



High Frenal Attachment - As a risk Factor of Midline Diastema

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ABSTRACT

Dental esthetics is a field of dentistry concerned especially with the appearance of dentition as achieved through its arrangement, form and color. The type of malocclusion, the degree of malocclusion, age, patients' esthetic desires, practitioners' style of treatment as well as gender predilection can influence the final esthetic treatment the patient will be subjected to. From functional demands, over the years, patients' demands have dynamically shifted to meeting the maximum esthetics possible. In older patients, it is difficult to treat the malocclusion by only utilising orthodontic procedures, hence bringing in the requirement of performing a multidisciplinary approach of dental treatment to provide the maximum esthetics for the patient. The aim of the study was to determine the prevalence of high frenal attachments as a risk for midline diastema. A sample size of 272 patients' information from the Dental Information Archiving Software database of an institutional setup in Chennai was taken, and a retrospective study was performed followed by data analysis using SPSS version 20.0 software. Within the limits of the study, it can be said that 13.6% of the midline diastema cases are caused by high frenal attachments. No significant association between age, gender and frenal attachments associated with midline diastema was confirmed in this study. P-value associated with high frenal attachment and age was 0.28, and P-value associated with high frenal attachment and gender was 0.39.



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INTRODUCTION

Dental esthetics is a field of dentistry concerned especially with the appearance of dentition as achieved through its arrangement, form and color. This does not just cover the complete dentition and also aims at the beautification of the smile as a whole. The importance of dentofacial appeal in regard to the individual's psycho-social well-being is a proven fact. One of the most important factors that affect people's smiles is teeth. A dental restoration's positive impact on the patient's smile, appearance, self-confidence and overall mental health can not be underestimated. Dental aesthetic corrections can be categorized into facial esthetics, esthetic orthodon-

tics and esthetic prosthodontics. The type of malocclusion, the degree of malocclusion, age, patients' esthetic desires, practitioners' style of treatment as well as gender predilection can influence the final esthetic treatment the patient will be subjected to.

Malocclusion can be defined as an abnormal alignment of upper and lower teeth. A malocclusion can be either minor or severe in nature. For such minor malocclusion, orthodontic treatment without surgery can be advised. In cases of severe malocclusions, surgical treatment might have to be performed. In certain cases, surgery, along with orthodontics, might still not be the solution to get maximum esthetics (Ganapathy *et al.*, 2016; Ajay *et al.*, 2017). At one point of time, esthetic dentistry was a speciality for an orthodontist only. But in current times, an oral and maxillofacial surgeon, periodontist and prosthodontist can be considered as estheticians (Turvey, 1988; Ashok *et al.*, 2014). Every dentist is responsible for the final outcome of the restoration and hence is considered an integral factor in maximizing esthetics (Kannan, 2017; Duraisamy *et al.*, 2019).

In the past world, functional demands were the main and sole focus of dental treatments. With time and technological advancements in dentistry, the main focus of demands had shifted to giving the patient the maximum esthetic values (Venugopalan *et al.*, 2014; Samorodnitzky-Naveh *et al.*, 2007). Dental aesthetics itself can be appreciated in cases of good oral hygiene (Basha *et al.*, 2018), a well-designed prosthesis (Jain *et al.*, 2017; Kannan and Venugopalan, 2018) and even in treatment using ceramic restorations (Ashok and Suvitha, 2016; Kannan and Venugopalan, 2018). Acceptance of dental aesthetics varies from person to person based on the age of the patient (Vallittu *et al.*, 1996), the gender of the patient, recognition of tooth color of the patient (Jayalakshmi *et al.*, 2013; Jain and Dhanraj, 2016), retained primary teeth (Berlin and Bennett, 2000; Ith-Hansen, 2000) as well as correlation of facial and dental midlines (Khan and Kazmi, 2019; Brisman, 1980).

Diastemas are spaces between 2 or more consecutive teeth which can occur anywhere in the upper and lower arches, caused by many etiological factors (Muthu *et al.*, 2007). Maxillary midline diastema is a common esthetic problem in mixed and early permanent dentition (Bolton, 1958). Midline diastema is caused by many etiological factors like the disproportion between teeth sizes, dental arches length and abnormal labial frenum attachment between central incisors (Edwards, 1977; Dehghani and Heravi, 2014).

