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Contents

Oral Cancer: The growing burden in context to Nepal

Dr Dipshika Bajracharya
Editor

Oral cancer commonly refers to the carcinoma of stratified squamous epithelium. About 96% of cases of oral cancer are squamous cell carcinoma(OSCC) and its subtypes and the rest of the cases are from salivary glands.[1] Oral and pharyngeal cancer grouped is the sixth most common cancer in the world with an annual estimated incidence of around 275000.[2] According to Globocan 2022 in Nepal cancer of Lip and Oral cavity is the seventh most common cancer affecting both males and female with 959 new cases in 2022.[3] According to Nepal Heath Research Council report, lip and oral cancer is fifth common cancer by 2018.[2]

Various different hospital-based studies in Nepal have found oral cancers to be more common in males than females with the most common site being tongue followed by mandibular alveolus and Gingivobuccal sulcus.[1,4] Maximum number of cases were from age group >50 years in both genders[4] likewise, more than 50% of oral squamous cell carcinoma was found to be diagnosed at Stage III and IV collectively.[4] Studies have reported several types of risk factors for oral cancer, mainly being tobacco consumption in both smoke and smokeless form. The relative risk among current smokers (The industrial brand cigarettes), Ex-smokers (1- 10 Years), and Ex-smokers (>10 Years) are 9.3, 2.9 and 0.6, respectively (Franco *et al.*, 1989). OSCC, mostly is preceded by Potentially malignant oral disorders(PMOD's) commonly Oral leukoplakia, Oral submucous fibrosis and erythroplakia.[5] These early changes of oral cancer are often missed or ignored by patients in many instances mainly attributing to lack of awareness of these early changes which over a period of time may transform into oral cancer.[5,6]

Not just changed lifestyles and food habits of people, the lack of proper health facilities across the country are also the risk factors for oral cancer. The reason for higher incidence of oral cancer in Nepal may be due to inadequate dentist especially in rural areas, poverty, lack of awareness, easy availability of tobacco products. Fewer Oncologist, surgeons and very few cancer centers which may have added the burden of higher incidence.Management of cancer in the long run is costly and difficult for poor people to afford, which makes it more difficult to deal with and infactin the long run may add a financial burden to overall economy in context to country like Nepal.[4]

REFERENCES

1. Jaiswal PK, Thakur P, Thapa K. Incidence of Oral Cancer in a Tertiary Cancer Centre of Nepal: A Retrospective Study. Europasian J Med Sci. 2021; 3(2):4-9
2. Warnakulasuriya, S. (2009). Global epidemiology of oral and oropharyngeal cancer. Oral Oncology, 45, 309-318.
3. Ferlay J, Ervik M, Lam F, Laversanne M, Colombet M, Mery L, Piñeros M, Znaor A, Soerjomataram I, Bray F (2024). Global Cancer Observatory: Cancer Today. Lyon, France: International Agency for Research on Cancer.
4. Thapa, K., & Jaiswal, P. (2022). Assessment of Oral Cancer: A Study in Nepal Cancer Hospital and Research Center, Harisiddhi, Lalitpur, Nepal. Journal of Institute of Science and Technology, 27(2), 31–37.
5. Ganesh D, Sreenivasan P, Öhman J, Wallström M, Braz-Silva PH, Giglio D, Kjeller G, Hasséus B. Potentially Malignant Oral Disorders and Cancer Transformation. Anticancer Res. 2018 Jun;38(6):3223-3229.
6. Bajracharya D, Gupta S, Sapkota M, Bhatta S. Oral Cancer Knowledge and Awareness in Patients Visiting Kantipur Dental College. J Nepal Health Res Counc. 2018 Jan 1;15(3):247-251.
7. Bajracharya B, Dahal A, Deo RK. Oral Cancer Awareness among Dental Patients. Medical Journal of Shree Birendra Hospital. 2021 Sep 6;20(2):162-9.

In vitro comparative assessment of bond strength of three different root canal sealers after root canal drying by different techniques

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ABSTRACT

Introduction: The durability and biocompatibility of a root canal filling material along with three-dimensional obturation of the root canal system plays an important role to achieve successful treatment outcomes. Among various factors that affect the success of endodontic sealers, one is the push out bond strength for which residual dentin moisture is an influencing factor.

Objectives: To compare and assess the bond strength of three different root canal sealers after root canal drying by different techniques.

Materials and Method: 132 samples were cut and prepared. Then, they were assigned into 4 groups based on different drying technique and 3 subgroups based on the type of sealer:
Group I : Absorbent paper point.
Group II : 95% Ethanol.
Group III : 70% Isopropyl Alcohol.
Group IV : Control (wet)
Sub group-1 : MTA-Fillapex
Sub group-2 : Bioactive RCS sealer
Sub group-3 : AH plus

Two transverse sections were made and each disc was mounted on a jig followed by placement of cylindrical plugger. Then the load was applied in a universal testing machine and force required for debonding of filling material from root canal wall was recorded as push out bond strength (PBS). Also, mode of failure was evaluated under dental operating microscope.

Result: The maximum mean PBS was noted in Isopropyl alcohol and Paper point followed by Ethanol groups but difference in mean PBS was not significant among 3 experimental groups ($P < .001$). However the mean PBS of Isopropyl alcohol, Ethanol and Paper point group was significantly higher than control group ($P > .001$). Thus, Isopropyl group, Paper point, Ethanol equally ranked in best drying techniques.

Conclusion: Different drying techniques with Paper point, Ethanol and Isopropyl alcohol enhanced the PBS of AH plus and Bioactive RCS sealers to root dentin without significant difference and exhibited superior performance than in MTA Fillapex.

Keywords: Push-out bond strength, Paper point, Ethanol, Isopropyl alcohol, Sealer, Moisture.

INTRODUCTION

The root canal treatment procedure consists of cleaning, shaping, disinfection and obturation of root canal system. To achieve the successful treatment outcomes, the durability and biocompatibility of root canal filling materials along with the three dimentional obturation of root canal system is very essential. The root canal sealers are applied to seal the gap between the root dentin and gutta percha, to fill the root canal wall irregularities, accessory canals and void between gutta percha points and to serve as lubricants.[1]

The sealers employed in root canal obturation should exhibit certain properties such as insolubitity in tissue fluids, biocompatibility, flow ability, suitable setting time, anti bacterial activity and dentin wall adhesion.[2]

One of the influential factor in determining the success rate of endodontic sealers is the push-out bond strength of sealers to root dentinal walls.[1,3,4] Different sealers have variable adhesive properties in bonding to dentine. A number of factors are responsible for different adhesive properties of sealer such as the differences in dentin

structure of different teeth or even different parts of same tooth, presence/absence of smear layer, chemical reaction of sealer and dentin reaction.[5,6,7]

Another influential factor on the bond strength of sealer to dentine is level of dentin moisture before application of sealer in root canal.[8] The residual moisture in the canal adversely affects the adhesion of resin based sealers however, it does not mean that the root canal walls should be completely dried out. Root dentin should remain slightly moist so that sealer can exhibit its hydrophilic property for attachment to dentin.

Different techniques are implemented to dry the canals like: Use of paper points, 95% Ethanol, 70% Isopropyl alcohol, Air vacuum. Among them, Paper point is most commonly practiced to dry the root canal as it is the simplest technique that highly absorbs moisture from the canal.

Ethanol increases the evaporation of water and hence decreases the residual moisture that expedites the root canal drying process.[10,11]

Isopropyl alcohol has lower polarity than ethanol and promotes less removal of water from the dentinal tubules. This will enhance the dentin wettability hence increase the degree of conversion of sealer and consequently improving their adhesion.[12]

Several endodontic sealers are available in market and they are popular by different chemical composition and properties. MTA sealer is responsible for the optimal biocompatibility, Bioceramic sealer is hydrophilic and Resin based sealer has low shrinkage.

There was very limited study, which has been documented and concluded in together that assessed and compared the bond strength of three different root canal sealers after root canal drying by different techniques . So, this study helps in assessment of excellency of bond strength of three different root canal sealers after root canal drying by different techniques.

MATERIALS AND METHOD

This Study was carried out in the Department of Conservative Dentistry and Endodontics of Kantipur Dental College Teaching Hospital and Research Center Basundhara, Kathmandu and Geo Technical Lab of Pulchowk Engineering College, Pulchowk, Lalitpur. The samples for this study were collected from Department of Oral and Maxillofacial Surgery, Kantipur Dental College Teaching Hospital and Research Center Basundhara and different Dental Clinics in Kathmandu.

The collected samples were immersed in 5.25% Sodium hypochlorite solution (CanalPro, Coltene) for 24 hrs to remove adhered tissues. Calculus and surface deposits were removed by ultrasonic scaler. All collected samples were examined under x 25 magnification using a dental operative microscope (Labomed-Magna). Samples with root resorption, cracks, fractures were excluded. For each sample, two radiographs were taken in buccolingual and mesiodistal projection to view root canal anatomy and radiographic apex. Teeth with more than one canal were excluded.

Finally, one hundred thirty two teeth were selected for the study. The anatomical crown of selected samples were cut at the cementoenamel junction by a fissure carbide bur (Mani). The root canal of samples were negotiated by # 10 K-file (Mani) and final working length of samples were determined by #20 K-file (Mani). Then, the root canal of samples were prepared upto # F3 with Pro Taper-Gold rotary system (Densply). The root canal of samples were irrigated with 10 ml of 5.25% sodium hypochloride (CanalPro, Coltene) after using each file. The smear layer were removed by using 17% ethylenediaminetetraacetic acid (Endoclean, Vishal) for 1 minute followed by a final rinse with 10 ml of distilled water to eliminate the chemical agents from root canal system.

Then, samples were randomly divided into 4 groups with 33 samples each (n=33).
Group I (n=33) : Root canal of samples were kept dry by using absorbent paper point (META).
Group II (n=33) : Root canal of samples were kept dry by using 95% Ethanol (Endodry, Endosure, DentaLife).
Group III (n=33): Root canal of samples were kept dry by using 70% Isopropyl Alcohol (equate TM).
Group IV (n=33): Root canal of samples were kept wet.
Then, depending on the type of sealer, each group was randomly divided into 3 sub groups with 11 samples each (n=11).
Sub group-1: MTA-Fillapex (Angelus)
Sub group-2: Bioactive RCS sealer (SafeEndo)
Sub group-3: AH plus (Dentsply

Thus, a total of 12 sub-groups were evaluated. The obturation was performed with single cone gutta percha # F3 (Dentsply) obturation technique in all groups.

After completion of obturation, the roots were incubated at 37°C and 100% humidity for 24 hrs. Then, tranverse sections was made of 1mm height (thickness) at the middle third of the roots by a low-speed diamond disc (Mani) under water coolent.

To measure the push out bond strength, each disc was mounted on a jig such that the coronal surface of the disc faced the metal surface of the jig. A cylindrical plugger with a 1mm diameter was positioned at the center of the root

canal space in each disc to prevent the contact of metal with dentin surrounding the root filling material (Figure 1). The load was applied by the tip of the cylindrical plugger to the disc in apicocoronal direction in a universal testing machine with a 200 kg load cell at a crosshead speed of 1 mm/minute.

Fig.1 PBS test by Jig and Cylindrical disc

The minimum force required for dislodgement of filling material and its debonding from the root canal wall was recorded as push out bond strength. We obtained our data in unit of Kg. Value of data was converted into Newton by using formula: 1Kg=9.81N. Then, final data was recorded by using formula: MPa = $N/(mm)^2$.

Here, MPa means Mega Pascal, N means Newton, cross section diameter = 1mm So, data was calculated by using formula: MPa= $N/(1)^2$ ie. MPa =N

The mode of failure was evaluated under dental operating microscope at x 25 magnification:
Adhesive failure: Debonding at the bonding interface
Cohesive failure: Fracture within the dentin structure or root filling material.
Mixed failure: A combination of adhesive and cohesive failures.

The frequency of different modes of failure were recorded for each group in percentage. Data were analyzed by SPSS (Statistical Package for the Social Sciences) software. The Kolmogorov- Smirnov test was used to assess the normality of data distribution, which showed a non normal distribution of data ($p < .05$). So, the groups were compared with the Kruskal-Wallis test followed by the Games-Howell test for pairwise comparisons at $p < .05$ level of significance.

RESULT

Mean and standard deviation of push-out bond strength of the experimental groups are in Table No 1.

A. Comparison of PBS of different drying technique irrespective of sealer type:
The maximum mean PBS was noted in drying with paper point and Isopropyl alcohol followed by Ethanol groups but difference in mean PBS was not significant among 3 experimental groups ($P < .001$). However the mean PBS of Isopropyl alcohol, Ethanol and Paper point group was significantly higher than that of control (wet) group (P, .001). Thus Isopropyl group, Paper point, Ethanol equally ranked in best drying techniques.

B. Comparison of PBS of different drying technique based on the sealer type:
In case of MTA Fillapex Sealer, lowest mean PBS was recorded in drying with Ethanol in comparison to paper point, Isopropyl alcohol but in comparison to control (wet) group, it showed high mean PBS. In Kruskal-Wallis test, the difference in mean PBS of different drying techniques was not significant.

In case of BioActive RCS sealer, highest mean PBS shown in both drying techniques Ethanol and paper point followed by Isopropyl but lowest PBS shown in control (Wet) group. In Kruskal-wallis test, the difference in mean PBS of different drying techniques was not significant whereas these were significantly different from Control group (Wet).

In case of AH Plus, highest mean PBS shown equal in drying with Paper point and Isopropyl alcohol followed by Ethanol but lowest PBS was shown in control (wet) group. In Kruskal-wallis test, the difference in the mean PBS of different drying techniques was not significant in the AH Plus sealer but was significantly different with Control (Wet) group.

C. Comparison of PBS of different sealers irrespective to drying technique:
The maximum mean PBS was recorded in AH Plus and Bioactive RCS sealers followed by MTA Fillapex Among these 3 sealers, there was significant difference as shown by Kruskal-wallis test ($p< .001$). Pairwise comparison was done by Games-Howell test in which the mean PBS of AH plus and Bioactive RCS sealers was shown to be significantly higher than MTA Fillapex but no significant difference was found between AH Plus and Bioactive RCS sealer ($P< .05$).

D. Comparison of PBS of different sealers in use of each drying technique:
In Paper point group, the maximum PBS was found in case of AH Plus followed ny Bioactive RCS and MTA Fillapex sealers. Kruskal-Wallis test showed that the difference in PBS was significant among three sealers. The mean PBS in AH Plus and Bioactive RCS sealers were significantly higher than MTA Fillapex but there was no significant difference between AH plus and Bioactive RCS Sealers.

In case of Ethanol group, the equal maximum PBS was

found in Bioactive RCS and AH plus but less PBS was found in MTA Fillapex. Kruskal-Wallis test showed that the mean PBS of both AH plus and Bioactive RCS was significant higher than MTA Fillapex.

In case of Isopropyl Alcohol group, the maximum PBS was found in AH plus followed by Bioactive RCS and MTA Fillapex sealers. Kruskal-wllis test showed significant difference among 3 sealers and the difference in PBS in AH plus and Bioactive RCS sealers was significantly higher then MTA Fillapex but there was no significant difference between AH plus and Bioactive RCS sealers.

In case of Control (Wet) group, Kruskal-Wallis test indicated significant difference in PBS of different sealers.

Table 1

	Paper point	Ethanol	Isopropyl alcohol	Wet environment
MTA sealer	2.206364 ± .4675526	1.896364 ± .6175965	2.303636 ± .6334236	.529318 ± .2354864
Bioceramic sealer	3.798636 ± .3577296	3.798636 ± .3577296	3.611818 ± .4429688	1.120909 ± .1599815
Resin sealer	3.860909 ± .5541923	3.798636 ± .3577296	3.860909 ± .3455996	1.120909 ± .1599815

Table 2

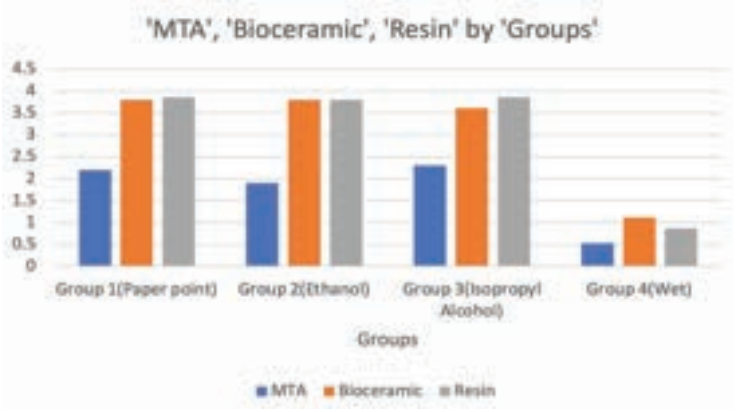

Table 3: Mode of Failure:

Group	Failure mode	MTA	Bioceramic	Resin	Total
Paper point	Adhesive	4	1	6	11
	Cohesive	4	7	0	11
	Mixed	3	3	5	11
Ethanol	Adhesive	1	0	4	5
	Cohesive	3	6	0	9
	Mixed	6	5	8	19
Isopropyl Alcohol	Adhesive	0	0	5	5
	Cohesive	2	7	0	9
	Mixed	9	4	6	19
Wet environment	Adhesive	2	6	8	16
	Cohesive	0	0	0	0
	Mixed	9	5	3	17

The mode of failure presented in this study is shown in Table 3. In this study, mixed types of failure was most common whereas, adhesive failure was found least followed by cohesive failure. In case of Bioactive RCS sealer, there was no or minimal adhesive failure in three different drying techniques.

