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Contents

Evidence Based Dental Practice

Dr Sujita Shrestha
Chief Editor

Dentistry is one of the important health care professions and dental practice should be based on an ethical obligation to protect patient health. Dental health care has transformed into a multifaceted and committed to science over the last decades. Advancement in new techniques and materials have added great amount of scientific knowledge in the field of dentistry. Advances in information communication technology have enabled practitioners and patients to obtain information at the fingertips. It has created the challenges for dental practitioner to understand, evaluate and integrate the new information into their daily clinical practice. Thus, FDI has endorsed Evidence Based Dentistry (EBD) because it helps dental surgeons to interpret and apply the best available evidence-based approach in clinical practice and oral healthcare.

Evidence based practice (EBP) is a process of making clinical decisions based upon evidence combined with clinical experience and patients expectations. EBP is applying or translating research findings in daily patient care, clinical practice and decision making. Evidence based dental practice integrates the use of the best available evidence, clinicians' expertise and patients' needs and preferences to inform decision making in clinical practice.

The integration of three components; best research evidence with clinical expertise and patient values will help to improve patients' outcome. The integration can be effectively achieved by '5A'; Ask, Acquire, Appraise, Apply and Assess. Niederman and Badovinac have identified five steps in the evidence based dental practice; 1) Converting required clinical information into an answerable question 2) Using electronic databases to find available evidence 3) Critically appraising the evidence for validity and importance 4) Integrating the appraisal with the patient's perceived needs and applying these results in clinical practice 5) Evaluating own performance. Evidence based practice provides an approach to collect and analyze scientific evidence systematically to answer a specific clinical question in oral health.

Evidence based dental practice provides an opportunity to synthesize and understand the research findings in a simple and authoritative manner. It helps to make clinical decision based on best available evidence, recent and advanced research. Dental practitioners, dental educators and dental students need to be aware on evidence based dental practice since variability and uncertainty are integral part of any clinical practice. Thus, evidence based practice is regarded as the gold standard in health care delivery worldwide as it uses resources more effectively and improves clinical practice.

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Assessment of Developmental Anomalies in Permanent Dentition: An Orthopantomographic Study

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ABSTRACT

Introduction: Developmental dental anomalies are abnormal morpho-differentiation of teeth that occur during different stages of tooth development. Deviations may occur in terms of tooth size, number, shape, position, and structure. Failure to diagnose these anomalies tends to complicate the treatment procedure, may cause permanent tooth loss or damage.

Objective: To determine the prevalence of developmental dental anomalies in permanent dentition utilizing panoramic radiographs of the referred patients.

Materials & Method: A total of 840 digital orthopantomograms (OPG) with equal frequency of gender aged 13 to 42 years (mean 25.7±6.97) were obtained from Kantipur Dental College and Hospital. The selected OPGs were evaluated for dental anomalies such as fusion, gemination, dilaceration, taurodontism, hypodontia, microdontia, macrodontia, supernumerary tooth, supernumerary root, etc. The comparison among gender, dental arches, and sides were evaluated.

Result: The total prevalence of developmental anomalies in the study was 56.19% (472 out of 840). The fused root had highest prevalence of 132 (15.7%) followed by hypodontia 111 (13.2%), dilaceration 80 (9.5%), microdontia 69 (8.2%) and supernumerary roots 21 (2.5%).

Conclusion: This study shows the prevalence of various dental anomalies in permanent dentition of the Nepali sample with the fused root showing the highest prevalence. Anomalies like hypercementosis, microdontia, supernumerary tooth, and supernumerary root showed statistically significant association with the type of arch. There was a significant association between the gender with fused root and supernumerary root.

Keywords: Dental anomalies, panoramic, prevalence.