High frenal attachment is characterized into four types namely gingival, mucosal, papillary and papillary penetrating types, the most severe being papillary penetrating where there is an attachment of upper border lip tubercle to the palatine papilla. Papilla penetrating is a severe attachment problem of the frenum, and subsequently, the cause for midline diastema, causing spacing in between the teeth (Priyanka *et al.*, 2013). Midline diastema is characterized as upright, convergent and divergent, and its prevalence is observed mostly in females. Etiology of midline diastema is of prime importance because it is necessary to get to the root of the problem for better treatment planning.

Fixed orthodontic appliances for correcting midline diastema is better than correction done with removable appliances. Availability of treatment modalities for correcting a midline diastema associated with a high frenal attachment are frenectomy and frenotomy. Smile designing, direct veneering, indirect veneering and single crowns placement can be considered as a treatment modality in restorative and prosthetic dentistry.

In an institutional setup such as Saveetha Dental College, there are several types of studies conducted such as in vitro studies, (Vijayalakshmi and Ganapathy, 2016; Jyothi *et al.*, 2017), reviews, (Selvan and Ganapathy, 2016; Subasree *et al.*, 2016), case reports (Jain *et al.*, 2019).

The sole purpose of the study was to determine the prevalence of high frenal attachment as a risk factor for midline diastema in patients reporting to Saveetha Dental College.

MATERIALS AND METHODS

A retrospective study was conducted in an institutional set up in Chennai, using Dental Information Archiving Software database over the duration of June 2019 till March 2020 over the past eight months reviewing 86,000 patients and narrowing down to a sample size of 272 patients who reported to the institution's OutPatient ward.

The study was conducted in a universal setting in a South Indian population. The positives of the study conducted were the similar ethnicity of the sample size of the study as well as the online availability of the Dental Information Archiving Software database. This study was approved by the Ethical Board of the University. The Ethical number provided for this study was SDC/ SIHEC/ 2020/ DIASDATA/ 0619-0320. There were two reviewers involved in the data collection process.

The case sheets of the given sample size of the study

were reviewed by the usage of intraoral photos of the patients. Cross verification of the patient's data was performed to prevent errors. The measure to prevent errors done was to review the observer, which will minimize the sampling bias.

The internal validity of the study was applicable. The external validity of the study defines the eligibility criteria of the sample size population. The cases were selected on the basis of the age group of 18-50 years. The patients were ensured to have the presence of midline diastema. The cause of the midline diastema was verified using the data present in the case sheet. The cases below the age group of 18 years were excluded from the study.

The data was tabulated using the Microsoft Excel Spreadsheet, and analysis of the data was performed using IBM SPSS version 20.0 software where chi square analytical tests were done.

RESULTS AND DISCUSSION

In a sample size of 272 patients reporting to the institution's OutPatient ward, 67.6% of the sample size are males and the remaining 32.4% are females. Of these 272 patients with midline diastema, 11.8% of the cases are of high frenal attachment.

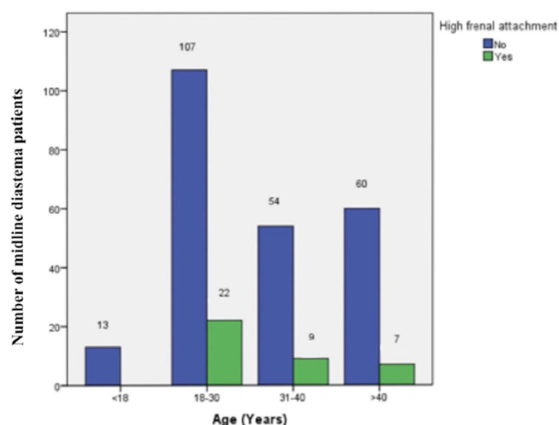


Figure 1: The above graph represents association between frenal attachment and age for midline diastema patients