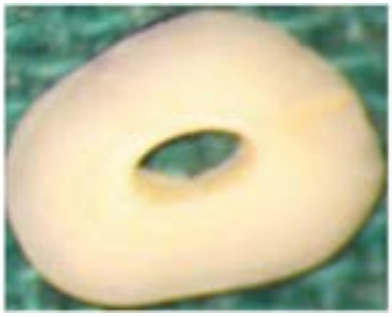

Fig.2.a) Adhesive Failure

Fig.2.b) Cohesive Failure

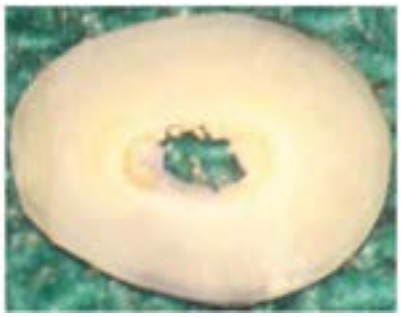

Fig.2.c) Mixed Failure

DISCUSSION

In endodontic treatment, well cleaned and prepared root canal system should be sealed three dimensionally by gutta percha and sealer. Gutta percha has no adhesion to the dentin surface so, sealer should be used that has adequate flow for filling the gaps between gutta percha cones and canal walls and thus contributing to the bond strength to root dentin. Commercially, various types of Root canal sealers such as Calcium based, Eugenol based, Epoxy-Resin based, Silicon based, Calcium Silicate based sealers are available in market. The sealer should have adhesive strength and cohesive strength to hold the obturation together.[13]

Optimal Push-out bond strength of sealer to root dentin enhances the tensile strength, prevents microleakage and stabilizes the root filling material thereby influencing the success rate of endodontic sealers.[1,3,4] Various factors like differences in dentin structure of different teeth or even different parts of same tooth, presence/absence of smear layer, chemical composition of sealer and dentin reaction are responsible for different adhesive properties of sealers.[5,6]

Epoxy-resin based sealer are frequenty used in endodontic practice but, the sealing ability of AH plus remains controversial partly because it does not bond to gutta percha and Bisphenol resin based AH26 releases formaldehyde during polymerization.[14,15] It is available in 2-tube mix or auto-mix syrinse in market. In this study, 2 tube mix AH Plus was used to evaluate push-out bond strength. Epoxy resin-based sealer can penetrate deeper into dentin irregularities and have higher displacement resistance resulting higher PBS and better adaptation at adhesive interface.[5,6,16,17]

MTA based sealer consists of resins, bismuth oxide, silica nanoparticles and dyes. This sealer has high sealing ability, radiopacity, low solubilty as well as low setting expansion, bactericidal effect and biocompatibility.[18] MTA based sealers are available in two paste mix and auto mix syrinse. In this study, two paste form MTA Fillapex was used for evaluation of Push-out bond strength.

Bioceramic sealer is composed of spherical nano-particles with maximum dimension $1.9x10^3$ micro-meter which is considered to penetrate into the dentinal tubules and interact with dentin moisture resulting in dimensionally stability with minimal shrinkage.[19] Bioceramic sealer is an insoluble, radioque, aluminum-free hydrophilic calcium silicate, which requires the presence of water to set and harden which is commercially supplied in premixed syringe.[8] In this study, premixed form Bioactive RCS sealer was used for evaluation of PBS. Bioceramic sealer released higher amounts of calcium ions which enhances greater biomineralization at dentin-cement interface resulting higher PBS. Epoxy resin based and calcium silicate based sealer demonstrated higher PBS than MTA based sealer.[8,20] The present study have also shown similar results.

Evidence shows that the residual moisture in the canal adversely affects the adhesion of resin sealers but, it does not mean that the root canal walls should be completely dried out.[11] Recent studies have shown that excessive removal of the water in the dentinal tubules may in turn hamper the effectiveness of hydrophilic sealers and adhesion to root dentin.[14,21] Level of dentin moisture before sealer application plays an influential factor on the bond strength of sealers to dentin.[8] Root dentin should remain slightly moist so that sealer can use its hydrophilic property for attachment to root dentin.[10]

There are no clear protocol to achieve an ideal state of residual moisture in the root canal and also manufacturers are not still able to provide precise clinical instructions to achieve an ideal level of residual moisture before application of their product.[22] Various chemical agents of different concentrations of alcohol have been tested to remove dentin moisture from root canals. In this study, 95% Ethanol, 70% Isopropyl alcohol and # F3 paper points were used to dry the root canal system.

Paper points are the simplest and most commonly practiced technique to dry the root canal. The use of paper points follows the principle of direct contact and capillary action for absorbing water but some moisture may be still left in root canal system because of complex anatomies.[10] Ethanol increases the evaporation of water and hence decreases the residual moisture from the canal.[10,11]

Isopropyl alcohol has lower polarity than ethanol and promotes less removal of water from dentinal tubules. This

ultimately enhances the dentin wettability and increases the degree of conversion of sealer thereby improving their adhesion.[12] Present study demonstrated that three drying technique-paper point, Ethanol and Isopropyl alcohol exhibited maximum PBS in AH plus and Bioactive sealers but there was no significant difference.

In push-out test, fracture occurs parallel to dentin-bonding interface, which makes it a true shear test for parallel- sided samples. So, the push-out test provides a better evaluation of bonding strength than conventional shear test.

Regarding mode of failure, present study revealed that, cohesive and mixed failure were most common in Resin based and MTA based groups. There was no or minimal adhesive failure in Bioceramic sealer and no cohesive failure in AH plus which was different with previous studies in which adhesive and mixed failure were more common in AH plus, adhesive and cohesive failure in Endo Sequence BC and MTA Fillapex and in AH 26 and MTA Fillapex, cohesive and mixed failure were most common failure.[8,9]

CONCLUSION

In present study, different drying techniques with Paper point, Ethanol and Isopropyl alcohol enhanced the Push out bond strength of AH plus and Bioactive RCS sealers to root dentin without a significant difference and exhibited an equal performance than in MTA Fillapex

REFERENCES

1. Saleh I, Ruyter I, Haapasalo M, Orstavik D. Adhesion of endodontic sealers: Scanning electron microscopy and energy dispersive spectroscopy. J Endod 2003;29(9):595-601.
2. Jumana A A , Eman A A Q, Nibras K I. Dentin drying methods affect the apical seal of three root canal sealers. MDJ 2022;18(2):160-166.
3. Teixeira C S, Alfredo E, Thome L H C, Gariba-Silva R, Silva-Sousa Y T C, Sousa-Neto M D. Adhesion of an endodontic sealer to dentin and gutta-percha: Shear and push-out bond strength measurements and SEM analysis. J Applied Oral Science 2009;17(2):129-135.
4. Teixeira F B, Teixeira E C N, Thompson J Y, Trope M. Fracture resistance of roots endodontically treated with a new resin filling material. J American Dental Association 2004;135(5):646-452.
5. Eldeniz A, Erdemir A, Belli S. Shear bond strength of three resin based sealers to dentin with and without the smear layer. J Endod 2005;31(4):293-296.
6. Lee K, Williams M, Camps J, Pashley D. Adhesion of endodontic sealers to dentin and gutta-percha. J Endod 2002;28(10):684-688.
7. Tagger M, Tagger E, Tjan A, Bakland L. Measurement of adhesion of endodontic sealers to dentin. J Endod 2002;28(5):351-354.
8. Nagas E, Uyanik M O, Eymirli A, Cehreli Z C, Vallittu P K, Lassila L V J, Durmaz V. Dentin moisture conditions affect the adhesion of root canal sealers. J Endod 2012;38(2):240-244.
9. Ahmadreza S, Ali S, Tasnim B C, Seyedali S. Comparison of push-out bond strength of endodontic sealers after root canal drying with different techniques. J Clin Exp Dent Res 2023;9(2):314-321.
10. Jang J A, Kiom H L, Her M J, Lee K W. Moisture on sealing ability of root canal filling with different types of sealer through the glucose penetration model. J Korean Academy of Conservative Dentistry 2010;35(5):335-343.
11. Rijal S. Sealing ability of resin based root canal sealers: An in vitro study. J GMC-Nepal 2017;9(2):58-62.
12. Zmener O, Pameijer CH, Serrano SA. Significance of moist root canal dentin with the use of methacrylate-based endodontic sealers: an in vitro coronal dye leakage study. J Endod 2008;34(1):76-79.
13. Orstavik D. Materials used for root canal obturation: technical, biological and clinical testing. Endod Topics 2004;12(1):25-38.
14. Dias KC, Soares CJ. Influence of drying protocol with isopropyl alcohol on the bond strength of resin-based sealer to the root dentin. J Endod 2014;40(9):1454-1458.
15. Ashraf H, Shafagh P, Mashhadi Abbas F, Heidari S, Shahoon H, Zandian A, Aghajanpour L, Zadsirjan S. Biocompatibility of an experimental endodontic sealer Resil in comparison with AH26 and. AH-Plus in rats: An animal study. J DRDCDP 2022;16(2):112-117.
16. Demiriz L, Kocak M, Kocak S, Saglam B, Turker S. Evaluation of the dentinal wall adaptation ability of MTA Fillapex using stereo electron microscope. JCD 2016;19(3):220-224.
17. Milani AS, Kuzegari S, Zand V, Mokhtari H, Rahbar M. Ability of calcium silicate and epoxy resin-based sealers to fill the artificial lateral canals in the presence or absence of smear layer. 2021 Maedica-A journal of Clinical Medicine 2021;16(3):458-462.
18. Forough Reyhani M, Ghasemi N. Push-out bond strength of Dorifill, Epiphany and MTA-Fillapex sealers to root canal dentin with and without smear layer. Iran Endod J 2014;9(4):246-250.
19. Razmi H, Bolhari B, karamzadeh DN, Fazlyab M. The effect of canal dryness on bond strength of bioceramic and epoxy-resin sealers after irrigation with sodium hypochlorite or chlorhexidine. Iranian Endodontic J 2016;11(2):129-133.
20. Sagsen B, Ustun Y, Demirbuga S, Pala K. Push-out bond strength of two new calcium silicate-based endodontic sealers to root canal dentine. International Endodontic Journal. 2011;44(12),1088-1091.
21. Singh G, Nigam As, Jangra B,Chourasia HR, Khurana N,Mansoori K. Effect of drying protocols on the bond strength of bioceramic, MTA and resin-based sealer obturated teeth. International Journal of Clinical Padiatric Dentistry. 2019;12(1):33-34.
22. Zmener O, pameijer C H, Serrano SA, Vidueira M, Macchi RL. Significance of moist root canal dentin with the use of methacrylate-based endodontic sealers: An in vitro coronal dye leakage study. J Endod. 2008;34(1):76-79.

Correlation between lateral cephalometric analysis and photographic profile analysis in determining different skeletal malocclusions

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ABSTRACT

Introduction: Cephalometric analysis is considered gold standard for diagnosing skeletal morphology in orthodontics. However, the photographic assessment can be a great diagnostic tool for initial assessment as it is cost-effective and does not expose the patient to potentially radiation.

Objective: To find the correlation between lateral cephalometric analysis with photographic soft tissue profile analysis and determine if the photographic soft tissue profile analysis can determine common skeletal malocclusions like Class I, Class II and different growth patterns.

Materials and Method: Lateral cephalogram and profile photograph of 51 Class I patient and 51 Class II patients were obtained. L-ANB, L-Witts, L-Facial Axis Angle were measured inlateral Cephalometric analysis, and P-ANB, P-GlSnPog, P-NSnPog, P-NTraMn were measured for photographic soft tissue profile analysis. Descriptive analysis and Pearson correlation analysis were performed in different group of samples like Class I and Class II, Male and Female.

Result: Highly significant correlations ($p \leq .01$) were found between analogous cephalometric and photographic measurements for most of the variables in Class II malocclusion and in determining growth patterns. However, Pearson coefficients ranged from weak to moderate correlation.

Conclusion: Photographic soft tissue profile analysis may be considered a feasible and practical diagnostic substitute, particularly if there is a need for a noninvasive and low-cost method.

Keywords: growth patterns, Lateral Cephalogram, photographic soft tissue profile analysis, skeletal malocclusion

INTRODUCTION

Radiographic analyses in orthodontic diagnosis and treatment planning have been routinely performed using cephalometry since its introduction in 1931.[1] In cases where orthodontist requires information about growth and underlying osseous structures, lateral cephalometric analysis plays important role.[2,3] Although being gold reference standard for proper diagnosis of facial skeletal structures, it may not always be the most indicated tool due to its cost, specific training requirements for staff and risks related to radiation exposure.[1,4] Pretreatment soft-tissue analysis has also been used to determine facial esthetics, thus offering an important tool to clinicians in diagnosing and planning treatment.[5,6] Photographic soft-tissue profile analysis can also be beneficial for the detection of common relationships, such as Class I, Class II and hyperdivergent skeletal discrepancies, as well as for replacement of radiologic analysis when minimally invasive diagnosis is needed and to make decisions about treatment timing.

Several studies have reported considerable correlations between a selection of 2D soft tissue and skeletal measurements, concluding that photographic soft tissue analysis is a valuable tool.[7–9] Relationships between facial overlying tissues and skeletal structures have been found through lateral radiographs analysis. However, comparisons involving cephalometric and photographic measurements have seldom been performed. Moreover, in Nepal, study correlating the photographic soft tissue profile analysis to the lateral cephalometric study are very scarce. Hence, the aim of this study was to find the correlation between lateral cephalometric analysis and photographic soft tissue profile analysis determine if the photographic soft tissue profile analysis can determine common skeletal malocclusions like Class I, Class II and different growth patterns.

MATERIALS AND METHOD

A cross sectional study was conducted among the patients visiting Department of Orthodontics, Kantipur Dental College. Ethical clearance was taken from the Institutional Review Committee of Kantipur Dental College (KDC-IRC ref no. 09/23) before conducting the study. Class I and Class II malocclusion patient which are the most common group of malocclusions in Nepal[10] meeting the inclusion criteria were included in the study. Samples were divided into Class I and Class II malocclusion according to the ANB angle.[11] Inclusion criteria were patients of 13-27 years with all teeth present up to second molars and with good facial symmetry. Exclusion criteria were Cleft lip and Palate patients, patients with significant medical history, trauma, previous orthodontic or prosthodontic treatment and or maxillofacial/plastic surgery and patients with radiographs showing the mandible protruded or teeth not in occlusion. Sampling technique was non-probability convenient sampling. Sample size was calculated in reference to the study done by Acharya *et al.*[10] using the following formula: $N= Z^2pq / d^2+(Z^2pq/N) = 51$ [Where, z = 1.96, p = 27.33%, 19 q = 72.67%, e = 0.05, and N = number of patients visiting the department with Angle's Class II malocclusion in a period of 2 months = 60]. Sample size was calculated to be 51 in each class of malocclusion.

Lateral cephalogram and right sided profile photograph of each patient were obtained. Variables that were used in the lateral cephalometric analysis are: (Figure 1)

- L-ANB: angle formed by connecting Point A, Nasion and Point B
- L-Witts: distance between Aa and Bb on palatal plane
- L- Facial Angle: angle formed by line connecting Basion-Nasion and Pt-Gn

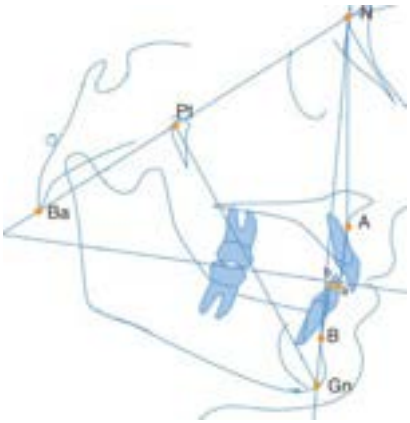

Figure 1: Cephalometric landmarks

Variables that were used in photographic soft tissue profile analysis are: (Figure 2)

- **P-ANB:**angle formed by photographic soft tissue Point A, soft tissue Nasion and soft tissue Point B
- **P-GlSnPog:** angle formed by photographic soft tissue Glabella,Subnasale and soft tissue Pogonion
- **P-NSnPog:**angle formed by photographic soft tissue Nasion, Subnasale and soft tissue Pogonion
- **P-NTraMe:**angle formed by photographic soft tissue Nasion, Tragus and soft tissue Menton

Figure 2: Photographic Soft Tissue Profile Landmarks

Lateral cephalogram was manually traced and analyzed by an orthodontist. Photographic soft tissue profile analysis was done using android base application. Data was entered using SPSS version 20. The Kolmogorov Smirnov test was done to evaluate the normality of data distribution. Descriptive statistics of the entire parameters were evaluated to determine the mean, standard deviationand range of the variables. Pearson correlation test was done to check the correlation between lateral cephalometric analysis and soft tissue profile analysis.