INTRODUCTION

Dental anomalies are abnormal morpho-differentiation of teeth during different stages of tooth development. They are usually attributed to congenital, developmental, or acquired factors during prenatal and postnatal periods that may result in alterations in tooth shape, size, number, position, and structure. [1] Alteration in the morphology of teeth includes double teeth (fusion and gemination), concrescence, dilaceration, dens evaginatus, and dens invaginatus. Variations in the size of teeth comprise microdontia and macrodontia. Deviation in terms of number of teeth involves hypodontia and hyperdontia or supernumeraries.[2]

Morphological anomalies can affect aesthetic appearance and can cause psychological problems to the patient. They can lead to occlusal disturbances due to crowding, spacing, or irregular morphology. Caries and periodontal problems can occur due to the presence of deep grooves on the surface, which can spread to the pulp leading to the endo-perio lesion.[3]

Orthopantomogram radiographs are routinely used to evaluate the whole dentition which allows the assessment of anomalous conditions. Early diagnosis of dental anomalies allows comprehensive treatment planning, less extensive intervention, and better prognosis.

The present study aimed to determine the prevalence of developmental dental anomalies in permanent dentition of the patients referred to Kantipur Dental College and Hospital, Kathmandu. The study also compared the findings of dental anomalies with the variables gender, dental arch, and arch-side.

MATERIALS AND METHODS

The cross-sectional, retrospective study consisted of 840

digital panoramic radiographs with equal distribution of males and females. The sample size was calculated based on the prevalence of anomalies in the Saudi Arabian sample by using the formula $N=z^2pq/e^2$, where z=1.96 at 95 % confidence interval; the value of p was 45.1%. [1] The OPGs were obtained from the archives of the Department of Oral Medicine and Radiology, Kantipur Dental College and Hospital, Kathmandu. Ethical approval was obtained from the Institutional Review Committee of Kantipur Dental College before conducting the research. The study was carried out from June to October 2021. A Performa sheet was developed to enter the data. Inclusion criteria were subjects aged between 13-40 years with a good quality panoramic image not considering the third molars. Patients who had previous orthodontic treatment, surgery, prosthetic treatment, any signs of trauma, or jaw fractures that might have affected the normal growth were excluded from the study.

Digital OPGs were examined in a standard manner under standardized screen brightness, and resolution to determine the dental anomalies. The selected radiographs were reviewed for the dental anomalies and three obvious categories were analyzed. Anomalies of tooth shape included fusion, gemination, concrescence, dilaceration, dens evaginatus, dens invaginatus, taurodontism, and hypercementosis. Variation in tooth size included microdontia, macrodontia along with variation in root size (rhizomicri, rhizomegaly). Variation in the number of teeth involved hypodontia, hyperdontia, supernumerary tooth, and supernumerary roots. Standardization was done by a qualified Oral Pathologist (Co-investigator) to eliminate inter-examiner discrepancies and to confirm the findings. Data were collected on a performa sheet, which was transferred to an MS-Excel. The data were verified and analyzed statistically using Statistical Package for Social Sciences (SPSS Version 20). Data was analyzed comparing males and females. The association between the groups and anomalies was tested using the Chi-squared test. McNemar's test was applied for arch-wise and side-wise comparison of data. The level of significance was considered at $p < 0.05$.

RESULTS

The samples ranged in age from 13 to 40 years with the mean age of 25.7±6.96. Total anomalies recorded were 472 out of 840(56.19%) samples. Of all the OPGs examined, 307(36.5%) had at least one dental anomaly, 68(18.1%) had two anomalies and 9(1.1%) had more than two anomalies. The most common dental anomaly was fusion of root (15.7%), followed by hypodontia (13.2%), dilaceration (9.5%), microdontia (8.2%), supernumerary root (2.5%), rhizomicri (2.1%), hypercementosis (1.7%), supernumerary tooth (1.3%), rhizomegaly (0.6%) taurodontism (0.5%), macrodontia (0.4%) fusion of crown (0.2%), bifid root (0.1%) and dens invaginatus (0.1%). No cases of gemination and concrescence were observed.

