anterior primary teeth with modified Nance appliance

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