RESULT

Analysis was done on a total of 102 lateral cephalograms and photographic soft tissue profile analysis was done on profile photograph of the same patient.

Descriptive analysis and correlation of photographic soft tissue profile parameters with lateral cephalometric parameters of Class I sample is shown in Table 1. The type and strength of the correlation were classified according to Table 4. Mean value of P-ANB, P-GlSnPog and P-NSnPog was found to be 8.95° ± 2.33°, 161.5° ± 5.5° and 158.2° ± 5.3° respectively in Class I samples. Correlation analysis showed that P-GlSnPog among photographic soft tissue parameters was significantly correlated with L-ANB with weak negative correlation in Class I samples.

Table 1: Correlation between lateral cephalometric and photographic soft tissue profile analysis in Class I skeletal malocclusion

Variables	Mean ± SD	Range	Significance (p value)	Pearson Correlation	Correlation
L-ANB°	2.46 ± 1.06	0 – 4	0.209	0.179	Weak +ve
P-ANB°	8.95 ± 2.33	4.7 – 13. 2			
L-ANB°	2.46 ± 1.06	0 – 4	0.042	-0.286*	Weak -ve
P-GlSnPog°	161.5 ± 5.5	151 - 176			
L-ANB°	2.46 ± 1.06	0 – 4	0.134	-0.213	Weak -ve
P-NSnPog°	158.2 ± 5.3	148.9 - 172			
L-Witts (mm)	2.03 ± 2.19	-4 – 9	0.340	0.136	Weak +ve
P-ANB°	8.95 ± 2.33	4.7 – 13. 2			
L-Witts (mm)	2.03 ± 2.19	-4 – 9	0.971	-0.005	None
P-GlSnPog °	161.5 ± 5.5	151 - 176			
L-Witts (mm)	2.03 ± 2.19	-4 – 9	0.715	0.052	None
P-NSnPog°	158.2 ± 5.3	148.9 – 172			

*Correlation is significant at the 0.05 level (2-tailed).

Descriptive analysis and correlation of photographic soft tissue profile parameters with lateral cephalometric parameters of Class II sample is shown in Table 2. The type and strength of the correlation were classified according to Table 4. Mean value of P-ANB, P-GlSnPog and P-NSnPog was found to be 10.98° ± 2.80°, 158° ± 5.7° and 154.6° ± 5.4° respectively in Class II samples. Correlation analysis showed all photographic soft tissue parameters to be significantly correlated with lateral cephalometric parameters in Class II samples except L-Witts with P-GlSnPog. L-ANB and P-ANB, L-Witts and P-ANB had Moderate positive correlation, all others parameters showed weak negative correlation.

Table 2 Correlation between lateral cephalometric and photographic soft tissue profile analysis in Class II skeletal maloccusion

Variables	Mean ± SD	Range	Significance (p value)	Pearson Correlation	Correlation
L-ANB°	6.22 ± 1.49	4.5 - 11	0.002	0.421**	Moderate +ve
P-ANB°	10.98 ± 2.80	4.1 – 18.3			
L-ANB°	6.22 ± 1.49	4.5 - 11	0.006	-0.378**	Weak -ve
P-GlSnPog°	158 ± 5.7	140 - 167			
L-ANB°	6.22 ± 1.49	4.5 - 11	0.001	-0.461**	Moderate -ve
P-NSnPog°	154.6 ± 5.4	138 - 164			
L-Witts(mm)	4.04 ± 2.58	0.5 – 12	0.001	0.467**	Moderate +ve
P-ANB°	10.98 ± 2.80	4.1 – 18.3			
L-Witts (mm)	4.04 ± 2.58	0.5 – 12	0.090	-0.240	Weak -ve
P-GlSnPog°	158 ± 5.7	140 – 167			
L-Witts (mm)	4.04 ± 2.58	0.5 – 12	0.032	-0.300*	Weak -ve
P-NSnPog°	154.6 ± 5.4	138 – 164			

*Correlation is significant at the 0.05 level (2-tailed).
**Correlation is significant at the 0.01 level (2-tailed).

Descriptive analysis and correlation of photographic soft tissue profile parameters with lateral cephalometric parameters according to growth pattern is shown in Table 3. The type and strength of the correlation were classified according to Table 4. Lateral Cephalomteric Facial Angle was found to be significantly correlated with photographic P-NTraPog in both Class I and Class II samples. In Class I samples, they were moderate negatively correlated while in Class II samples they were weak negatively correlated.

Table 3 Correlation between lateral cephalometric and photographic soft tissue profile analysis for determining growth pattern in skeletal maloccusions

Malocclusion	Variables	Mean± SD	Range	Significance (p value)	Pearson Correlation	Correlation
Class I	L-Facial Angle°	-1.5 ± 4.08	-13 - 5	0.000	-0.478**	Md -ve
	P-NTraPog°	62.2 ± 4.7	49. 1 – 72.7			
Class II	L-Facial Angle°	-1.01 ± 5.4	-21 - 11	0.005	-0.390**	Wk -ve
	P-NTraPog°	62.9 ± 5.2	48 - 74.7			

**Correlation is significant at the 0.01 level (2-tailed).

Table 4 Inference for Table 1,2 and 3

Score	Inference
-1	Perfect Negative
-0.70	Strong Negative
-0.50	Moderate Negative
-0.30	Weak Negative
0	None correlation
0.30	Weak Positive
0.50	Moderate Positive
0.70	Strong Positive
1	Perfect Positive

Descriptive statisticsof Class I and Class II samples according to the gender is shown in Table 5.

Table 5: Descriptive statistics according to gender in different skeletal malocclusions

Variables	Class I				Class II			
	Male		Female		Male		Female	
	Mean ± SD	Range	Mean ± SD	Range	Mean ± SD	Range	Mean ± SD	Range
L-ANB °	2.4 ± 1.02	1 - 4	2.4 ± 1.1	0 - 4	6.5 ± 1.8	5 - 11	5.9 ± 1.1	4.5 - 8
L-Witts (mm)	2.04 ± 2.1	-2 – 5.5	2.03 ± 2.2	-4 – 9	3.5 ± 2.5		4.4 ± 2.6	.5 – 12
L-FacialAngle°	-0.8 ± 3.4	-7 – 5	-2 ± 4.5	-13 – 5	-1.6 ± 6.0	-21 – 7	-0.5 ± 4.9	-10 – 11
P-ANB°	9.6 ± 2.4	4.7 - 13. 2	8.3 ± 2. 08	5 – 12.6	10.7 ± 3.0	4.1 – 18.3	11.1 ± 2.6	7.1 – 17.1
P-GlSnPog°	161 ± 4.7	151 - 171	161 ± 6.2	152 - 176	159.5 ± 5.3	149 – 167.8	156.8 ± 5.8	140.7 – 164.9
P-NSnPog°	157.6 ± 5.1	148 - 168	158.8 ± 5.4	150 – 172.1	155.5 ± 5.3	143 – 164.4	153.8 ± 5.4	138.8 – 164. 5
P-NTraPog°	62.2 ± 5.2	49 – 72.7	62.3 ± 4.3	54.1 – 70.9	63.8 ± 5.7	48 – 74.9	62.1 ± 4.8	52.1 – 74.7

DISCUSSION

In the present study, photographic P-NSnPog value was found to be 158.2° ± 5.3° in Class I patients and 154.6° ± 5.4° in Class II patients. This result is in accordance with the study done by Hameed et al in Pakistani population (156.94° ±8.38° in Class I and 153.9°± 5.46° in Class II samples).[12] Photographic P-ANB value was found to be 8.95° ± 2.33° in Class I patients and 10.98° ± 2.80° in Class II patients. Thus, in absence of lateral cephalogram, photographic soft tissue profile angle, P-NSnPog can be helpful in diagnosing Class I and Class II malocclusion patients.

The correlation analysis showed that all photographic soft tissue profile parameters were correlated with lateral cephalometric parameters in Class II malocclusion patients and in determining growth pattern of a patient. This result is in accordance with the results of Bittner and Pancherz in which they concluded that sagittal maxillary and mandibular positions could only occasionally be determined on the basis of facial appearance, while a Class II jaw base relationship (large ANB angle) could easily be seen and the vertical jaw relationship could be determined with relatively high precision.[9] Hence, photographic soft tissue profile analysis can be suitable alternative to lateral cephalogram, particularly in rural areas of Nepal, where availability and cost of the radiographs may be of concern. Highly significant correlations ($p \leq .01$) were found between analogous cephalometric and photographic measurements for most variables. However, Pearson correlation coefficients ranged from weak to moderate. Similar results were found in the study done by de Carvalho et al.8 Descriptive analysis according to the gender showed gender dimorphism in photographic soft tissue profile analysis which was in accordance with the literature.[4,6,8]

CONCLUSION

Highly significant correlations between analogous photographic and cephalometric measurements were found for most sagittal and vertical variables. Photographic soft tissue profile analysis may be considered a feasible and practical diagnostic alternative, particularly if there is a need for a non-invasive and low-costmethod, particularly in rural areas where availability and cost of the radiographic intervention may be of concern.Further studies are needed to test the diagnostic accuracy of the photographic soft tissue profile analysis.

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REFERENCES

1. Becking BE, Fledderus AC, Richard Van Merkesteyn JP, Jonkman REG. The accuracy of photographic soft-tissue profile analysis to determine Class II and vertical skeletal relationships in children. Eur J Orthod. 2023;45(6):703–11.
2. Proffit WR, Fields HW, Sarver DM. Contemporary Orthodontics. 5th ed. Missouri: Elsevier; 2013.
3. Jacobson A, Jacobson RL. Radiographic Cephalometry: From Basics to 3-D Imaging. 2nd ed. New Malden: Quintessence; 2006.
4. Ferrario VF, Sforza C, Miani A, Tartaglia G. Craniofacial morphometry by photographic evaluations. Am J Orthod Denofac Orthop. 1993;103:327–37.
5. Peck S, Peck L. Selected aspects of the art and science of facial esthetics. Seminar in Orthodontics. 1995;1:105–26.
6. Gautam B, Sreedharan S, Seetha SM. Photographic Profile Analysis in Preschool Children of Thiruvananthapuram, Kerala. Int J Clin Pediatr Dent. 2019;12(2):111–5.
7. Farkas LG, Bryson W, Klotz J. Is photogrammetry of the face reliable? Plast Reconstr Surg. 1980;66:346–55.
8. de Carvalho Rosas Gomes L, Horta KO, Gandini LGJ, Goncalves M, Goncalves JR. Photographic assessment of cephalometric measurements. Angle Orthod. 2013;83(6):1049–58.
9. Bittner C, Pancherz H. Facial morphology and malocclusions. Am J Orthod Dentofac Orthop. 1990;97:308–15.
10. Acharya A, Bhattarai B, George D, Bhagat T. Pattern of malocclusion in orthodontic patients in south-eastern region of Nepal. Orthod JNepal. 2017;7(1):7–10.
11. Riedel RA. The relation of maxillary structures to craniumin malocclusion and in normal occlusion. Angle Orthod. 1952;22(3):142–5.
12. Hameed A, Khan JI, Ijaz A. Soft Tissue Facial Profile Analysis in Patients with Class I and Class II Skeletal Pattern visiting Children's Hospital, Lahore. Pakistan Oral & Dental Journal. 2008;28(2):183–8.

Assessment of Level of Knowledge regarding Cone Beam Computed Tomography amongst Dental Interns of Nepal

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ABSTRACT

Introduction: Cone Beam Computed Tomography (CBCT) is a crucial three-dimensional imaging technique in dentistry, enabling detailed visualization of the dentomaxillofacial region. It has wide applications in various dental procedures and has many advantages over Conventional Tomography (CT) as well. Since the present dental interns are future practitioners, their proficiency with CBCT becomes essential for maximizing its clinical benefits.

Objective: To assess the level of knowledge about CBCT among the dental interns of Nepal.

Materials and Method: A cross sectional study was conducted among convenient sample of 163 dental interns for a period of three months in six different colleges affiliated to Kathmandu University. Data was collected using a self-administered questionnaire. Data was entered in Microsoft Excel and analyzed using Statistical Package for Social Sciences (SPSS) version 20. One way Analysis of Variance (ANOVA) was used to find the difference in mean knowledge among dental interns of different colleges. Level of significance was set at p-value<0.05.

Result: The study included 163 participants, with 31 (21.5%) males and 128 (78.5%) females, from six different colleges of Nepal. The mean age was 24.65±2.06 years. The question concerning the usefulness of CBCT in assessing bone density for implant procedures yielded the highest correct response rate of 97.5%. Majority of the participants 88(54.0%) had average level of knowledge. Knowledge level varied according to gender and colleges, with statistically significant differences in mean knowledge scores among different colleges (p-value = 0.03*).

Conclusion: The dental interns of Nepal have an average CBCT knowledge level, with variation across different colleges. Emphasis should be placed on targeted educational interventions, including workshops, continuing education, and practical exposures, to improve understanding and uniformly address knowledge gaps.

Keywords: Cone beam computed tomography; dental interns; knowledge

INTRODUCTION

Cone Beam Computed Tomography (CBCT) has emerged as a crucial three-dimensional imaging technique in dentistry, enabling detailed visualization of the dento-maxillofacial region.[1] Initially introduced in the late 1990s, particularly by Arai et al. in Japan and Mozzo *et al.* in Italy, its adoption in developing countries like Nepal has been relatively recent.[2,3] CBCT imaging uses a cone-shaped X-ray beam rotated around the patient to produce a large number of slice images, facilitating detailed three-dimensional visualization.[4] CBCT offers high-resolution images in all three planes, aiding precise diagnosis and treatment planning with minimal radiation exposure, lower costs, less space and higher scanning speed compared to conventional CT scans. However, CBCT has limitations, including lower soft tissue resolution and the need for experienced interpretation.[5]

CBCT is widely used in dental procedures including implant placement, orthodontics, endodontic, and maxillofacial surgeries, especially prevalent in Nepal for implant imaging.[6] Establishment of CBCT imaging centers is also gradually increasing in Nepal lately, indicating an increasing trend toward its utilization. However, the deficit in knowledge regarding CBCT principles and applications presents challenges for the optimal utilization of CBCT technology.[4]

There is a paucity of published literature regarding the knowledge of CBCT among dental interns in Nepal. Since the present dental interns are future practitioners, their proficiency with CBCT becomes crucial for maximizing its clinical benefits. Considering the increasing use of CBCT in dentistry, it is crucial to assess the knowledge level of dental interns regarding this technology in order

to bridge the existing knowledge gap and ensure proficient integration of CBCT in dental clinical practice. Hence, this study aims to assess the level of knowledge regarding CBCT amongst dental interns of Nepal.

MATERIALS AND METHOD

A questionnaire based cross-sectional study was conducted for the period of three months with the help of self-administered, pre-tested questionnaire. Sample size was calculated by the following formula, $n = Z^2pq/d^2+(Z^2pq/N) = 118$ [where, p = 18% 7 N = Total number of dental interns in Kathmandu University dental colleges (obtained from administrative authority of the concerned colleges)]. Further, taking response rate as 90%, final sample size was calculated to be 131.[1] (approximately 135). The minimum desired sample size was estimated to be 135 for the study. Using convenience sampling method, 163 dental interns were selected as study participants from six different colleges of Nepal affiliated to Kathmandu University (KU). Kathmandu University School of Medical Sciences (KUSMS), Nepal Medical College (NMC), Kathmandu Medical College (KMC), Kantipur Dental College (KDC), College of Medical Science (COMS) and Nobel Medical College Teaching Hospital (NMCTH) were the colleges included. This study was conducted after the ethical approval from Institutional Review Committee of Nepal Medical College (Reference no: 031-077/078). Verbal consent was obtained from head of institutions as well as informed consent from each student. Those dental interns who responded with incompletely filled questionnaire and those who were not willing to participate in the study were excluded.

Data was collected by the help of a questionnaire adopted from various studies.[5,8,9,10-12] The questionnaire was sent to the participants in the form of Google Forms (Alphabet Inc., USA) through email and Viber. Follow-up reminder was send at the end of every month to the non-respondents during data collection period. The questionnaire comprised of the questions regarding demographic details and 15 close-ended questions regarding mechanism, indications, contraindications, advantages and disadvantages of CBCT. Each question had either dichotomous option (Yes/No) or multiple choice options, the correct response scored as 1 and incorrect as 0. The total scores obtained from the responses of each participant was expressed in percentage and the values was interpreted as good (71-100%), average (51-70%) and poor (0-50%).