Table 1 demonstrates the distribution of different developmental anomalies according to the tooth type. Table 2 depicts the arch-wise and side-wise distribution of samples with developmental anomalies on tooth shape, size, and number. There was a statistically significant association between hypercementosis (p-value 0.01),

Table 1: Distribution of dental anomalies on tooth type

Dental anomaly		Central Incisor (n=3360)	Lateral Incisor (n=3360)	Canine (n=3360)	1st Premolar (n=3360)	2nd Premolar (n=3360)	1st Molar (n=3360)	2nd Molar (n=3360)	Total (N=23520)
Shape	Fusion crown	3 (0.09)	-	-	-	-	-	-	3
	Fusion root	2 (0.06)	1 (0.03)	-	-	6 (0.18)	13 (0.39)	211 (0.63)	233
	Dilaceration	3 (0.09)	9 (0.27)	8 (0.24)	8 (0.24)	30 (0.89)	16 (0.48)	48 (1.43)	122
	Taurodontism	-	-	-	-	-	5 (0.15)	10 (0.29)	15
	Hypercementosis	-	-	1 (0.03)	-	-	11 (0.33)	4 (0.12)	16
	Dens invaginatus	-	1 (0.03)	-	-	-	-	-	1
Size	Microdontia	28 (0.83)	85 (2.52)	10 (0.29)	9 (0.27)	10 (0.29)	12 (0.36)	10 (0.29)	164
	Macrodontia	2 (0.06)	-	1 (0.03)	-	-	-	-	3
	Rhizomicry	10 (0.29)	-	3 (0.09)	2 (0.06)	3 (0.09)	2 (0.06)	4 (0.12)	24
	Rhizomegaly	-	-	1 (0.03)	-	-	5 (0.15)	-	6
Number	Hypodontia	25 (0.74)	34 (1.01)	11(0.32)	19 (0.57)	23 (0.68)	36 (1.07)	17 (0.51)	165
	Supernumerary root	2 (0.06)	-	1 (0.03)	-	4 (0.12)	14 (0.42)	2 (0.06)	23
	Bifid root	-	-	-	1 (0.03)	-	-	-	1

Table 2: Arch-wise and side-wise comparison of dental anomalies

Dental anomaly		Maxilla (n=840)	Mandible (n=840)	p-value	Right (n=840)	Left (n=840)	p-value
Shape	Fusion crown	1 (0.1)	1 (0.1)	>0.99	-	2 (0.2)	0.50
	Fusion root	70 (8.3)	82 (9.8)	0.29	94 (11.2)	107 (12.7)	0.13
	Dilaceration	50 (6.0)	33 (4.4)	0.16	51 (6.1)	44 (5.2)	0.46
	Taurodontism	2 (0.2)	4 (0.5)	0.50	4 (0.5)	4 (0.5)	>0.99
	Hypercementosis	2 (0.2)	12 (1.4)	0.01*	10 (1.2)	6 (0.7)	0.39
	Dens invaginatus	1 (0.1)	-	>0.99	-	1 (0.1)	>0.99
Size	Microdontia	63 (7.5)	10 (1.2)	<0.001*	46 (5.5)	52 (6.2)	0.43
	Macrodontia	3 (0.4)	-	0.25	2 (0.2)	3 (0.4)	>0.99
	Rhizomicri	10 (1.2)	9 (1.1)	>0.99	13 (1.5)	10 (1.2)	0.58
	Rhizomegaly	1 (0.1)	4 (0.5)	0.38	3 (0.4)	3 (0.4)	>0.99
Number	Hypodontia	55 (6.5)	68 (8.1)	0.228	70 (8.3)	68 (8.1)	0.913
	Supernumerary tooth	17 (2.0)	1 (0.1)	<0.001*	7 (0.8)	8 (1.0)	>0.99
	Supernumerary root	1 (0.1)	20 (2.4)	<0.001*	14 (1.7)	9 (1.1)	0.359

