Preference of Gingival Retraction Methods - Mechanical Over Chemico Mechanical Method in University Based Setting - A Retrospective Study

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ABSTRACT
Tooth preparation is done in the treatment of fixed partial dentures. It is necessary to obtain a good amount of gingival retraction for accuracy in marginal positioning of prosthesis. The aim of this study is to evaluate the efficiency of gingival retraction by mechanical and chemico mechanical methods. A retrospective data collection was done by reviewing 86000 case sheets from Saveetha dental college. Study period was about 10 months. Inclusion criteria & exclusion criteria were available. Parameters were tabulated and analysed using SPSS software. There were 899 patients treated for fixed partial dentures in the study period. Among these, 398 were males and 501 were females. Chi square t test was performed and p value was found to be 0.02 and the results are significant as p value is <0.05. Also, 95% of both the population irrespective of age and gender underwent mechanical method of gingival retraction. This study is in consensus with existing literature that gingival retraction can be efficiently obtained through the mechanical method. Whether systemic health issues or socioeconomic reasons played a role in the acceptance of choice of treatment needs to be further evaluated with larger sample size and multicentre studies among our population.

INTRODUCTION
In case of treatment of fixed partial denture, after preparing a tooth, it is necessary to obtain a good amount of gingival retraction for accuracy in marginal positioning of the prosthesis (Katreva and Doychinova, 2017). The gingival margin should be clean, devoid of saliva, debris, blood etc. so that there is an adequate adaptation of material over the region. For such margins, it is necessary to retract gingiva. Various methods of gingival retraction include mechanical, chemical, electrical, surgical etc. (Kostić et al., 2012). Mechanical methods of retraction are a fast, simple, inexpensive technique which is globally followed for a longer period of time. This technique can be implemented in two methods as a single cord and double cord retraction techniques.

Chemical methods include the use of chemical agents like adrenaline, aluminium chloride etc., which reduces vessel diameter and interfere in the permeability of vessels (Bowles et al., 1991). Chemico mechanical method is the combination of using cords dipped in these agents, namely...
adrenaline, aluminium chloride, epinephrine etc. and induce hemostasis. However, there always has a limit for the maximal dosage. It cannot be a preset value as it depends on individuals age, weight, cardiac and blood conditions. Theoretically, the maximum dosage for any patient with no underlying cardiac problems or hypertension would be 0.2 mg (Chaudhari et al., 2015). However, it is mostly a contradictory technique in patients with hypertension as it may interfere with the metabolism of drugs taken by them and may pose unseen complications (Bader et al., 2002).

Surgical methods include localised curettage, whereas electrical method, foam technique are newer advancements. Preference of mechanical method over chemico mechanical method has been a topic of debate and was the zone of interest in research for many decades which has eventually led to such advancements and use of technologies in prosthetic dentistry.

Kellam et al. (1992) stated that epinephrine absorption from gingival epithelium is around 70-90% and hence can be used as a good chemical agent for gingival retraction (Kellam et al., 1992). Feng, in his literature, reported that there is the release of tumor necrosis factor alpha during the usage of retraction cords in epithelium causing damage to normal and healthy soft tissues (Feng et al., 2006). In retraction of gingiva of anterior proper width should be recorded to avoid marginal discrepancy where we can reduce such errors by anthropometric measures (Ariga et al., 2018). Initial periodontal assessment with plaque score (PLS), bleeding on probing (BOP), probing pocket depth (PPD), loss of attachment (LOA), furcation and mobility has to be carried in order to get optimal retraction (Jyothi et al., 2017).

If not assessed prior to the treatment they may lead to micro gaps between margin and crown which has a tendency for food lodgement and may result in tissue necrosis, dental caries and even cellulitis in severe cases (Vijayalakshmi and Ganapathy, 2016; Duraisamy, 2019). Since tooth preparation is slightly invasive process care must be taken to control damage for a retraction and it is recommended to prescribe antibiotic coverage like cephalexins etc. to avoid further infections and avoid poor oral hygiene among patients (Selvan and Ganapathy, 2016; Subasree et al., 2016). All these can affect the marginal integrity, which is one of the fundamental principles of fixed partial dentures. Marginal discrepancy severely affects the long term success of pontics placed especially in the incisive and cervical region (Ganapathy, 2016; Ajay, 2017).

Even after perfect preparation and placement of pontics the success of the fixed partial dentures lies in the attitude of patients as it has an effect in the overall success of treatment (Ashok and Suvitha, 2016). Fixed partial dentures are preferred to avoid failure of treatments like screw loosening in case of implants as they are coated with zinc or due to resin reaction to tissues in the removable prosthesis (Ganapathy et al., 2017).

The role of chemical methods has to be evaluated in the case of patients with conditions like acromegaly, arthritis etc. as they may require different treatment approach (Ashok, 2014). The preference of fixed partial dentures over magnet retained prosthesis or to cement retained crowns were due to their less hazardous or invasive effects and complications and low incidence of failures (Venugopalan, 2014). However, the proper retraction technique and usage of impregnated retraction cords to be evaluated.

Extra consideration to be done for geriatric, pregnant and lactating patients as they may have hormonal disturbances during this phase of life and the usage of chemical agents for retraction should be done only after proper evaluation of risk and complications (Basha et al., 2018; Kannan and Venugopalan, 2018). Henceforth, it is necessary for us to compare the results for both longer and shorter duration to estimate the efficiency of one over the other and thereby giving the right treatment with the lowest possible damage. Taking into consideration the above studies, our study aims at evaluating the preference of gingival retraction methods possess minimal disadvantage with regards to a systemic health condition.