The relation of high frenal attachment, along with the age group of the sample size, was studied. The majority of the sample size were found to be from the age group 18-30 years. Of all age groups, the majority of patients of the age groups do not possess high frenal attachment. Below 18 years, there is no evidence of high frenal attachments associated with midline diastema ($p > 0.05$). Between 18-30 years, 17.1% have midline diastema associated

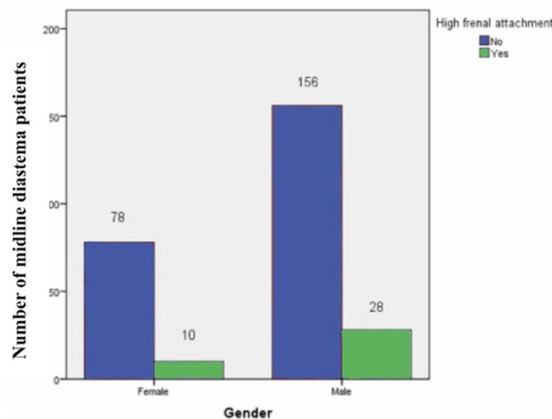


Figure 2: The above graph represents association between high frenal attachment and Gender

with high frenal attachment. Between 31-40 years, 14.3% have midline diastema associated with high frenal attachment. Above 40 years, 10.4% have midline diastema associated with high frenal attachment (Figure 1). However, a higher percentage of midline diastema patients within the age group of 18-30 years with high frenal attachment in comparison to that of other age groups. The statistical analytical test performed with the given two parameters of the study was Pearson's chi square test. Since the p-value is more than our chosen significance level ($p < 0.05$), we can not reject the null hypothesis and conclude that there is no significant association between age and high frenal attachment responsible for midline diastema. The statistical test concluded that the Pearson Chi-square value was found to be 3.829 and P value was 0.28 (> 0.05), (Table 1).

The gender of the sample size and type of frenal attachments were studied. In males and females, it was found the majority of the patients did not possess high frenal attachment, and a very small minority possessed such high frenal attachments with a percentage of 15.2% and 11.4% respectively (Figure 2). However, there is a higher percentage of males with high frenal attachment in comparison to that of females. The statistical analytical test performed with the given two parameters of the study was Pearson's chi square test. Since the p-value is more than our chosen significance level ($p < 0.05$), we can not reject the null hypothesis and conclude that there is no significant association between gender and high frenal attachment responsible for midline diastema. The statistical test concluded that the Pearson Chi square value was found to be 0.736, and P value was 0.39 (> 0.05), (Table 1).

Table 1: The association of frenal attachment with age and gender of midline diastema patients

		High Frenal Attachment		
		Absent	Present	Pearson chi
Age (years)	Below 18 years	100%	0%	Square = 3.829 P value =0.28
	18-30	82.9%	17.1%	
	31-40	85.7%	14.3%	
	Above 40 years	89.6%	10.4%	
Gender	Male	84.8%	15.2%	Pearson chi square = 0.736 P value = 0.39
	Female	86.6%	11.4%	

There is no statistically significant association between high frenal attachment with age and gender

In the study conducted, within the sample size, the gender predilection was found to be of male patients with a percentage of 67.6%. Age group predilection was found to be within 18-30 years of age, of which it was found that 17.1% of the cases had midline diastema along with association of high frenal attachment seen. Between the age group, gender and high frenal attachment, it was seen that no association was present.

A lot of literature is present, which says that midline diastema is caused by multiple etiological factors such as high frenal attachment, impacted supernumerary teeth, etc. In Christabel SL et al 2015, 49.5% of the cases have a gingival free attachment, 38.8% are of mucosal attachment, 1.9% are of papillary penetrating type, and 9.8% are of papillary attachment (Christabel, 2015). The prevalence type of frenal attachment had no association with the gender but possessed a significant association with age. As the age decreased, the prevalence of papillary penetrating frenal attachment was found to increase. Another study given by Serai B et al 2019, concluded that there is a correlation between high frenum and maxillary midline diastemas (Seraj et al., 2019).