* Significant at $p < 0.05$

Table 3: Genderwise comparison of dental anomalies

Dental anomaly		Male (n=420)	Female (n=420)	Total (n=840)	p-value
Shape	Fusion crown	1 (0.2)	1 (0.2)	2 (0.2)	>0.99
	Fusion root	55 (13.1)	77 (18.3)	132 (15.7)	0.04*
	Dilaceration	45 (10.7)	35 (8.3)	80 (9.5)	0.24
	Taurodontism	2 (0.5)	2 (0.5)	4 (0.5)	>0.99
	Hypercementosis	6 (1.4)	8 (1.9)	14 (1.7)	0.59
	Dens invaginatus	1 (0.2)	0 (0)	1 (0.1)	>0.99
Size	Microdontia	32 (7.6)	37 (8.8)	69 (8.2)	0.53
	Macrodontia	1 (0.2)	2 (0.5)	3 (0.4)	>0.99
	Rhizomicri	11 (2.6)	7 (1.7)	18 (2.1)	0.34
	Rhizomegaly	1 (0.2)	4 (1.0)	5 (0.6)	0.37
Number	Hypodontia	50 (11.9)	61 (14.5)	111 (13.2)	0.26
	Supernumerary tooth	5 (1.2)	6 (1.4)	11 (1.3)	0.76
	Supernumerary root	16 (3.8)	5 (1.2)	21 (2.5)	0.02*
	Bifid root	1 (0.2)	-	1 (0.1)	>0.99

microdontia, supernumerary tooth, supernumerary root (p-value <0.001) with the type of arch. There was no significant association between the arch and the rest of the developmental anomalies. Similarly, none of the dental anomalies showed significant association with the side of the dentition.

Table 3 shows a genderwise comparison of samples with developmental anomalies. There was a statistically significant association between gender and fused root (p-value 0.04) and supernumerary root (p-value 0.02). There was no significant association between gender and other developmental anomalies.

DISCUSSION

The prevalence of developmental anomalies in the present study was 56.19% which is comparable with the findings on the Brazilian population by Goncalves-Filho et al (56.9%).[4] It is higher than the results of Goutham et al (35.27%) on Indian[5] and Vani et al (37.8%) on Saudi samples.[6] In a study conducted by Gupta et. al on Nepali orthodontic patients, the prevalence of dental anomalies was 15.3%, which is quite less as compared to the present study.

Fused root was the most common anomaly recorded

in 132(15.7%) cases with more occurrence in female 77(18.3%) as compared to male 55(13.1%) samples. It was commonly observed in the second molar and least in lateral incisors. This anomaly was more common in the mandible as compared to the maxilla. The fused root is one of the important factors to be considered while performing endodontic procedures in the molar region. The fused root may pose a C-shaped canal configuration which may cause difficulty in biomechanical preparation and require a thermo-plasticized obturation technique during endodontic treatment.[8]

Dilacerations arise secondary to trauma during tooth formation that creates an angle between the tooth germ and the developed tooth portion. It may also occur due to the pressure from adjacent cyst, tumor, or odontogenic hamartoma. Maxillary incisors are more commonly affected followed by the mandibular anterior. Dilaceration can cause delayed eruption, apical fenestration of buccal or labial cortical plate, and difficulty during root canal therapy and tooth extraction. Early recognition of preoperative radiographs can minimize such problems.[9,10] In the present study, dilacerations of the roots comprised 9.5% of the anomalies which is higher than in the population of Saudi Arabia.[1] It was more common in maxilla and on the right side with a higher occurrence in males. Second molar roots were the most dilacerated and central incisors were the least. Higher prevalence in the posterior teeth may be due to idiopathic developmental disturbance during the calcification of tooth germ.[11]

In this study, taurodontism was observed in 4(0.5%) samples. It is less than the result of Guttal et. al (18%) seen in the Indian population.[12] Teeth affected by taurodontism shows features like elongated pulp chamber and apical displacement of bi- or tri-furcation of the roots. Variations in size and shape of the pulp chambers and canal configuration can lead to challenges during endodontic treatment.[13] It may cause difficulty in visualizing the pulpal floor and negotiate pulp canal, and the debridement of the pulp tissue is time-consuming.[14]

Hypercementosis was observed in 14(1.7%) samples with more occurrence in the mandible. It is the excessive deposition of non-neoplastic cementum on the roots. This may affect the success of root canal treatment as it is difficult to determine the apical limit which is the Cemento-dentinal junction. [15]

Dens invaginatus is the infoldings of the enamel into the dentin. It presents as a pit or fissure on the lingual surface of anterior teeth providing favorable conditions for the spread of dental caries. They are mostly located in the maxilla and lateral incisors; with the prevalence rate varying from 0.25 to 5.1% as cited by Mupparapu et.al .[16] In our study, the prevalence of dens invaginatus is 0.1%; only one male sample showed dens invaginatus in the maxillary left lateral incisor.