Data was entered in Microsoft Excel and exported to SPSS version 20 for analysis. Descriptive statistics were presented in the form of frequency, percentage, mean and standard deviation. One way ANOVA was used to find the difference in mean knowledge between dental interns of different colleges. Level of significance was set at p-value<0.05.

RESULT

Out of the total 163 participants involved in the study, majority 128 (78.5%) were female. Mean age of the study participants was 24.65±2.06 years. Most of the participants 31 (19.0%) were from KUSMS (Table 1).

Table 1: Distribution of the study participants by gender and colleges

Variables		n (%)
Gender	**Male**	**31 (21.5)**
	Female	128 (78.5)
College	KUSMS	31 (19.0)
	NMC	29 (17.8)
	KMC	26 (16.0)
	KDC	26 (16.0)
	COMS	27 (16.5)
	NMCTH	24 (14.7)
Total		163 (100.0)

Table 2 presents the responses of the study participants regarding questions related to CBCT. Majority 159 (97.5%) gave the correct response on question concerning the usefulness of CBCT in assessing bone density for implant procedures. Question about the justifiability of using intraoral radiographies compared to CBCT for detecting interproximal caries had the lowest correct response rate 34 (20.9%).

Table 2: Distribution of the study participants according to the responses

SN	Questions	Responses	n (%)
1.	The radiation used in CBCT is	Ionizing †	132 (81.0)
		Non-ionizing	31 (19.0)
2.	Mechanism of action of a CBCT machine	Virtual slices of the scanned region	46 (28.2)
		Divergent X-rays forming a cone which is reconstructed digitally †	104 (63.8)
		X-rays directed perpendicular to the long axis of the objects to be scanned	13 (8.0)
3.	The accurate order of the amount of radiation exposure to the patient is	CBCT> head CT> panoramic	30 (18.4)
		Head CT > panoramic > CBCT	27 (16.5)
		Head CT > CBCT > panoramic †	80 (49.1)
		Panoramic > head CT > CBCT	26 (16.0)
4.	CBCT is comparatively expensive than CT	Yes	82 (50.3)
		No †	81 (49.7)
5.	CBCT offers good soft tissue image resolution.	Yes	68 (41.7)
		No †	95 (58.3)
6.	Artifacts arising from metal restorations are more in CBCT than CT.	Yes	74 (45.4)
		No †	89 (54.6)
7.	Which of the following techniques provides higher clarity in the evaluation of periapical and periodontal lesions and root fractures?	CT	13 (8.0)
		CBCT †	150 (92)
8.	CBCT is not indicated for	Assessment of apical cyst	11 (6.8)
		Soft tissue evaluation †	118 (72.4)
		Sinus evaluation	17 (10.4)
		Detection of fractures in the posterior part of mandible	17 (10.4)
9.	CBCT cannot be used for which of the following diagnostic imaging task?	Position of temporomandibular disc†	77 (47.2)
		Position of condyle in glenoid fossa	37 (22.7)
		Condyle fracture	9 (5.5)
		Ankylosis	40 (24.5)
10.	Orthodontics application of CBCT cannot be for	Lip cleft †	68 (41.7)
		Palatal cleft	3 (1.8)
		Impacted canine	10 (6.2)
		Assessment of airways	82 (50.3)
11.	Intra oral radiographies compare to CBCT are justifiable for	Interproximal caries †	34 (20.9)
		Measuring the ridge height	5 (3.1)
		Extension of pathological lesions	27 (16.5)
		a and b	97 (59.5)
12.	Which of the following statements regarding CBCT is correct?	It can show only vertical root fractures	3 (1.8)
		It can show only horizontal root fractures	3 (1.8)
		All kinds of root fractures can be detected by CBCT †	142 (87.1)
		CBCT cannot detect root fractures	15 (9.3)
13.	CBCT is useful to evaluate bone density for implant procedure.	Yes †	159 (97.5)
		No	4 (2.5)
14.	In Nepal's scenario, the most common indication of CBCT is for the assessment of	Inferior alveolar nerve block for removing wisdom teeth	42 (25.8)
		Implant sites †	62 (38.0)
		Pathological lesions	42 (25.8)
		Bone density	17 (10.4)
15.	Have you heard about the guidelines for when or when not to take CBCT scan?	Yes †	66 (40.5)
		No	97 (59.5)

† Correct responses

Majority of the study participants 88 (54.0%) were in the average knowledge category, with 21 (60%) of males and 67 (52.3%) females. A higher proportion of females (27.3%) demonstrated poorer knowledge compared to males (14.3%). KDCshowed the highest proportion of participants 9 (34.6%) with good knowledge (Table 3).

Table 3:Distribution of the study participants according to the level of knowledge

Variables		Good	Average	Poor
		n (%)	n (%)	n (%)
Gender	Male	9 (25.7)	21 (60.0)	5 (14.3)
	Female	26 (20.3)	67 (52.3)	35 (27.3)
Colleges	KUSMS	9 (29.0)	15 (48.4)	7 (22.6)
	NMC	7 (24.1)	14 (48.3)	8 (27.6)
	KMC	6 (23.1)	15 (57.7)	5 (19.2)
	KDC	9 (34.6)	15 (57.7)	2 (7.7)
	COMS	3 (11.1)	17 (63.0)	7 (25.9)
	NMCTH	1 (4.2)	12 (50.0)	11 (45.8)
Total		35 (21.5)	88 (54.0)	40 (24.5)

There was a statistically significant difference (p-value 0.03) in knowledge scores among the interns of different colleges (Table 4). Post hoc Tukey test revealed a significant difference in mean knowledge scores between KDCand NMCTH(p-value = 0.04), with KDCexhibiting a higher mean knowledge score than the other college.

Table 4: Comparisons between knowledge scores and colleges

Variables		Mean±SD	p-value
College	KUSMS	9.39±2.35	0.003*
	NMC	8.66±2.32	
	KMC	9.38±1.84	
	KDC	9.58±1.75	
	COMS	8.59±1.69	
	NMCTH	7.92±1.86	
Total		8.94±2.05	

DISCUSSION

CBCT holds significant value in multiple aspects of maxillofacial diagnosis and treatment planning, yet there is limited understanding among undergraduate students and interns regarding its principles, mechanism, applications, and importance in this field.[4] Various literature shows limited in-depth knowledge about CBCT in practicing dentists and certain dental specialists as well.[5,12] This study has been conducted in order to assess the level of knowledge of CBCT amongst the dental interns of Nepal. The predominance of female participants (78.5%) in our study reflects the overall unequal gender distribution within the dental intern population in Nepal. Similar findings were found in many other studies.[5,13] This may suggest differences in interest or accessibility for participation in the study or career choice as dentists between males and females.

The responses from dental interns reflect varying levels of understanding regarding CBCT. Majority of the participants accurately identified fundamental aspects such as the ionizing nature of CBCT radiation and its utility in assessing periapical and periodontal lesions, detecting root fractures and evaluating bone density for implants. These results suggest that participants were well-informed about the clinical benefits of CBCT in these specific areas. However, many struggled with identifying the correct order of radiation exposure and specific indications for CBCT use. These findings are in accordance with the studies conducted among dentists and dental interns.[5,9,10] Less than half the participants had knowledge about the advantages of CBCT over CT, a finding consistent with the study among dental interns10but in contrary to a study conducted among postgraduate students in Navi Mumbai.[14]

Only few of the participants understood the justification for the use of intraoral radiographs for assessing interproximal caries, indicating a potential gap in knowledge regarding the comparative advantages of various imaging modalities in specific clinical scenarios. This finding is in contrast with a study[5] in which majority gave correct response.

Current study showed that most of the dental interns

of Nepal had average knowledge about CBCT. When superficial and basic questions were asked majority responded but when asked in depth, the only few responded. Similar pattern was also seen in dental interns of Mangalore, general dental practitioners of India and Iran.[10,14] Howevera higher level of knowledge about CBCT was demonstrated byspecialists in a study in Iran. This difference may be attributed to the characteristics of the specialist's job or more exposure to CBCT Unit and more exposure to the recent advancements through seminars, workshops, and training programs. Present study exhibits slightly predominance of male in average knowledge category and predominance of female in poor knowledge category. This suggests that, on average, males may have a slightly better understanding of the subject matter than females in the study population. This trend may be influenced by various factors, including societal norms, educational opportunities, and individual learning styles. On contrary, not much knowledge difference was noted between males and females in various studies.[1,5]

The findings of this study showed a difference in knowledge levels between dental interns of different colleges. This suggests that educational institutions may play a role in shaping the level of understanding of CBCT among dental interns. Colleges with higher mean knowledge scores may have CBCT set up with more exposure and effective educational programs.

The precise knowledge about CBCT in practicing dentistry is of paramount importance due to its wide application in future as well.8 Any published literature assessing the level of knowledge regarding CBCT among dental interns in Nepal could not be traced. This study fills this gap by offering valuable insights into the knowledge levels of CBCT among dental interns in Nepal. Nevertheless, it is recommended to conduct further studies on a larger sample size, encompassing dental interns from other university-affiliated colleges as well.

CONCLUSION

The present study showed that dental interns in Nepal had an average level of knowledge regarding CBCT. The study also sheds light on the variations in CBCT knowledge levels among dental interns across different colleges of Nepal. Hence, it highlights the need of enhancing knowledge and understanding of CBCT with targeted educational interventions and implementing strategies such as continuing education programs, workshops, practical exposures and interactive training sessions.

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REFERENCES

1. Kamburoğlu K, Kurşun Ş, Akarslan Z. Dental students' knowledge and attitudes towards cone beam computed tomography in Turkey. Dentomaxillofacial Radiol. 2011;40(7):439-43.
2. Arai Y, Tammisalo E, Iwai K, Hashimoto K, Shinoda K. Development of a compact computed tomographic apparatus for dental use. Dentomaxillofac Rad. 1999;28(4):245-8.
3. Mozzo P, Procacci C, Tacconi A, Tinazzi Martini P, Bergamo Andreis I. A new volumetric CT machine for dental imaging based on the cone-beam technique: preliminary results. Eur Radiol. 1998;8(9):1558-64.
4. Shivanshu A, Arora B, Faizi M, Maheshwari S, Prateek M. Evaluation of dentist's knowledge and awareness towards cone beam computed tomography used in oral implantology: An original study. Int J Appl Dent Sci. 2018;4(4):5-8.
5. Tofangchiha M, Arianfar F, Bakhshi M, Khorasani M. The assessment of dentists' knowledge regarding indications of cone beam computed tomography in Qazvin, Iran. Biotechnol Health Sci. 2015;2(1):e25815.
6. Mainali A, Joshi U, Acharya J. Types of Referrals for Cone Beam Tomography Imaging in Kathmandu, Nepal. Nepal Med Coll J. 2016;18(3-4):100-3.
7. Iqbal W, Farooq F, Bari YA, Nazir F, Quadri MAW, Habib A. Knowledge, Attitude and Practice Regarding Computed Tomography and Cone Beam Computed Tomography among Dental Students at Dow University of Health Sciences. Adv Dent Oral Health 2016; 2(4):1-16.
8. Thakkar A, Reche A, Srivastava S, Nade N, Jagtap S, Nimbulakar G. Knowledge, attitude, and practice of general dentists toward cone-beam computed tomography and dental radiology. J Datta Meghe Inst Med Sci Univ. 2019;14(3):226-31.
9. Ghoncheh Z, Panjnoush M, Kaviani H, Kharazifard MJ, Zahirnia F. Knowledge and attitude of Iranian dentists towards cone-beam computed tomography. Front Dent. 2019;16(5):379-85.
10. Qurashi N, Chatra L, Shenoy P, KM V PR. Knowledge and attitude about cone beam computed tomography (CBCT) among dental interns. J Dent Sci. 2018;6(4):19-25.
11. Dupare A, Dhole A, Motwani M. Knowledge and attitude towards cone beam computed tomography (CBCT) amongst the dentist in Nagpur, Maharashtra. Int J Appl Dent Sci. 2018;4(2):238-41.
12. Ghapanchi J, Saberi E. Knowledge of Iranian dentists about cone beam computed tomography. A questionnaire study. J Dentomaxillofacial. 2016;5(4):11-6.
13. R R, V JK. Awareness of CBCT among the Final Years and Interns- A Pilot Study. J Med Sci Clin Res 2016; 4(5):10375-80.
14. Ramani R, Kalra D. Assessment of knowledge, attitude and practice of dentists regarding cone beam computed tomography in Mumbai and Navi Mumbai: A cross sectional study. Eur J Biomed Pharm Sci. 2016;3(10):480-5.

Premolar Extraction's Impact on Vertical Dimension, Cervical Posture in Class-II High-angle Cases: A Cephalometric Analysis

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ABSTRACT

Introduction: Extraction of premolars is frequently selected as an alternative to creating space for correcting tooth material and arch length discrepancies. The decision to extract premolars in orthodontic practice is primarily influenced by the desire to control or influence the vertical facial dimension and mandibular plane.

Objective: The objective is to establish a correlation between changes in the vertical dimension and concurrent adjustments in lower neck posture following orthodontic treatment involving premolar extractions in Class II high-angle malocclusions.

Materials and Method: A retrospective cephalometric study was conducted with 52 patients aged between 16±10 years. Pre- and post-treatment lateral cephalograms were examined from patients with a Frankfort-Mandibular Angle (FMA) of 27-30 degrees, Point A-Nasion-point B (ANB) angle of 4-5 degrees, and presenting with proclined upper and lower incisors. All patients had undergone extraction of their first premolars. Cephalometric analysis was conducted to evaluate changes in vertical dimension and neck posture.

Result: Paired t-tests were utilized to evaluate pre- and post-treatment modifications in cephalograms. Linear measurements of posterior facial height, anterior facial height, and Jarabak's ratio showed changes of 0.35 mm, 1.61 mm, and 0.4, respectively. Angular measurements, including Sella-Nasion to Gonion-Gnathion (SN-GoGn), Frankfort-Mandibular Angle (FMA), and Occlusion plane to Frankfurt Horizontal plane (OP-FH), demonstrated changes of 0.53 degrees, 0.64 degrees, and 0.88 degrees, respectively. Furthermore, alterations of 0.08 degrees and 0.16 degrees were noted in the lower cervical vertebrae tangent to the palatal plane (CVT-PP) and cervical vertebrae tangent to the mandibular plane (CVT-MP), respectively.

Conclusion: Orthodontic treatment for skeletal Class II malocclusions with increased mandibular divergence, via premolar extraction, significantly affects the vertical dimension without impacting lower neck posture.

Keywords: Bicuspid; cervical vertebrae; malocclusion; posture; retrospective studies; vertical dimension.

INTRODUCTION

According to Angle's classification, Class II malocclusion occurs when the lower first permanent molar is distally positioned relative to the upper first permanent molar by at least half a cusp width. This malocclusion can result from a prognathic maxilla, retrognathic mandible, or a combination of both, often accompanied by various jaw rotations such as upward or downward divergence of the mandible.[1]

Both skeletal Class II malocclusion and cervical-vertebral anatomy are interconnected components of the craniofacial structure. There is significant discourse within orthodontics regarding the observation of increased extension of cervical vertebrae in children with Class II malocclusion.[2,3]

Orthodontic treatments typically involve mechanisms that induce extrusion and aim to alter the position of the mandible and its related structures. However, existing research presents inconsistent findings regarding the effects of premolar extraction on the vertical dimension of the face and mandibular divergences. Furthermore, no studies have investigated the correlation between premolar extractions and the vertical dimension of the face in conjunction with

associated neck posture alterations in Class II skeletal discrepancies.[4]

This study aims to explore the relationship between premolar extraction-induced changes in the vertical dimension and associated lower neck posture adjustments in cases of Class II malocclusion with high angulation.

MATERIAL AND METHODS

This retrospective comparative study was conducted at the Department of Orthodontics and Dentofacial Orthopedics, College of Medical Sciences, Bharatpur, Chitwan, Nepal. The study spanned two months.

Ethical approval was secured from the Institutional Review Committee (IRC) of the College of Medical Sciences-Teaching Hospital, affiliated with Kathmandu University and accredited by the Nepal Medical Council, under reference number COMSTH-IRC/2023-06-1.

Patients' eligibility was determined consecutively based on specific criteria. These included the requirement of pretreatment and post-treatment lateral cephalograms from patients aged 16±10 years, exhibiting a Skeletal Class II jaw relation with point A-Nasion-point B (ANB) angle of 4-5 degrees, hyper-divergent (Frankfurt mandibular plane angle (FMA) of 27-30 degrees), and presenting with proclined upper and lower incisors (bidental protrusion) necessitating the extraction of all first premolars. Additionally, patients with morphological developmental anomalies such as peg lateral, supernumerary teeth, mesiodens, or retained deciduous teeth were excluded. Growing children in need of myofunctional therapy, those with severe skeletal discrepancies (ANB angle greater than 6 degrees) necessitating orthognathic surgery, and patients with a history of previous orthodontic treatment or premolar extraction were also excluded from this study.