Every study till date, has its own scope as well as limitations. In this study, limitation is the usage of intraoral photos, and this can be amended by ensuring the diagnosis is done by live examination of the patients. It might take a long time, but it will provide a confirmation to the study conducted.

Every causative agent of midline diastema has been reviewed upon by multiple research studies, and the significance has been spoken about. In this study, the aim is to increase the awareness of practitioners on the incidence of midline diastema and high frenal attachment, thus giving them a fair idea of early diagnosis and treatments using the latest technological advancements to give the patient maximum esthetic value.

CONCLUSION

Within the limits of the study, it can be said that 13.6% of the midline diastema cases are caused by high frenal attachments. The most prevalent gender association was found to be of male patients and the age group of 18-30 years. Hence early detection of high frenal attachment is important as correcting it at a younger age.

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Author contributions

First author, Dr Nadhirah Faiz, performed the analysis, and interception and wrote the manuscript. Second author, Dr.Subhabrata Maiti, contributed to the conception, data design, analysis interpretation and critically revised manuscript. The third author, Dr Iffat Nasim, Participated in the study and revised the manuscript. The fourth author, Dr. Jessy, revised the manuscript as per guideline, alignments and formatting. All the authors have discussed the results and contributed to the final manuscript.

Conflict of interest

The authors declare that they have no conflict of interest for this study.

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REFERENCES

- Ajay, R., Suma, K., Ali, S., Sivakumar, J. K., Rakshagan, V., Devaki, V., Divya, K. 2017. Effect of surface modifications on the retention of cement-retained implant crowns under fatigue loads: An In vitro study. *Journal of Pharmacy And Bioallied Sciences*, 9(5):154–154.