Microdontia commonly affects maxillary lateral incisors and third molars. It is characterized by a reduction in mesiodistal diameter and convergence towards the incisal edge, which is known as peg-shaped incisors. In our study, microdontia was more common in lateral incisors (2.52%). In total, microdontia was present in 69(8.2%) samples, which is higher as compared to 2.16% observed in the study by Gupta et.al.[7] Macrodontia was seen in 4(0.4%) cases and it was more common in the maxillary arch. Rhizomicri was observed in 18(2.1%) and rhizomegaly was observed in 5(0.6%) samples. Clinically, the tooth with smaller roots (rhizomicri) cannot be used as anchorage and abutment, and longer sized endodontic instruments are required while performing root canal treatment in rhizomegaly conditions. Previously, Kumar et al has reported an upper canine root length as long as 48 mm.[17]

Missing teeth can cause unfavorable appearance, malocclusion, drifting of teeth, insufficient alveolar bone growth, decreased chewing ability, inarticulate pronunciation, etc.[18] In this study, second most prevalent anomaly was hypodontia with the occurrence of 111(13.2%) cases, which was more common in females (14.5%). The most commonly missing teeth were first molars (1.07%) followed by lateral incisors (1.01%), central incisors (0.74%), and second premolars (0.68%). In a study among orthodontic patients in Nepal, maxillary lateral incisors were commonly missing teeth (48.61%) followed by mandibular lateral incisors.[7] In the present study, there was no relevant evidence regarding whether the teeth were congenitally missing or missing due to other reasons. Thus there could be an overestimation of the missing teeth espicially the first molars.

Supernumerary teeth included 11(1.3 %) of the anomalies which was more common in the maxilla. Among them, the most common supernumerary tooth was distomolaris (50%), followed by mesiodens (31.8%) and paramolaris (18.2%). In a study conducted by Limbu et. al out of 40 subjects with mesiodens in 1871 Nepali children, mesiodens was more prevalent in permanent dentition(81.1%) as compared to deciduous dentition (18.9%).[19] In this study, supernumerary roots were present in 21(2.5%) samples which were more common in mandibular first molar (radix

entomolaris). One (0.2%) male patient possessed a bifid root in the lower left first premolar.

CONCLUSION

This study provides an overview regarding the prevalence of dental anomalies in the permanent dentition of the Nepali population sample. In the order of occurrence, fused roots were the most prevalent anomaly followed by hypodontia, dilaceration, and microdontia. Whereas, bifid roots, fused crown, and dens invaginatus were the least common findings. Statistically, a significant association was found between anomalies like hypercementosis, microdontia, supernumerary tooth, and supernumerary root with the type of the dental arch. There was a significant association between the gender with fusion root and supernumerary root. Early identification of anomalies helps in the treatment planning with esthetic and functional rehabilitation. The findings from this study suggest that the orthopantomogram acts as a valuable tool to diagnose dental anomalies.

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Estimation of Point A by Three Different Cephalometric Methods

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ABSTRACT

Introduction: Manual tracings of lateral cephalogram are routinely used in orthodontic practice. The process involves precise identification and tracing of anatomic landmarks. However, certain landmarks like point A, are frequently obscured due to soft-tissue shadow or poor radiographic contrast. The alternate points described in the literature to estimate point A are insufficient to draw reliable data for clinical. The objective of the study is to estimate the reliability of alternate points to point A for precise cephalometric tracing.