Sample size calculation: The sample size was determined using the formula N = Z^2 * SD^2 / d^2, where Z represents the standard normal Z value for a significance level (1.96), SD denotes the standard deviation (taken from the facial axis angle, which is 3.68), and d represents the absolute error (set at 1). Thus, the calculation yielded a sample size of approximately 52.

Cephalometry: Pretreatment and post-treatment cephalograms of patients exhibiting a Class II skeletal base and vertical growth pattern, who underwent extraction of all first premolars, were included. All cephalograms were manually traced onto acetate tracing paper and meticulously aligned with radiographs. Radiograph magnification was adjusted and calibrated based on the magnification factor. The traced lateral cephalograms were then analyzed to assess changes in vertical dimension and lower neck posture following premolar extraction in skeletal Class II cases. The same investigator conducted the cephalometric readings twice to ensure consistency. (Figure 1, Figure 2 and Figure 3)

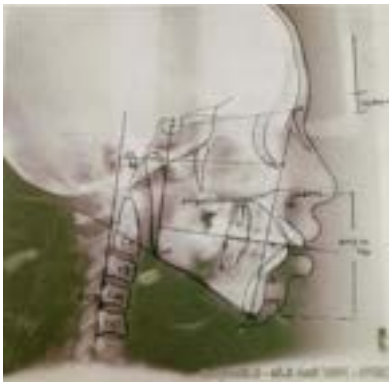

Fig. 1 Cephalometric tracing of the pre-treatment cephalogram.

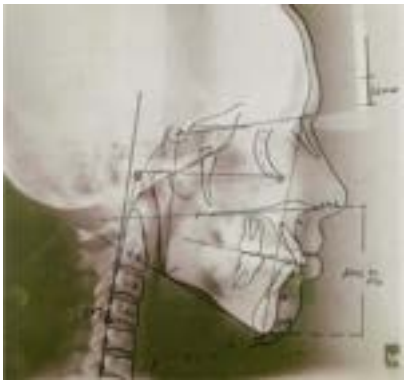

Fig.2 Cephalometric tracing of the post-treatment cephalogram.

Fig.3 Superimposition of pre-treatment and post-treatment cephalogram.

Data analysis: The data were inputted into a Microsoft Excel spreadsheet and analyzed using SPSS for Windows (Statistical Presentation System Software, SPSS Inc.) version 20.0. Continuous data were presented as mean and standard deviation. Paired t-tests were employed for appropriate comparisons.

RESULT

A total of 52 patients, with a mean age of 16±10 years, were included in the study. Table 1 presents the cephalometric variable changes following premolar extraction and orthodontic treatment in Class II vertical growers. Post-treatment variables exhibited significant changes in posterior facial height, anterior facial height, Jarabak's ratio (the ratio of posterior facial height to anterior facial height), Sella-Nasion to Gonion-Gnathion plane, Frankfurt plane to mandibular plane, occlusal plane to mandibular plane, Cervical Vertebrae Tangent (CVT) to Palatal plane, and CVT to mandibular plane.

Linear measurements such as posterior facial height and anterior facial height significantly increased from

75.65±6.08mm to 76.0±5.17mm and 135.0±7.65 mm to 136.61±4.8 mm, respectively, following orthodontic treatment. Additionally, Jarabak's ratio significantly decreased from 56.03±6.5% to 55.63±3.2%, and lower anterior facial height significantly increased from 68.95±5.5 mm to 70.88±6.54 mm post-treatment. Angular measurements including SN-GoGn (Sella Nasion to Gonion Gnathion), Mandibular plane to Frankfurt horizontal (FH) plane angle, and occlusal plane to FH plane angle significantly increased from 35.65±2.25 degrees to 36.18±2.09 degrees, 30.46±1.75 degrees to 31.10±1.72 degrees and 17.78±1.20 degrees to 18.66±1.15 degrees, respectively, pre and post orthodontic treatment. However, Cervical Vertebrae Tangent to Palatal Plane(CVT-PP) and Cervical Vertebrae Tangent to Mandibular Plane (CVT-MP) showed non-significant angular changes from 98.98±1.83 degrees to 98.90±1.61 degrees and 80.04±1.76 degrees to 80.20±1.67 degrees. The alterations in linear and angular parameters of the vertical dimension were clinically significant, whereas changes in cervical vertebrae position were not statistically significant.

Table 1: Comparison of variables assessing pre- and post-treatment changes in Class II high-angle cases following premolar extractions.

Variables	Pre-treatment (T1) N=52		Post-treatment (T2) N=52		Mean Difference	P value
	Mean	Standard Deviation	Mean	Standard Deviation		
Posterior facial height(mm)	75.65	6.08	76.0	5.17	0.35	<0.005
Anterior facial height(mm)	135.0	7.65	136.61	4.8	1.61	<0.005
Jarabak's ratio (Posterior facial height/anterior facial height)(%)	56.03	6.5	55.63	3.2	0.4	<0.005
Lower anterior facial height (Menton to ANS) (mm)	68.95	5.5	70.88	6.54	1.93	<0.005
SellaNasion – GonionGnathion(degree)	35.65	2.25	36.18	2.09	0.53	<0.005
Mandibular plane to frankfurt horizontal plane angle (degree)	30.46	1.75	31.10	1.72	0.64	<0.005
Occlusal plane to frankfurt horizontal plane angle(degree)	17.78	1.20	18.66	1.15	0.88	<0.005
Angle between CVT and PP(degree)	98.98	1.83	98.90	1.61	0.08	0.14
Angle between CVT and MP(degree)	80.04	1.76	80.20	1.67	0.16	0.19

Abbreviation: ANS: Anterior Nasal Spine, CVT: Cervical Vertebrae Tangent, PP: Palatal Plane, MP: Mandibular Plane.

DISCUSSION

According to etiology, Class II malocclusion can be managed through growth modification, orthodontic camouflage, or orthognathic surgery. Mild to moderate cases can be addressed with camouflage techniques such as distalization or premolar extraction. Extraction of premolars has become a common practice in orthodontics, often chosen to address issues such as tooth and arch length discrepancies, proclined incisors, mild to moderate jaw discrepancies, management of partial malocclusions involving impacted canines, and anterior open bites.[5,6] In Class II cases, premolar extraction is typically performed to correct overjet, retract incisors, and alter the soft tissue profile.

The decision to extract premolars in orthodontic practice is primarily influenced by the desire to control or impact the vertical facial dimension and mandibular plane.[7,8] Despite premolar extraction being a common procedure in orthodontics, its effect on the vertical dimension remains a topic of debate. Some studies have suggested that in cases where premolars are extracted, there may be a tendency for the posterior teeth to migrate forward, resulting in mandibular overclosure and a reduction in vertical dimension.[9] Additionally, there are concerns raised by studies regarding the effect of premolar extraction followed by retraction on the position of the mandible and condyle, potentially causing posterior displacement and alterations in tongue space and upper pharyngeal airway dimensions.[10] Class II skeletal discrepancies can be associated with various facial divergences, such as upward or downward jaw rotation.[11] Considering the lower anterior facial height and facial divergence, both treatment planning, such as extraction or non-extraction, and biomechanics are adjusted accordingly. Orthodontic mechanisms typically involve extrusion, aimed at opening the bite by extruding

posterior teeth to open the mandibular axis. This approach is beneficial in cases with a flat mandibular plane angle but may lead to downward and backward rotation of the mandible in high-angle cases, potentially exacerbating open bite issues and affecting aesthetics.

This study evaluated the effects of premolar extraction on vertical dimension and lower neck posture in 52 adolescent Class II hyperdivergent cases through cephalometric analysis. Premolar extraction in Class II hyperdivergent cases is typically performed to control the vertical dimension of the face. The tendency of bite closure associated with premolar extractions is attributed to the protraction of posterior teeth into extraction sites, which may enable counterclockwise mandibular rotation, thereby reducing the "wedge effect."[12]

This study demonstrated an increase in all vertical parameters following the extraction of all four premolars in Class II patients. Contrary to the theory proposed by several authors suggesting a loss in the vertical dimension of occlusion after the extraction of first premolars,[13,14] our findings did not support this notion. Specifically, the SN-GoGn, Frankfurt Mandibular plane angle, and the ratio of posterior facial height to anterior facial height all showed increased values in post-extraction Class II cases.These results diverge from a study by Porto et al., who reported a statistically significant decrease in the SN-GoGn angle in the extraction group compared to an increase in the non-extraction group.[15]

This study revealed a significant increase in lower anterior facial height and total anterior facial height. The observed slight clockwise rotation of the mandible resulted in a steeper mandibular plane and inferior positioning of the Menton, contributing to the augmentation of lower anterior and total anterior facial height.[16,17] Another contributing factor may be the biomechanics employed for space closure and anterior retraction. Class II mechanics typically involve extrusion, leading to the opening of the mandibular axis, as suggested by various authors.[18,19] Additionally, Dwivedi *et al.*[20] also reported a significant increase in the mandibular plane angle post-extraction treatment in subjects with a hyperdivergent growth pattern.

This study also aimed to assess the associated alterations in lower neck posture alongside changes in vertical dimension in Class II high-angle cases following the extraction of all first premolars. The relationship between the mandible and cervical spine is governed by a chain of muscles, and neck posture is influenced by the musculoskeletal system, growth patterns, and mandibular divergence.[21] Moreover, orthodontic interventions, such as removable appliances, splints to increase vertical dimension, and the use of anterior repositioning devices in skeletal Class II cases, can impact the position of cervical vertebrae.[22]

Vertical growers typically exhibit weaker muscle attachments, reduced cross-sectional area of muscles, and diminished bite force.[23] Additionally, the extrusive mechanics employed in orthodontic treatment can influence the vertical position of the mandible and subsequently affect the cervical spine.

Although changes in vertical dimension were observed in post-extraction cephalograms, no alterations were noted in lower neck posture. While neck posture changes have been documented in the literature following functional appliance therapy,[24] no studies have yet investigated the comparison between premolar extraction and its effects on neck posture.

CONCLUSION

Skeletal Class II high-angle cases exhibited a notable increase in vertical dimension following orthodontic management involving premolar extraction, with no significant impact observed on lower neck posture. Further research is warranted to compare the effects of extraction on neck posture, comparing with a control group and other skeletal patterns.

REFERENCES

1. Moyers RE, Riolo ML, Guire KE, Wainright RL, Bookstein FL. Differential diagnosis of Class II malocclusions: Part 1. Facial types associated with Class II malocclusions. Am J Orthod. 1980;78(5):477-94.
2. Kofide EA, Namankani E. The association between posture of the head and malocclusion in Saudi subjects. CRANIO®. 2007;25(2):98-105.
3. Nobili A, Adversi R. Relationship between posture and occlusion: a clinical and experimental investigation. CRANIO®. 1996;14(4):274-85.
4. Kocadereli İ. The effect of first premolar extraction on vertical dimension. Am J Orthod Dentofacial Orthop. 1999;116(1):41-5.
5. Tweed CH. Indications for the extraction of teeth in orthodontic procedure. Am J Orthod Oral Surg. 1944;30(8):405-28.
6. Araújo TM, Caldas LD. Tooth extractions in Orthodontics: first or second premolars?. Dental press J Orthod. 2019;24:88-98.
7. Fanning RJ. The role of extractions in orthodontic treatment. Int J Orthod. 1964;2(1):17-26.
8. Schudy FF. The control of vertical overbite in clinical orthodontics. Angle Orthod. 1968;38(1):19-39.
9. Bowbeer GR. The 6th key to facial beauty and TMJ health. Funct Orthod. 1987;4(4):10.
10. Sharma K, Shrivastav S, Sharma N, Hotwani K, Murrell MD. Effects of first premolar extraction on airway dimensions in young adolescents: A retrospective cephalometric appraisal. Contemp Clin Dent. 2014;5(2):190-4.
11. Schudy FF. The rotation of the mandible resulting from growth: its implications in orthodontic treatment. Angle Orthod. 1965;35(1):36-50.
12. Beane Jr RA. Nonsurgical management of the anterior open bite: a review of the options. Semin Orthod 1999;5(4):275-83.
13. Tulley WJ. The role of extractions in orthodontic treatment. Br Dent J 1959;107:199-205.
14. Wyatt WE. Preventing adverse effects on the temporomandibular joint through orthodontic treatment. Am J Orthod Dentofacial Orthop. 1987;91(6):493-9.
15. Porto VS, Henriques JF, Janson G, Freitas MR, Pinzan A. Influence of treatment with and without extractions on the growth pattern of dolichofacial patients. Dental Press J Orthod. 2012;17:69-75.
16. Ricketts RM. Facial and denture changes during orthodontic treatment as analyzed from the temporomandibular joint. Am J Orthod. 1955;41(3):163-79.
17. Yamaguchi K, Nanda RS. The effects of extraction and nonextraction treatment on the mandibular position. Am J Orthod Dentofacial Orthop. 1991;100(5):443-52.
18. Chua AL, Lim JY, Lubit EC. The effects of extraction versus nonextraction orthodontic treatment on the growth of the lower anterior face height. Am J Orthod Dentofacial Orthop. 1993;104(4):361-8.
19. Stromboni Y. Facial aesthetics in orthodontic treatment with and without extractions. Eur J Orthod. 1979;1(3):201-6.
20. Dwivedi S, Sonwane S, Chokotiya H, Patel P, Gupta G. Effect of premolar extractions on facial vertical dimension-a cephalometric study. Indian J Orthod Dentofac Res. 2016;2(04):194-6.
21. Springate SD. A re-investigation of the relationship between head posture and craniofacial growth. The Eur J Orthod. 2012;34(4):397-409.
22. D'Attilio M, Caputi S, Epifania E, Festa F, Tecco S. Evaluation of cervical posture of children in skeletal class I, II, and III. CRANIO®. 2005;23(3):219-28.
23. Pepicelli A, Woods M, Briggs C. The mandibular muscles and their importance in orthodontics: a contemporary review. Am J Orthod Dentofacial Orthop. 2005;128(6):774-80.
24. Kamal AT, Fida M. Evaluation of cervical spine posture after functional therapy with twin-block appliances: A retrospective cohort study. Am J Orthod Dentofacial Orthop. 2019;155(5):656-61.

Assessment of Applicability of Demirjian's Method for Dental Age Estimation

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ABSTRACT

Introduction: Contemporarily importance of the dental age estimation has been increasing in diagnosis and treatment planning of orthodontic and pedodontics patients, forensic odontology, medico legal purposes as well as research associated with growth and development. Evaluation of dental age can be done by numerous methods, among which, Demirjian's method makes the use of orthopantomogram (OPG). OPGs are non-invasive and are commonly used for routine clinical examination.

Objectives: To assess the applicability of Demirjian's method for dental age estimation in age group (7-18) years.

Materials and methods: A cross-sectional study was carried out in the Department of Oral and Maxillofacial Pathology of Kantipur Dental College and Hospital, Kathmandu, Nepal. Digital OPGs were used, which were collected with consent from the Department of Oral Medicine, Diagnosis and Radiology. The permission to study was obtained from the Institutional Review Committee of Kantipur Dental College prior to conducting study. The patient's confidentiality were maintained. Intra-examiner assessment of the OPGs was done and the data were collected in Microsoft Excel sheet. Its analysis were performed in Statistical Package for the Social Sciences (SPSS).

Results: Mean and mean differences in chronological ages and dental ages were calculated, which revealed and overestimation of age in both males and females by 1.35 and 1.01 years respectively, which were statistically significant. When compared with chronological ages, there was an overestimation pf age in all age group except 12, 13, 16, 17 and 18 years. Mean difference in age group (7-9) years were highly significant (p value <0.05), whereas, in age groups (10-18) years, it was not statistically significant.

Conclusions: Age estimation by Demirjian's method using Aacharya's formula showed an overestimation of the dental age in the studied Nepalese population sample. The difference between the mean chronological ages and the dental ages was less significant in the age groups (11-18) years indicating greater applicability of this method in this age group.

Keywords: Age estimation; Demirjian's method; Dental age; Nepali children

INTRODUCTION

Age estimation carries great importance for forensic, medical as well as research purposes.[1] Various skeletal, dental and somatic indicators can be used for age estimation.[2] Among them, dental indicators are considered most reliable for age assessment because of the uniqueness of dental characteristics to each individual along with systematic, identifiable sequence of tooth development and eruption.[3,4] Also, teeth are well-preserved parts of the body in long run.[3]

In this respect, Demirjian's method is one of the methods for dental age estimation, which is popular because of its simplicity, reproducibility and ease of standardization.[5] Furthermore, digital OPGs, utilized in this method, are a dependable source since the developmental status of the whole dentition can be assessed from a single radiograph and used for dental age estimation.[6]

Because of its simplicity, Demirjian's method has been widely used for dental age estimation in the Nepalese population as well. Acharya AB7 gave a formula for the age estimation in the South Indian population, which was developed on a sample of 165 males and 296 females aged 7 to 25 years. This study will use this formula for the estimation of dental age using the Demirjian's method in the children and adolescents of age group (7-18) years with aim to assess the applicability of Demirjian's method.