- Ashok, V., Nallaswamy, D., Begum, S. B., Nesappan, T. 2014. Lip Bumper Prosthesis for an Acromegaly Patient: A Clinical Report. *The Journal of Indian Prosthodontic Society*, 14(S1):279–282.
- Ashok, V., Suvitha, S. 2016. Awareness of all ceramic restoration in rural population. *Research Journal of Pharmacy and Technology*, 9(10):1691–1691.
- Basha, F. Y. S., Ganapathy, D., Venugopalan, S. 2018. Oral Hygiene Status among Pregnant Women. *Research Journal of Pharmacy and Technology*, 11(7):3099–3099.
- Berlin, K., Bennett, J. 2000. The long-term survival of lower second primary molars in subjects with agenesis of the premolars. *The European Journal of Orthodontics*, 22(3):245–255.
- Bolton, W. A. 1958. Disharmony in tooth size and its relation to the analysis and treatment of malocclusion. *The Angle Orthodontist*, 28(3):113–130.
- Brisman, A. S. 1980. Esthetics: A Comparison of Dentists' and Patients' Concepts. *The Journal of the American Dental Association*, 100(3):345–352.
- Christabel, S. L. 2015. Prevalence of Type of Frenal Attachment and Morphology of Frenum in Children, Chennai, Tamil Nadu. *World Journal of Dentistry*, 6(4):203–207.
- Dehghani, M., Heravi, F. 2014. Orthodontic-restorative treatment of maxillary midline diastema. *Dental Hypotheses*, 5:124–124.
- Duraisamy, R., Krishnan, C. S., Ramasubramanian, H., Sampathkumar, J., Mariappan, S., Sivaprakasam, A. N. 2019. Compatibility of Nonoriginal Abutments With Implants: Evaluation of Microgap at the Implant-Abutment Interface, With Original and Nonoriginal Abutments. *Implant dentistry*, 28(3):289–295.
- Edwards, J. G. 1977. The diastema, the frenum, the frenectomy: a clinical study. *American journal of orthodontics*, 71(5):489–508.
- Ganapathy, D., Sathyamoorthy, A., Ranganathan, H., Murthykumar, K. 2016. Effect of resin bonded luting agents influencing marginal discrepancy in all ceramic complete veneer crowns. *Journal of Clinical and Diagnostic Research*, 10(12).
- Ith-Hansen, K. 2000. Persistence of deciduous molars in subjects with agenesis of the second premolars. *The European Journal of Orthodontics*, 22(3):239–243.
- Jain, A., Ranganathan, H., Ganapathy, D. 2017. Cervical and incisal marginal discrepancy in ceramic laminate veneering materials: A SEM analysis. *Contemporary Clinical Dentistry*, 8(2):272–272.
- Jain, A. R., Dhanraj, M. 2016. A Clinical Review of Spacer Design for Conventional Complete Denture. *Biology and Medicine*, 8(5).
- Jain, A. R., Nallaswamy, D., Ariga, P. 2019. Determination of Correlation of Width of Maxillary Anterior Teeth with Extraoral Factor (Interpupillary Width) in Indian Population. *Journal of Clinical & Diagnostic Research*, (7):13–13.
- Jayalakshmi, N. S., Ravindra, S., Nagaraj, K. R., Rupesh, P. L., Harshavardhan, M. P. 2013. Acceptable Deviation between Facial and Dental Midlines in Dentate Population. *The Journal of Indian Prosthodontic Society*, 13(4):473–477.
- Jyothi, S., Robin, P. K., Ganapathy, D., Anandiselvaraj 2017. Periodontal Health Status of Three Different Groups Wearing Temporary Partial Denture. *Research Journal of Pharmacy and Technology*, 10(12):4339–4339.
- Kannan, A. 2017. Effect of Coated Surfaces influencing Screw Loosening in Implants: A Systematic Review and Meta-analysis. *World*, 8(6):496–502.
- Kannan, A., Venugopalan, S. 2018. A systematic review on the effect of use of impregnated retraction cords on gingiva. *Research Journal of Pharmacy and Technology*, 11(5):2121–2121.
- Khan, M., Kazmi, S. 2019. Coincidence of Dental Midline with Facial Midline in a Sample of Pakistani Population. *Journal of the College of Physicians and Surgeons Pakistan*, 29(3):210–213.
- Muthu, M. S., Rathna, P., Koora, K. 2007. Spontaneous closure of midline diastema following frenectomy. *Journal of Indian Society of Pedodontics and Preventive Dentistry*, 25(1):23–23.
- Priyanka, M., Emmadi, P., Ambalavanan, N., Sruthi, R., Ramakrishnan, T. 2013. An overview of frenal attachments. *Journal of Indian Society of Periodontology*, 17(1):12–12.
- Samorodnitzky-Naveh, G. R., Geiger, S. B., Levin, L. 2007. Patients' satisfaction with dental esthetics. *The Journal of the American Dental Association*, 138(6):805–808.
- Selvan, S. R., Ganapathy, D. 2016. Efficacy of fifth generation cephalosporins against methicillin-resistant *Staphylococcus aureus*-A review. *Research Journal of Pharmacy and Technology*, 9(10):1815–1815.
- Seraj, B., Shahrabi, M., Masoumi, S., Jabbarian, R., Manesh, A. A., Fini, M. B. 2019. Studying Maxillary Labial Frenulum Types and Their Effect on Median Diastema in 3–6-year-old Children in Tehran Kindergartens. *World Journal of Dentistry*, 10(2):93–97.
- Subasree, S., Murthykumar, K., Dhanraj 2016. Effect

- of Aloe Vera in Oral Health-A Review. *Research Journal of Pharmacy and Technology*, 9(5):609-609.
- Turvey, T. A. 1988. Orthognathic surgery: a significant contribution to facial and dental esthetics. *The Journal of the American Dental Association*, 117(4):49E-55E.
- Vallittu, P. K., Vallittu, A. S. J., Lassila, V. P. 1996. Dental aesthetics — a survey of attitudes in different groups of patients. *Journal of Dentistry*, 24(5):335-338.
- Venugopalan, S., Ariga, P., Aggarwal, P., Viswanath, A. 2014. Case Report: Magnetically retained silicone facial prosthesis. *Nigerian Journal of Clinical Practice*, 17(2):260-264.
- Vijayalakshmi, B., Ganapathy, D. 2016. Medical management of cellulitis. *Research Journal of Pharmacy and Technology*, 9(11):2067-2067.