Materials and Method: Lateral cephalograms of 72 patients (34 males and 38 females) were selected from pre-treatment records of skeletal Class I patients visiting Kantipur Dental College Hospital, Kathmandu. Three alternative points to Point A were constructed manually in a lateral cephalogram as A_X (Jacobson and Jacobson), A_Y (Tindlund *et al*) and A_Z (Bongaarts *et al*). The angular measurements of SNA, SNA_X, SNA_Y and SNA_Z were calculated. The normality of distribution of data was assessed using Shapiro-Wilk test. The difference between the SNA angle and the three alternate angles: SNA_X, SNA_Y and SNA_Z were compared using Mann-Whitney U test.

Result: The means of samples were calculated as SNA: 81.50±3.39°, SNA_X: 81.90±3.30°, SNA_Y: 82.25±3.23°, and SNA_Z: 85.22±3.48°. There was no significant difference between SNA-SNA_X and SNA-SNA_Y ($p>0.05$). However, there was a statistically significant difference between SNA-SNA_Z ($p<0.05$).

Conclusion: The alternate pointsA_X and A_Y as described by Jacobson and Jacobson (1980) and Tindlund *et al*(1993) were found to be reliable and could be used when Point A was obscured.

Keywords: Lateral cephalogram; Point A; Skeletal malocclusion.

INTRODUCTION

Lateral cephalograms are routinely used in orthodontic practice for diagnosis and treatment planning, estimation of growth, treatment progress and evaluation of final outcome.[1] In manual technique, the cephalogram istraced, marked for landmarks and cephalometric analyses are performed. As a two-dimensional projection, certain landmarks may be concealed due to soft-tissue overshadow, disparity in the skeletal structures or poor radiographic film.[2] Point A or subspinale is among these landmarks prone to become obscured.

Anthropologically, Downs defined point A as the deepest midline point on the premaxilla between ANS and prosthion.[3,4] It is a reference point to determine sagittal skeletal relationship of the jaws.[3] The ANB angle stated by Reidel (1952) which relates the jaw to anterior cranial base also depends upon proper identification of point A.[5] The findings of the Second Research Workshop on Roentgenographic Cephalometrics also stated that point A as defined by Downs was more appropriate.[4]

Few authors have described alternative point to point A. Jacobson and Jacobson (1980) described a point 3 mm labial to the long axis of root of maxillary central incisor as an alternative to point A.[6] Tindlund et al (1993) utilized a constructedmaxillary point (max P) on anterior maxilla instead of point A.[7] Bongaarts et al (2008) used a point in reference to prosthion and palatal plane.[8]

The objective of this study was to estimate the reliability of the alternate points given by Jacobson and Jacobson, Tindlund et al and Bongaarts et al for precise cephalometric tracing.

MATERIALS AND METHOD

A cross-sectional study was conducted at Kantipur Dental College Teaching Hospital and Research Center during October 2020 to December 2020.The ethical clearance

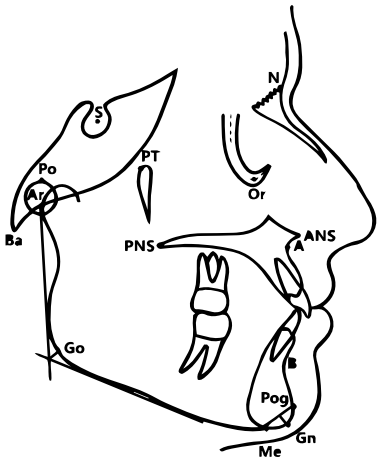


Figure 1: Cephalometric landmarks

was taken from the Institutional Review Committee, Kantipur Dental College.

The sampling technique was convenient sampling. Sample size was determined as 65 using the data from the study of Gupta et al.[9] When 10% of permissible error was added, the total sample size was 72 (i.e.,65+6.5). Subjects above 13 years of age with fully erupted permanent maxillary anterior teeth, skeletal Class I jaw relationship and ANB angle 0º to 4º were taken in the study.

The radiographs with shadow that would obscure the identification of point A were not included in the study. The radiographs of patients with previous history of orthodontic and dentofacial orthopedic treatments, missing/malformed permanent tooth germ, cleft anomaly or other craniofacial malformations with gross deformities were excluded.