MATERIALS AND METHOD

A total of 156 sample OPG's of the patients with equal frequency of gender and age groups ranging from (7-18)

were collected with their consent from the Department of Oral Medicine, Diagnosis and Radiology of Kantipur Dental College and Hospital, Kathmandu, Nepal to conduct a cross-sectional study. The permission to study was obtained from the Institutional Review Committee of Kantipur Dental College prior to conducting study. The patient's confidentiality were maintained. The OPGs were taken from the same machine (CS900) by the same operator. The samples were collected and selected by one investigator on April 4th-7th, 2022. Radiographs were selected randomly but care was given so as to include equal number of OPGs for each sex in the individual age group for better assessment and relativity. The radiographs were then divided blindly among the other investigators, examined and the data (age at the time radiograph was taken; sex; tooth maturity score according to criteria of Demirjian's tooth development stage) were entered in Microsoft Excel and were analyzed from April 8th-11th, 2022. Intra-examiner reliability was tested.

The teeth in the third quadrant including third molar were examined and scored as Stage 0-9 according to the criteria of Demirjian's tooth development stage. Maturity scores were assigned to each tooth accordingly. Total maturity score was calculated and the dental age of the patient were calculated as per the formula given by Acharya AB for each sex.[7] The estimated dental age were compared with the chronological age of the patient for assessment of the reliability of the Demirjian's method.

The data obtained were entered and analyzed on the SPSS V 20.0 software package. Descriptive statistics such as standard deviation and mean were used for dental age and chronological age. The difference between chronological age and dental age was derived giving positive value representing overestimation and negative value representing underestimation of the age among two sexes and all age groups. Statistical tests were performed at 95%confidence level with SPSS V 20.0 software package.

Inclusion criteria

Healthy children of age ranging from (7-18) years (well developed and syndrome free) with properly recorded name, sex, age at the time OPG was taken and clear OPGs with no blurring, no artifacts.

Exclusion criteria

OPGs with blurring and or with artifacts present; poor quality OPGs; image deformation on left side of the mandible that prohibits the proper visualization and speculation of the tooth development; presence of dental abnormalities like hypodontia, congenitally missing left mandibular permanent teeth including left mandibular third molar, fracture due to trauma and presence of gross pathologies involving left mandible.

RESULT

Mean and mean differences in chronological age and estimated dental age were calculated, which revealed an overestimation of age in both males and females by 1.35 and 1.01 years respectively and an overestimation by 1.18 years as a whole where the mean chronological age for male was 12.54 years, for female was 12.46 years and for the whole group was 12.50 years and mean estimated dental age for male was 13.89 years, for female was 13.47 years and for the whole group was 13.68 years, which were statistically significant (Table 1;Fig.1).

Table 1: Comparison of mean chronological age and mean estimated dental age between genders

Gender	N	Chronological age		Dental Age		Difference			p-value
		Mean	SD	Mean	SD	CA	CI		
							Lower	Upper	
Male	78	12.54	3.37	13.89	2.58	-1.35	-2.00	-0.69	0.000
Female	78	12.46	3.47	13.47	2.79	-1.01	-1.48	-0.53	0.000
Total	156	12.50	3.46	13.68	2.68	-1.18	-1.58	-0.78	0.000

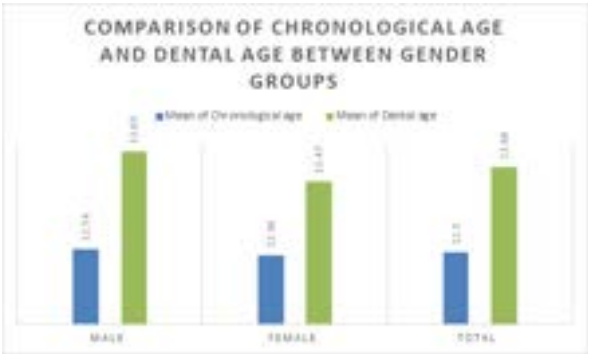

Fig.1: Bar Diagram representation of comparison of mean chronological age and mean estimated dental age between genders and as a whole

Mean and mean differences in chronological age and estimated dental ages in a specific age group including both male and female were calculated. When mean estimated dental ages were compared with mean chronological ages in a specific age group, there was an overestimation of age in all age groups except for age group12, 13, 16, 17 and 18 years which had underestimation of age (Table 2;Fig.2).

Table 2: Comparison of mean chronological age and mean estimated dental age in all age groups

Age	N	Chronological Age		Dental Age		Difference			p-value
		Mean	SD	Mean	SD	CA	CI		
							Lower	Upper	
7	13	7	0.00	13.79	1.67	-6.79	-7.79	-5.78	0.000
8	13	8	0.00	12.08	1.91	-4.08	-5.23	-2.92	0.000
9	13	9	0.00	11.33	1.51	-2.33	-3.24	-1.42	0.000
10	13	10	0.00	10.97	1.07	-0.97	-1.61	-0.33	0.006
11	13	11	0.00	11.09	1.30	-0.09	-0.88	0.69	0.809
12	13	12	0.00	11.66	1.72	0.34	-0.69	1.38	0.489
13	13	13	0.00	12.67	1.58	0.33	-0.62	1.29	0.461
14	13	14	0.00	14.20	1.66	-0.19	-1.20	0.81	0.676
15	13	15	0.00	16.07	1.09	-1.07	-1.73	-0.41	0.004
16	13	16	0.00	15.97	1.16	0.03	-0.06	0.73	0.935
17	13	17	0.00	16.45	1.17	0.55	-0.16	1.26	0.117
18	13	18.00	0.00	17.84	0.77	0.16	-0.30	0.62	0.468

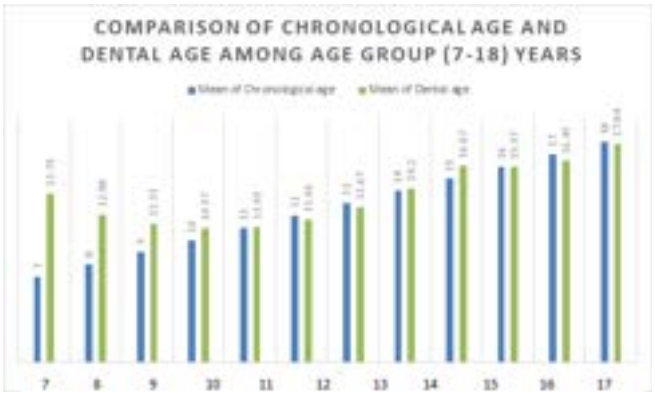

Fig.2: Comparison of mean chronological age and mean estimated dental age in all age groups

Mean difference in age groups (7-9) years were highly significant (p-value< 0.05) whereas, in age groups (10-18) years, it was not statistically significant.

DISCUSSION

Several methods has been developed over the period of time for speculation of dental age by analyzing several factors like anatomy, histology, sequence of tooth eruption and radiographs.[5] No such method is present that is considered to be effective universally for calculating the dental age.[5] Demirjian's method is one such method which was chosen for its easy application and utilization of radiograph showcasing the maturity of the permanent tooth. Though it is widely used it has not caught up with chronological age either positively or negatively in most populations of worldwide where the study was conducted using Demirjian's method.

The study we conducted consisted of OPGs of children aged (7-18) years with equal number of radiographs of each sexes in each age group which sufficed the sample size obtained for applying the Demirjian's method to estimate the dental age.

The estimated age when found to be overestimated meant that positive value was obtained when the chronological age was subtracted from the calculated dental age and likewise when estimated age was found to be underestimated meant that negative value was obtained.[5] There was an overestimation of age using the Demirjian's method by 1.18 years in the whole group of children. Incidentally, most of the studies conducted in Nepal using Demirjian's method mostly resulted in negative value; that is underestimation of age.[5] Studies conducted in the population around world like Turks, Malaysian, Bangladeshi, British, Croats, Brazilians, Indians and Spanish children had overestimation of age just like in our studies conducted in Nepali children.[5]

The overestimation was found to be more in male gender than in female gender in our study, where several literature has shown that female has evidently forward tooth development than in male.[5]

In the study conducted in the Indian population by Kiran *et. al*., an underestimation of dental age was seen when original equation was used, whereas, the use of Aacharya's formula resulted in an overestimated age by 1.72 years males and 1.91 years in the females; significant mean difference was seen between the chronological and dental age in all age groups except (14-16) years and (18-18.99).

Study conducted by Rinky Nyachhyon, in the age group (7-18) years, an underestimation of 0.82 years was seen in males and 1.17 years in females; whereas, an overestimation of 0.80 years and 0.25 years was observed in age groups of 7 and 9 years respectively, when the original equation was used.

CONCLUSION

Age estimation by Demirjian's method, using Aacharya's formula showed an overestimation of the dental age in Nepalese children among which the overestimation of age was less significant in the age groups (11-18) years indicating greater applicability of Demirjian's method in this age group.

REFERENCES

1. Nyachhyon R. Evaluation of Dental Age in Nepali Children using Demirjian's 7-Teeth Teeth Method. Orthod J Nepal. 2018; 7(2):37–40.
2. Cugati N, Kumaresan R, Srinivasan B, Karthikeyan P. Dental age estimation of growing children by measurement of open apices: A Malaysian formula. J Forensic Dent Sci.2015; 7:227-31.
3. Prabhakar AR, Panda AK, Raju OS. Applicablity of Demirjian's method of age assessment in children of Davengere. J Indian Soc Pedo Prev Dent. 2002; 20(2):54-62.
4. Bijjaragi SC, Sangle VA, Saraswathi FK, Patil VS, Ashwini Rani SR, Bapure SK. Age estimation by modified Demirjian's method (2004) and its applicability in Tibetan young adults: A digital panoramic study. J Oral Maxillofac Pathol. 2015; 19(1):100-5.
5. Limbu S, Dikshit P, Malla M, Gautam U. Dental age estimation and accuracy assessment by Demirjian, Nolla and Willems methods in Nepalese children for predicting the chronological age. Orthod J Nepal. 2021 Dec. 31; 11(2):46-5.
6. Kapoor D. Age Estimation using Orthopantomogram and Willems Method in Chitwan Population. JCMS Nepal. 2018; 14(2):98-101.
7. Acharya AB. Age Estimation in Indians using Demirjian's 8-teeth Method. J Forensic Sci. 2011;56(1):124–127.
8. M. Puranik and S. R. Uma. Dental age estimation: a review. Journal of Dental and Maxillofacial Research. 2015; 1: p. 24.
9. Nykanen R, Espeland L, Kvaal SI, Krogstad O. Validity of the Demirjian method for dental age estimation when applied to Norwegian children. Acta Odontol Scand. 1998; 56:238-44.
10. Upadhyay S, Poudyal S, Khatiwada P, Khanal B, Shrestha S. Estimation of Dental Age by Demirjian and Willems Method in a Tertiary Care Hospital of Nepal. 2021; 11(1): 40-5.

Immediate Implant with Immediate Loading- A Case Report

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ABSTRACT

Immediate implant placement and provisionalization following tooth extraction have been documented as a predictable treatment modality. This case report illustrates immediate implant placement and provisionalization to replace missing teeth on lower front teeth region. Atraumatic extraction of teeth were done, the socket was prepared to the required depth and implant was inserted and temporization by a bonded restoration was done day after. An impression was made 3 months after implant insertion, and a definitive restoration was placed. The dental implant and provisional restoration provided the patient with immediate esthetics, function, comfort and most importantly preservation of tissues.

Keywords: Implant, Immediate implant placement, immediate loading, provisionalization

INTRODUCTION

Since the beginning of mankind, humans have used dental implants in one form or another to replace missing teeth. The first evidence of dental implants is attributed to the Mayan population roughly round 600 AD where they excelled in utilizing pieces of shells as implants as a replacement for mandibular teeth.[1] The four treatment options for post-extraction implant placement as defined by the International Team for Implantology (ITI) in two ITI Consensus Conferences (2003 and 2008) are:

1. Immediate implant placement: same day of extraction
2. Early implant placement with soft tissue healing:4-8 weeks
3. Early implant placement with partial bone healing:12-16 weeks
4. Late implant placement with complete bone healing: >6 months

Immediate placement of a dental implant in an extraction socket was initially described more than 30 years ago by Schulte and Heimke in 1976. Lazzara later in 1989 reintroduced the method of immediate implant placement into fresh extraction sockets with three case reports. Immediate implant placement may be defined as implant placement immediately following tooth extraction and as a part of the same surgical procedure, or as implant placement immediately following extraction of a tooth which must be combined in most patients with a bone grafting technique to eliminate peri-implant bone defects. An abundance of literature supports the placement of immediate implants and almost all studies report high survival rates of immediate implants however case selection is necessary. [2]

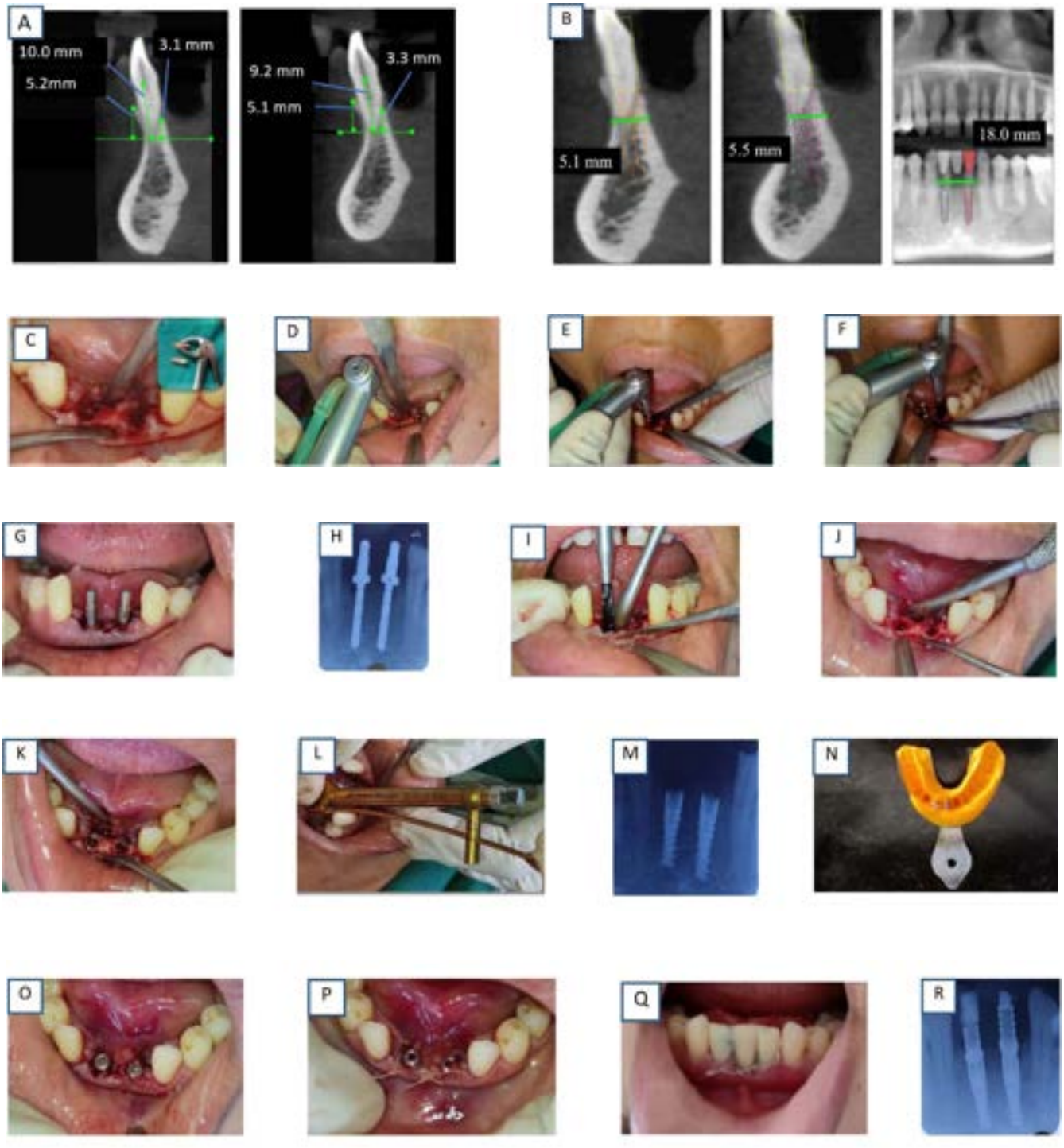
CASE REPORT

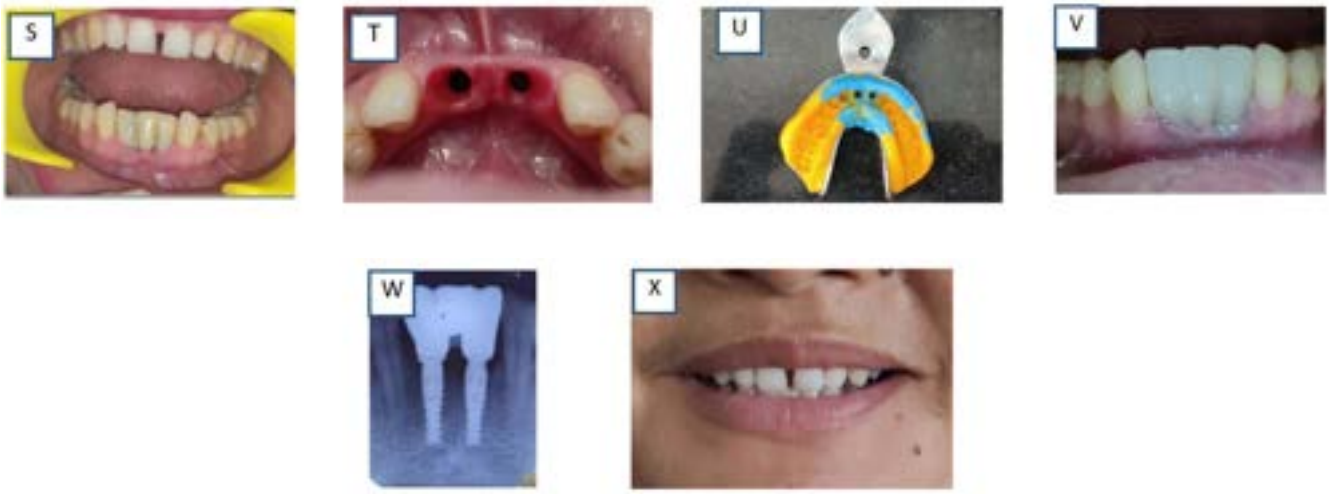
35 year old female patient reported to the Department of Periodontics in Kantipur Dental College with her chief complain of missing teeth on lower front teeth region since childhood. Due to which she was using removal prosthesis since 15 years. The removable prosthesis was uncomfortable and difficult to maintain therefore, she wanted the fixed prosthesis. No Significant medical history was reported. On examination, 31 and 41 were congenitally missing with Grade II mobile with respect to (w.r.t) 32 and 42.