MATERIALS AND METHODS

Study type and setting
This is a retrospective study and all data were collected by reviewing 86000 case sheets of outpatients department of Saveetha Dental College and Hospitals over a period of 10 months from June 2019-March 2020.

Participants
Patients treated for fixed partial dentures were included and it accounted for around 899 patients where 398 were male and 501 were female.

Sampling and verification
All data were obtained and are approved by the Institutional Ethical Committee and cross verified by 2 reviewers. The external and internal validity were applicable.

Data analysis

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All data retrieved were compiled in an excel sheet and imported to SPSS by IBM for statistical analysis. Chi square statistical analysis was performed. The independent and dependant variables include age, gender and treatment, respectively.

RESULTS AND DISCUSSION

Figure 1 representing gender of patients undergoing treatment. It can be seen that 94% of males (375/399) and 95% of females (477/500) had undergone mechanical method over chemico mechanical methods. Chi square t test was performed and the p value was found to be 0.508 and the results are not significant as p value is >0.05 and there is no significant relationship between gender and retraction method preferred.

Figure 2 representing the age of the patients undergoing treatment states that 97% of patients who were of age < 35 had undergone mechanical methods (324/334), whereas 93% of participants above 35 years of age had undergone mechanical method over chemico mechanical method. Chi square t test was performed and p value was found to be 0.02 and the results are significant as p is <0.05, which implies significant relation between age and method of retraction.

Thus it can be seen that irrespective of age & gender, the mechanical retraction was the choice of preference for gingival retraction in treatment of fixed partial dentures to avoid local drug absorption and systemic complications.

In the current study, we can see the preference of mechanical method over chemico mechanical method. The comparison between gender over method had been established to see the preference of techniques as males were considered to develop hypertension much earlier than women (Tezal et al., 2001).

In that case, there should be more preference for chemico mechanical methods among women, but on the contrary, we have around 94% in both the genders being preferred mechanical method. Also, the comparison between age over the preferred method was established as patients have a tendency to develop prehypertension in the late 30s and 40s (Tangade et al., 2018). Hence a comparison was made also aiming to establish the reactions of adrenaline or other chemicals in these patients. But 95% of patients in both the age groups were preferred mechanical method.

In many literatures, the mechanical method was the preference of choice. But the majority of the dental practitioners across different parts of the world had addressed concerns like the inability of such technique in supragingival finish lines. Singh et al. (2019) stated that retraction cords are most preferred in gingival retraction compared to other materials like clamps, strips etc. for retraction by mechanical method (Singh et al., 2019).

Stark performed a study in comparing the efficiency of retraction through the chemical method with that of electro surgery and concluded chemico mechanical method as a better option due to their hemostatic effects and lesser tissue damage (Stark et al., 1977). Many literatures stated that use of vasoconstrictive agents even in healthier patients had a negative systemic impact and arresting bleeding was the only advantage of their preference (Csillag et al., 2007).

The pH of gingival tissues usually lies in acidic range and so deposition of such reactive chemicals on their surface have the high potentiality to create damage and necrosis.

Many studies also revealed that patients had been reporting of burning sensation in the usage of such chemicals which made the practitioners consider other retraction options which could potentially mimic the use of chemicals (Khoroushi et al., 2014). Anum Aijaz stated that majority of people walking into a dental office at any random place may have an undiagnosed or untreated medical condition and it is safer and reliable for a dental practitioner to prefer cord packing techniques without the use of any chemical agents over other methods like surgical curettage, chemical deposition, laser etc which was also accepted by many dental practitioners (K N Inc and Kernel Networks, 2019).

Chemical methods are strictly contraindicated for people under hypertensive medications, lactating and pregnant women etc., whereas mechanical method is found to be difficult in patients with severe anterior malocclusion. A gingival retraction method should be effective and the effect indented should be spontaneously reversible and leave no permanent damage to tissues or cause hypersensitive reactions to them (Jokstad, 1999).

Theoretically, it has been stated that cords that are not dipped with chemical agents can be safely used across the majority of patients irrespective of any systemic illness underlying for a maximum extent of 30 minutes whereas the safety limit for those dipped with chemical agents were 10-15 minutes in normal individuals without any health complications and even <10 minutes in medically compromised patients.

Hence it would be a safer option to use conventional mechanical methods of retraction as it is safe, gives
Figure 1: Association between gender of patient and the method of retraction

Figure 2: Association of age and the method of retraction
optimal time for working and causes lesser damage to tissues and to other systems as well. There has been global consensus with the result and this can be taken as evidence to practice.

Certain limitations were observed in this study which includes underlying medical conditions, financial status, postoperative complications, allergic responses if any, dentofacial anomalies, exposure and distortions in impressions and final prosthetic crown fitting.

All these can be minimized by taking into account all the factors and so a complete theory regarding their optimal preference can be proposed. Future prospects of this study can be established to observe any changes in the impressions or in the fitting of final prosthesis based on gingival retraction methods. Also conducting CDE programs can be helpful to spread awareness on the implications of gingival retraction on systemic health and prosthetic outcome among student and private practitioners to avoid failure of treatment.

**CONCLUSIONS**

Within the limitations of the study, it can be concluded that mechanical method of retraction was preferred over chemico mechanical method in gingival retraction for the treatment of fixed dental prosthesis due to their less hazardous properties, reliability and safety.

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**Conflict of Interest**

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

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