CBCT analysis along with clinical examination revealed poor periodontal prognosis w.r.t 32 and 42 (fig: A). Hence, treatment plan for the case consisted of extraction of 32 and 42 followed by immediate implant placement with immediate loading. Digital planning (fig: B) was performed along with mock up on diagnostic cast. 3.5 mm*13 mm implants were selected and due to lesser availability of space, 3 unit prosthesis was selected as prosthetic option.

After completion of Phase I therapy, extraction was done w.r.t 32 and 42 under local anesthesia. Flap was reflected and precision drill was performed followed by 1.5 mm and 2.0 mm drill. Parallel pins were placed and radiograph was taken. After verification of the implant placement sites and angulation, 2.4 mm drill was performed for preparation of final osteotomy site. Noble active implantof 3.5 mm*13 mm dimension was placed and 70NCm torque was achieved on both the sites. Post-operative radiograph was taken and temporary impression was made for the temporary prosthesis. Healing abutments were placed and suturing was performed (vicryl 5-0). (Fig: C-P) The patient was kept on antibiotic coverage for 7 days.

On the next day, immediate loading was performed. And patient was recalled for regular follow-ups. After 3 months of immediate loading. Final impression was made and final prosthesis was delivered. Fig Q- X)





DISCUSSION

Indications of immediate implants include tooth extraction done due to trauma or endodontic causes (root fracture/ resorption/ perforation), unfavourable crown to root ratio (not due to periodontal loss), intact bony walls of alveolus, intact facial bone wall with a thick wall phenotype (> 1mm), thick gingival biotype and sufficient bone volume apically as well as palatally of the extracted root to allow a correct three dimensional implant positioning with good primary stability.[3] Likewise, contraindications are presence of active infection, insufficient bone (<3 mm) beyond the tooth socket apex for initial implant stability, wide and/or long gingival recession and proximity to vital anatomic structures.[4]

Advantages of immediate implant placement includes reduction in the number of surgical interventions, treatment duration is reduced, bone width and height of the alveolar bone is preserved, enabling maximal utilisation of bone-implant surface area, ideal orientation of the implant can be achieved, preservation of bone at the extraction site, soft tissue aesthetics can be maintained and better patient acceptance[5,6] whereas its disadvantages are risk of partial alveolar bone resorption due to a pathologic process or to a traumatic damage during the extraction, difficulty to achieve a primary stability, gap between implant surface and socket wall, additional cost in cases of guided bone regeneration, difficulty to predict the final position of the implant, difficulty to achieve a complete closure of the implant site and need to raise a flap in order to cover the implant if two stage procedures is preferred.[7,8]

A systematic review investigated 26 randomised control trials and found a survival rate of 83.7–100% for immediately placed implants. Implant failure was not consistently reported and when reported, failure due to lack of osseointegration prior to placement of the definitive restoration was the most common descriptor. Others attributed reasons included infection abscess, mobility after immediate loading, and iatrogenic complication. Several factors may influence the survival of immediate implants, such as loading protocols, location of implants in the jaw, antibiotic protocol, grafting methods, and implant geometry.[9]

Immediate implants can be performed via flap elevation or flapless technique. In our case, we opted for flap elevation technique. However, flapless surgery resulted in more buccal bone preservation at immediate implants. The orofacial position of the implant shoulder and the tissue biotype are important contributory factors.[10] Immediate implant sites with soft tissue augmentation offers enhanced soft-tissue thickness and maintained soft-tissue contours but does not prevent peri-implant mucosal recession or interproximal bone resorption.[11]

Immediate loading is defined as a prosthesis being placed in occlusion within 48 hours of implant surgery[12] or after 72 hours of implant placement.[13] The survival rate of implants as well as marginal bone loss was not affected by the difference between immediate and early loading at 1 or 3 years. So, either the immediate or early loading of the implants should be considered. But patients always prefer to be rehabilitated as soon as possible, provided there is less risk of implant failure.[14]

CONCLUSION

Immediate implant placement with immediate loading allows a significant comfort to the patient, a reduction of the healing duration and preservation of the gingival architecture; which optimises the aesthetic outcomes.

REFERENCES

1. Abraham CM. A brief historical perspective on dental implants, their surface coatings and treatments. Open Dent J. 2014;8(1):50–5.
2. Dhami B, Shrestha P, Gupta S, Pandey N. Immediate Implant Placement: Current Concepts. J Nepal SocPerio Oral Implantology. 2019;3(1):18–24.
3. Morton D, Chen ST, Martin WC, Levine RA, Buser D. Consensus statements and recommended clinical procedures regarding optimizing esthetic outcomes in implant dentistry. Int J Oral Maxillofac Implants. 2014;29 Suppl:216–20.
4. Kaur G, Tabassum R, Mistry G, Shetty O. Immediate Implant Placement: A Review. J Dent Med Sci. 2017;165:90–5.
5. Chen ST, Wilson TG, Hammerle CF. Immediate or early placement of implants following tooth extraction: review of biologic basis, clinical procedures, and outcomes. Consensus statement. Int J Oral Maxillofac Implants. 2004;19:12–25.
6. Mayfield LJ. Immediate, delayed and late submerged and transmucosal implants. In: Proceeding of the 3rd European Workshop on Periodontology. Quintessence.
7. Bhola M, Neely AL, Kolhatkar S. Immediate implant placement: clinical decisions, advantages, and disadvantages. J Prosthodont. 2008;17(7):576–81.
8. Esposito M, Grusovin MG, Polyzos IP, Felice P, Worthington HV. Timing of implant placement after tooth extraction: immediate, immediate-delayed or delayed implants? A Cochrane systematic review. Eur J Oral Implantol. 2010 Autumn;3(3):189–205.
9. Soegiantho P, Suryawinata PG, Tran W, Kujan O, Koyi B, Khzam N, et al. Survival of single immediate implants and reasons for loss: a systematic review. Prosthesis. 2023;5(2):378–424.
10. Pitman J, Christiaens V, Callens J, Glibert M, Seyssens L, Blanco J, et al. Immediate implant placement with flap or flapless surgery: A systematic review and meta-analysis. J ClinPeriodontol. 2023;50(6):755–64.
11. Ferraz MP. Bone grafts in dental medicine: An overview of autografts, allografts and synthetic materials. Materials (Basel). 2023;16(11).
12. Ibañez JC, Jalbout ZN. Immediate loading of osseotite implants: two-year results. Implant Dent. 2002;11(2):128–36.
13. Pigozzo MN, Rebelo da Costa T, Sesma N, Laganá DC. Immediate versus early loading of single dental implants: A systematic review and meta-analysis. J Prosthet Dent. 2018;120(1):25–34.
14. Araújo M, Linder E, Lindhe J. Effect of a xenograft on early bone formation in extraction sockets: an experimental study in dog. Clin Oral Implants Res. 2009;20(1):1–6.

Reattachment of fractured segment: The instant remedy

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ABSTRACT

Trauma to the anterior tooth is a more frequent occurrence due to their position in the arch. Fractured anterior tooth if left untreated can cause damage to the dentition and can even have the psychological impact on the patient. Conventional methods used for the restoration of fractured teeth are time consuming, expensive and not conservative. While reattachment of fractured tooth segment can be a viable alternative . This process allows minimal sacrifice of the tooth structure, and allows better esthetics in less time

Keywords: Trauma, Reattachment

INTRODUCTION

Trauma to maxillary anterior teeth is most commonly encountered situation. It is mainly due to the position of teeth in the arch.[1] Teeth in lower anterior region are less frequently affected.[2] Among the traumatic injuries, complicated and uncomplicated crown fractures are most common. Coronal fractures of permanent incisors accounts 18-22% of all trauma to dental hard tissues, 28-44% being uncomplicated and 11-15%, complicated (enamel +dentin +pulp). Of these, 96% includes maxillary central incisors.[3] Males are more frequently affected than females.[4] Fractured tooth in anterior region is of great concern.[5] This creates problems in esthetic, phonetic and function.[1] If timely treatment is not provided, this might lead to the loss of dentition and can even have psychological impact on the patient.[5] Various options for management of fractured teeth can be : Direct composite resin restorations, Laminate veneers and Crowns. But these treatment modalities are more expensive, time consuming and not conservative at all.[1] So, Reattachment of fractured segment stands as a viable alternative. It is indicated when the fractured segment is retained or recovered in a reasonable time, when there is minimal or no violation of the biological width with a correct fit between the fractured segment and remaining tooth structure.[6]

CASE PRESENTATION

A 19 years old male patient reported with a chief complain of broken tooth in upper front region of jaw since 1 day. The tooth was symptomatic. Clinical examination revealed a complicated oblique fracture on 22 and uncomplicated crown fracture on 21 (Figure 1, 2 and 4).

In tooth wrt 22, the fracture was extended 1mm subgingivally on the palatal aspect. The fractured segment was being held by the gingival attachment (Figure 4). Intraoral periapical radiograph revealed an intact periodontal ligament space, complete root formation and no associated root fracture (Figure 3). Both these tooth were responsive on Electric Pulp Test (EPT). No significant medical history was reported by the patient. Various treatment options were explained to the patient:

a) Reattachment of fractured segment after endodontic treatment, gingivectomy and fiber post placement

b) Endodontic treatment followed by crown lengthening by gingivectomy or orthodontic extrusion followed by placement of crown

Patient opted for the reattachment of fractured segment as he was more esthetically concerned and also wanted to keep his original tooth rather than the prosthesis. So, the case was planned to be managed by reattachment of fractured segment after root canal treatment and fiber post reinforcement.

Under local anaesthesia, the mobile fractured segment was removed (Figure 5) and kept in normal saline (Figure 6). Single visit root canal treatment was done under rubber

dam isolation (Figure 8-11). During obturation, sectional method of obturation was done with resin based sealer (Epoxyseal) (Figure 11). Post space preparation was done on canal and on fractured tooth segment.(Figure 11 and 12). Esthetic fiber post No 1 was selected (Figure 13). Gingivectomy on palatal aspect was done via laser (Diode laser: Biolase) (Figure 14 a and b). Etching and bonding protocol was followed for the fiber post as well as the fractured tooth segment (Figure 15). Fiber post cementation and fractured fragment reattachment was done using dual cure resin based cement (NexCore) (Figure 17). Then a layer of composite was added on the fracture line and finishing and polishing was completed (Figure 19). Post operative instructions were given to the patient as to avoid biting hard foods from anterior teeth and to follow the basic oral hygiene measures.

For tooth wrt 21, biodentine was used as capping material (Figure 19). Then build up was done with composite (Fig 20).

On follow up visits, patient was asymptomatic with the tooth being firm, non- tender without any signs of swelling, sinus tracts. Along with this, gingival healing was found satisfactory (Figure 21 and Figure 22). Also, Electric Pulp Test was done which showed that the tooth wrt 21 was responsive.

Figure 1: Pre-Operative (Labial view)

Figure 2: Pre-Operative (Palatal view)

Figure 2: Initial IOPA

Figure 4: Mobile Fractured segment before removal

Figure 5: Fractured segment after removal

Figure 6: Fractured segment stored in Normal saline

Figure 7: Pulpal exposure visualized after fractured segment removal

Figure 8: Refined access opening with file in place for working length determination

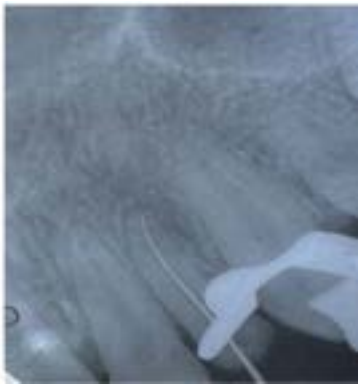

Figure 9: Working length determination

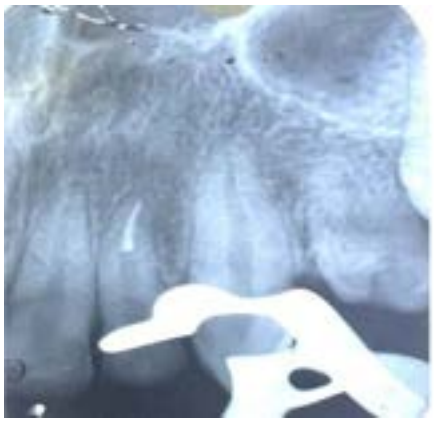

Figure 11: Sectional method of obturation and post space preparation

Figure 12: Post space preparation in fractured segment

Figure 13: Fiber post selection

Figure 14: (a) During Laser Gingivectomy
(b) Palatal aspect after gingivectomy

Figure 15: Etching and bonding for both fiber post and fractured segment

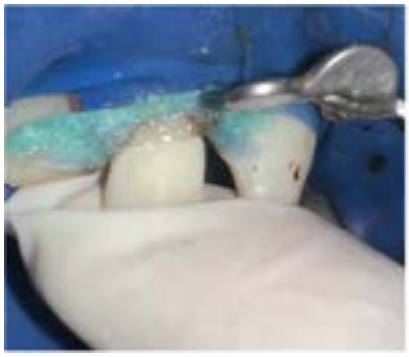

Figure 16: Fiber post cementation and reattachment of fractured segment with dure cure resin cement

Figure 17: Post- Operative Palatal view

Figure 18: Post- Operative Labial view

Figure 19: Placement of Biodentine as a capping material wrt 21

Figure 20: Composite build up wrt 21

Figure 21: Follow up after 1 month

Figure 22: Follow up after 3 months

DISCUSSION

Trauma to anterior teeth requires immediate attention due to an esthetic concern.[7] One conservative method of management of tooth is reattachment of fractured segment. The present case describes the complicated crown root fracture where the fractured segment was reattached by a multidisciplinary approach.[8] Reattachment of fractured segment has certain advantages, most of which is related to esthetics as it preserves the original shape, color, brightness, and surface texture of enamel.[9] Besides this, it is conservative, safe, simple, cost-effective and less time consuming.[1] Reattachment of fractured segments has become successful these days because of the advancements in adhesive technology.[9]

In our case, the fracture line has extended subgingivally and there was minimum encroachment on the biologic width. So we did the gingivectomy on palatal aspect and no osteotomy was needed.[5]

Rehydration of fractured segment is necessary to retain its original color translucency, and to gain adequate bond strength.[1]

Various literature suggests that the fractured segment can be reinforced with the post. We used the fiber post in our case. Fiber post was cemented with the help of dual cure resin cement. Advanatages of resin based restorative materials include suitable modulus of elasticity, enhanced esthetics, good bonding between post and cement, lower chair time, and minimal tissue removal.[5]

CONCLUSION

With the development of newer materials and the adhesive technology, the esthetic results are enhanced with the predictable outcomes. So, Reattachment can be an alternative instant remedy for the conservative management of fractured anterior tooth.[10]

REFERENCES

1. Karmacharya A, Shrestha S, Rajbhandari SM, Sapkota P, Pradhan M, Rimal G. Reattachment of Fractured Tooth Fragment: Case Series. J Kantipur Dent Coll. 2021;2(2):42-6.
2. Thapak G, Arya A, Arora A. Fractured tooth reattachment: A series of two case reports. Endodontology 2019;31(1):117-20. https://doi.org/10.4103/endo.endo_140_18
3. Divakar HD, Nayak M, Shetty R. Changing concepts in fracture reattachment of teeth-A case series. Endodontology 2009 Jan 1;21(1):48-54.
4. Patel N, Patel K, Venkataraghavan K, Madan S. Utilization of Different Management Concepts in Fractured Tooth Fragment Reattachment: A Report of Three Cases. J Contemp Dent Pract 2013;14(5):973-9.
5. Sapna CM, Priya R, Sreedevi NB, Rajan RR, Kumar R. Reattachment of fractured tooth fragment with fiber post: A case series with 1-year follow up. Case Reports in Dentistry. 2014 Nov
6. Choudhary A, Garg R, Bhalla A, Khatri RK. Tooth fragment reattachment: An esthetic, biological restoration. J Nat Sc Biol Med 2015;6(1):205-7.
7. Mojirade AD, Funmilayo AI, Olaide GS. Reattachment of Fractured Anterior Tooth: A 2-Year Review of a Case. Int J Prosthodont Restor Dent 2011;1(2):123-7.
8. Shetty P, Bhat R, Kini A. Reattachment of coronal tooth fragments: Aesthetic management of a complicated anterior maxillary crown fracture. Acta Marisiensis-Seria Medica. 2022 Sep 1;68(3):136-9.
9. Garcia FC, Poubel DL, Almeida JC, Toledo IP, Poi WR, Guerra EN, Rezende LV. Tooth fragment reattachment techniques—a systematic review. Dental Traumatology. Official Publication of International Association for Dental Traumatology. 2018 Jun;34(3):135-43.
10. Sargod SS, Bhat SS. A 9 year follow-up of a fractured tooth fragment reattachment. Contemporary clinical dentistry. 2010 Oct 1;1(4):243-5.

An Intriguing Presentation of Dentigerous Cyst

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ABSTRACT

One of the most prevalent types of developmental odontogenic cysts is the dentigerous cyst, also known as the follicular cystoften discovered in connection with the crown of an impacted permanent or supernumerary tooth. According to a prevalence study of odontogenic cysts and tumors, the dentigerous cyst registered a substantial presence at 26.7%. In this particular case, a 34-year-old female patient sought consultation due to a distressing swelling leading to facial deformity localized in the mandibular anterior region. A comprehensive assessment encompassing clinical, histopathological, and radiographic examinations was diligently conducted, revealing findings consistent with the characteristic traits associated with a dentigerous cyst.

Keywords: dentigerous cyst; impacted tooth; odontogenic cysts

INTRODUCTION

The second most commonly presented odontogenic cysts are Dentigerous cysts after Radicular cysts, and regarded as the most common developmental cyst of the jaws.[1] It is also known as follicular cyst, is caused by fluid accumulation between the reduced enamel epithelium and the enamel surface of a formed tooth and originates by separation of the follicle from around the crown of an unerupted tooth.[1] The most frequently involved teeth are mandibular third molar and maxillarycanine.[2] Young men are most commonly involved with a ratio of 1.6:1 usually associated with impacted or unerupted teeth.[1] Supernumerary teeth are associated with this cyst and constitutes only 5–6% of all dentigerous cysts. We hereby report a case of a 34-year-old female patient sought consultation due to a distressing swelling leading to facial deformity localized in the mandibular anterior region.

CASE DESCRIPTION

A 34 years old Nepalese female with a chief complaint of a hard swelling on her lower front tooth region presented to the department of Oral and Maxillofacial surgery. She was confronted with a slow progression of the swelling sincepast 1 year. There was negative history of trauma and no significant findings were delineated on her medical history.

Her extraoral inspection findings revealed facial deformity pertaining to mental region. The swelling was severe, hard in consistency, tender on palpation and was surrounded by normal skin.

According to intraoral examination, the swelling was diffuse, solitary, soft, tender, pulsatile, fluid filled, oval in shape, measuring 2x2cm, located in mandibular vestibular region. No significant elevation in temperature or purulent discharge was observed. Deciduous teeth 73 and 83 were confirmed to be retained. Teeth 31, 32, 73, 41, 42 and 83 were associated with the swelling, displaying various grades of mobility. Tooth 73 exhibited the greatest degree of mobility (Grade III). Teeth 31, 32, and 41 displayed moderate mobility (Grade II), while teeth 42 and 83 presented with slight mobility (Grade I).

Figure 1: Extraoral view

Figure 2: Intraoral views

INVESTIGATIONS

A handful of investigations were performed beginning with a radiographic inspection, an electric pulp test of associated teeth, followed by an incisional biopsy. The panoramic radiograph, suggestive of a dentigerous cyst, disclosed a large, expanding, well defined, unilocular radiolucent lesion of size approximately 2X2cm, enclosed within a well-defined radiopaque border, in relation to the anterior region of the mandible and associated with teeth 31, 32, 73, 34, 35, 41, 42, 83 and 44. The lesion is seen extending from mid-root of the impacted 43 to the apex of 34. The two horizontally impacted mandibular permanent canines 33 and 43 were seen enveloped inside the lesion. Resorption of 31, 32, 73, 41, 42, 83 were also evident.

Electric pulp testing of the involved teeth revealed that tooth 31 exhibited a normal response (responded at 4), tooth 41 exhibited a delayed response (responded at 7) and teeth 35 and 45 responded at 5. However, teeth 32, 34, 42, and 44 were non-responsive to the vitality test.

Shortly thereafter, a fine needle aspiration cytology (FNAC) of the lesion was carried out to generate more clarity into reaching a diagnosis. The aspiration revealed a clear, strawcolored fluid. Scanty epithelium was also identified during the biopsy procedure, further suggesting the likelihood of a dentigerous cyst. The sample obtained from biopsy was then sent for a histopathological examination. Hematoxylin and eosin (H&E) staining of the incisional biopsy demonstrated the following at 10x magnification: a non-keratinized, stratified squamous epithelium with an underlying connective tissue. At 40x magnification, the epithelium appeared flattened, resemblingreduced enamel epithelium. The underlying connective is composed of loosely arranged fibers with blood vessels.

Axial view of cone beam CT (CBCT) revealedhorizontally impacted mandibular canines. Radiolucency appeared more pronounced labially, resulting in expansion and thinning of labial cortical bone, while lingual cortical bone remained intact.

Figure 3: Orthopantomogram revealing a large radiolucent lesion associated with horizontally impacted permanent mandibular canines

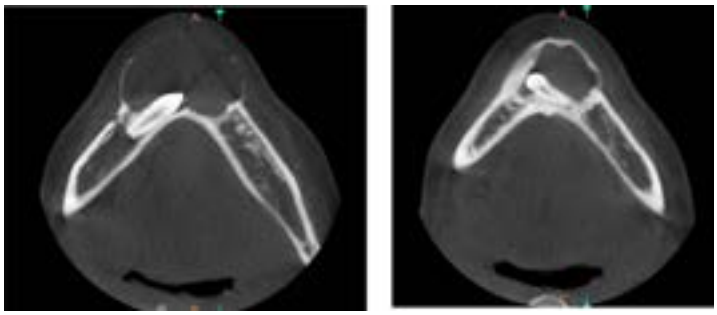

Figure 4: Axial section of CBCT identifying lesion pronounced more labially along with the impacted mandibular canines

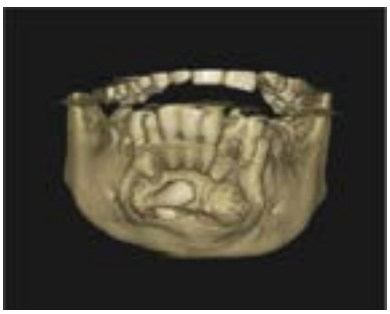

Figure 5: Frontal view of CBCT of mandible

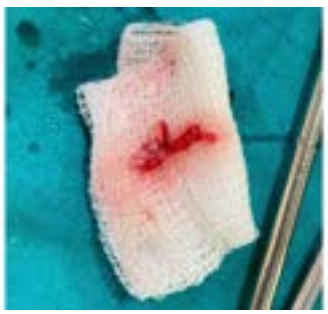

Figure 6: Specimen of Incisional Biopsy

Figure 7: Surgical site closure of incisional biopsy

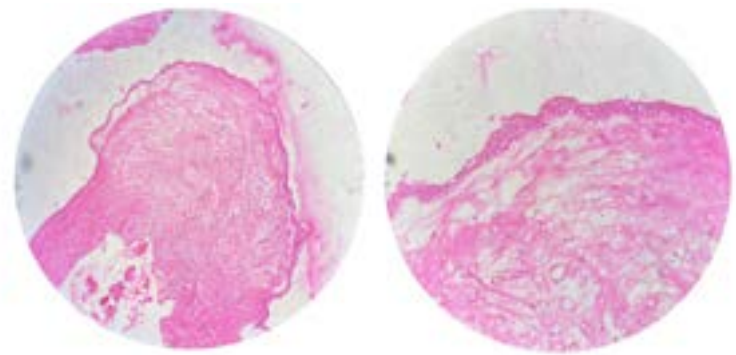

Figure 8: Histopathological examination of incisional biopsy specimen at low (10x) and high (40x) magnification

TREATMENT

Correlating clinical presentation with results of subsequent investigations, final diagnosis was established as a dentigerous cyst associated with impacted canines and retained deciduous teeth.

Therefore, enucleation of the cyst followed by extraction of the associated teeth were carried out. While teeth 34 and 44 could potentially have been preserved, the patient declined root canal therapy, necessitating their extraction as well.

Surgically enucleated specimens were further sent for a definitive histopathological examination. The microscopic evaluation under 10x revealed a non-keratinized, stratified squamous epithelium with an underlying dense bundle of connective tissue. High-power microscopic examination (40x) confirmed epithelium composed of 2-8 layers of flattened cells with areas of hyperplasia and an underlying connective tissue suggestive of dentigerous cyst.

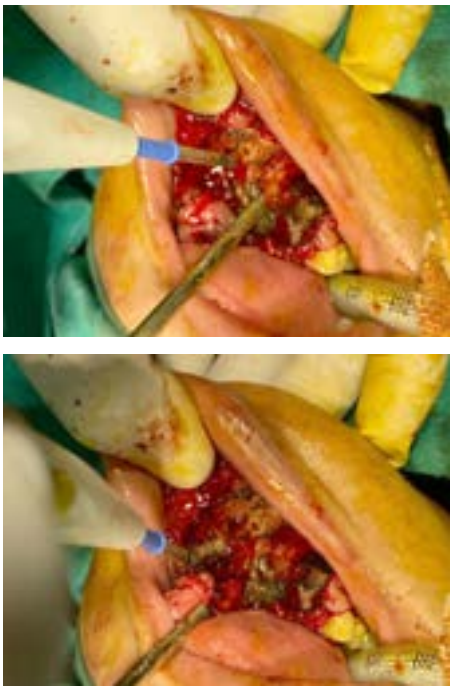

Figure 9: Cyst enucleation with concomitant extraction of associated and impacted teeth

Figure 10: Surgical wound closure following enucleation and extraction

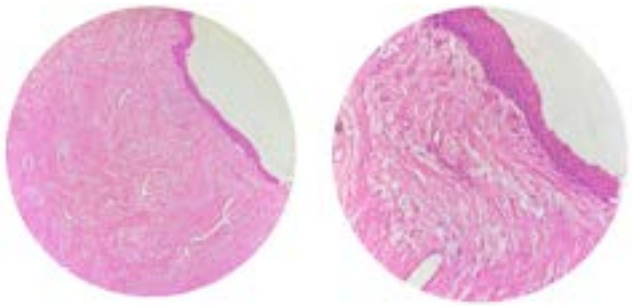

Figure 11: Histopathological examination of excisional biopsy specimen at low (10x) and high (40x) magnification

Figure 12: Follow up after 3 weeks

DISCUSSION

Cysts of jaws often manifest as a jaw swelling and are subclassified into odontogenic, non-odontogenic and pseudocysts.[1-3] Dentigerous cysts are developmental

odontogenic cysts that circumscribes and encasescrown of an unerupted tooth. The cyst attaches atcementoenamel junction (CEJ) where tooth's root and crown meet. Dentigerous cyst comprises approximately 20% of all odontogenic cysts, typically developing around 10-30 years of age. The lesion exhibits a predilection for males, especially inmandibular third molar region.[4]

In the case described in this report, probable cause of dentigerous cyst could be the horizontally impacted permanent mandibular canines. The dentigerous cyst originates from the accumulation of inflammatory fluid, a byproduct of obstructed follicular veins associated with an unerupted tooth. This fluid collects between the reduced enamel epithelium and crown of the tooth. Due to hydrostatic pressure of its contents, the cyst enlarges by a unicentric expansion.[5]

Dentigerous cysts are easily identified on radiographs due to their well defined radiolucent appearance. While X-rays offer a preliminary assessment, A CT scan proves invaluable in not only precisely pinpointing cyst's pathology and location of the impacted tooth, but also in delineating lesion's entire scope and revealing any cortical bone erosions or infiltration into neighboring soft tissues. This comprehensive information significantly helps in formulating an appropriate treatment plan.[6]

Radiographic examination reveals three distinct presentations of dentigerous cysts. The most common, the central variant, features a radiolucent area encircling solelycrown of the involved tooth, with crown itself protruding intocyst cavity. In lateral variant, cyst develops alongside root of tooth, partially enveloping crown. Finally, the circumferential variant manifests as a complete encasement of tooth by cyst, encompassing both the crown and extending down root surface such that the entire tooth resides within the cyst. This case exhibited a presentation of the circumferential variant.

Majority of dentigerous cyst require enucleation along with extraction of impacted teeth as treatment.[7] In this case, teeth associated with the swelling necessitated extraction due to their poor prognosis. Marsupialization is advocated for larger cysts when a solitary drainage procedure may prove inadequate and complete excision of adjacent structures isn't deemed preferable.[8] In case of large cyst, Scolozzi et. al recommended enucleation followed by immediate implantation of bone graft materials.[9] On rare occasions, dentigerous cyst may undergo malignant transformation into squamous cell carcinoma, mucoepidermoid carcinoma or even ameloblastoma.[10] Cysts that are diagnosed histopathologically usually bear an excellent prognosis, with recurrence manifesting infrequently.[11]

CONCLUSION

The management of dentigerous cyst epitomizes a multidisciplinary approach, consisting of precise diagnosis, meticulous surgical intervention achieved through enucleation and removal of the involved impacted and non-salvageable affected teeth alongside a proper histopathological confirmation. Long term follow up is crucial to monitor for potential recurrence and to ensure a sustained oral health.

REFERENCES

1. Shah KM, Karagir A, Adaki S, Pattanshetti C. Dentigerous cyst associated with an impacted anterior maxillary supernumerary tooth. BMJ Case Rep. 2013 Jan 31;doi: 10.1136/bcr-2012-008329.
2. Freitas DQ, Tempest LM, Sicoli E, Lopes-Neto FC. Bilateral dentigerous cysts: review of the literature and report of an unusual case. Dentomaxillofacial Radiology. 2006 Nov;35(6):464-8.
3. Wong T, Yap T, Wiesenfeld D. Common causes of 'swelling'in the oral cavity. Australian Journal of General Practice. 2020 Sep;49(9):575-80.
4. Thompson LD. Dentigerous cyst. Ear, Nose & Throat Journal. 2018 Mar;97(3):57-.
5. Browne RM. The pathogenesis of odontogenic cysts: a review. J Oral Pathol. 1975 Jul;4(1):31-46. doi: 10.1111/j.1600-0714.1975.tb01738.x.
6. Mohan KR, Natarajan B, Mani S, Sahuthullah YA, Kannan AV, Doraiswamy H. An infected dentigerous cyst associated with an impacted permanent maxillary canine, inverted mesiodens and impacted supernumerary teeth. J Pharm Bioallied Sci. 2013 Jul;5(Suppl 2):S135-8. doi: 10.4103/0975-7406.114307.
7. Giancotti A, Grazzini F, De Dominicis F, Romanini G, Arcuri C. Multidisciplinary evaluation and clinical management of mesiodens. The Journal of clinical pediatric dentistry. 2002 Jan 1;26(3):233-7.
8. Scolozzi P, Lombardi T, Richter M. Upper lip swelling caused by a large dentigerous cyst. European Archives of Oto-Rhino-Laryngology and Head & Neck. 2005 Mar;262:246-9.
9. Leider AS, Eversole LR, Barkin ME. Cystic ameloblastoma: a clinicopathologic analysis. Oral surgery, oral medicine, oral pathology. 1985 Dec 1;60(6):624-30.
10. Hasan S, Ahmed SA, Reddy LB. Dentigerous cyst in association with impacted inverted mesiodens: Report of a rare case with a brief review of literature. International Journal of Applied and Basic Medical Research. 2014 Sep 1;4(Suppl 1):S61-4.
11. Neville BW, Damm DD, Allen CM, Bouquot JE. Odontogenic cysts and tumors. Oral and maxillofacial pathology. 2002;3:678-740.

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Author Guideline

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