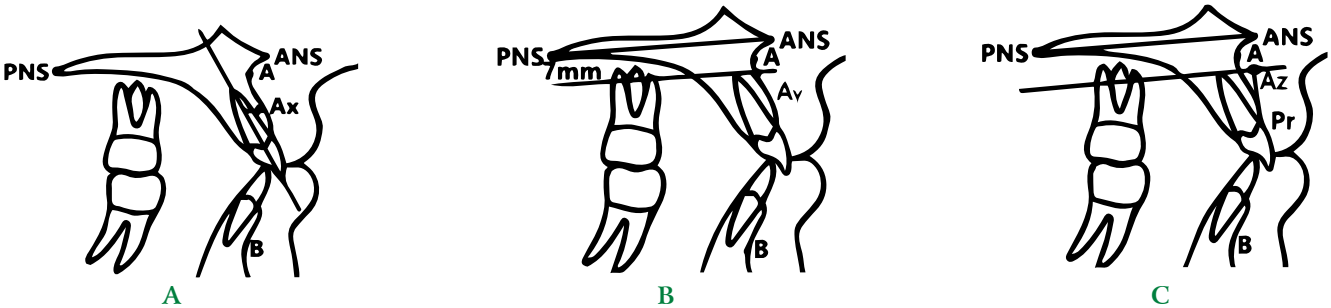
Lateral cephalograms of 34 male and 38 female samples were used to measure the angular parameters in the study. Manual tracing was done on a view box with a 2B pencil on transilluminated light. The landmark points were marked as shown in Figure 1.

Landmarks:

1. Sella (S): Center of pituitary fossa, the geometric center of the sella turcica
2. Nasion (N): Most anterior point of frontonasal suture in the midsagittal plane
3. Orbitale (Or): Lowest point on the inferior rim of the orbit
4. Anterior nasal spine (ANS): Anterior tip of the sharp bony process of maxilla at the lower margin of anterior nasal opening
5. Posterior nasal spine (PNS): Posterior spine of the palatine bone constituting the hard palate
6. Point A/ Subspinale (A): Most posterior midline point in the concavity between ANS and prosthion
7. Point B/ Supramentale (B): Point at the deepest midline concavity on the mandibular symphysis between infradentale and pogonion
8. Prosthion (Pr): Point of the maxillary alveolar process in the midline that projects most anteriorly

The alternate points were marked as follows:

1. Point A alternative 1, A_X: Point plotted 3 mm labial to a point between the upper third and lower twothirds of the long axis of the root of the maxillary central incisor (Jacobson and Jacobson) - Figure 2A
2. Point A alternative 2, A_Y: Point formed by the intersection between a line parallel to the plane joining ANS and PNS (palatal plane), 7 mm below, and the anterior contour of the maxilla (Tindlund et al) - Figure 2B
3. Point A alternative 3, A_Z: Projection of point Pr on a line parallel to the palatal plane, 7 mm below the palatal plane(Bongaarts et al) - Figure 2C



A B C

Figure 2: A. Point A alternative 1, A_X which is 3 mm labial from a point at upper 1/3rd and lower 2/3rd of the long axis of root of maxillary central incisor, B. Point A alternative 2; A_Y formed as an intersection of anterior maxilla and a line parallel to and 7 mm below the palatal plane, C. Point A alternative 3; A_Z, a point 7 mm below the palatal plane projected perpendicular from prosthion.

The angles were measured as follows:

1. ANB: Sagittal skeletal relation of the maxilla and mandible
2. SNA: Anteroposterior position of point A in relation to the plane joining Sella and Nasion (anterior cranial base)
3. SNA_X: Anteroposterior position of point A_X in relation to the anterior cranial base
4. SNA_Y: Anteroposterior position of point A_Y in relation to the anterior cranial base
5. SNA_Z: Anteroposterior position of point A_Z in relation to the anterior cranial base

Statistical analyses were performed using SPSS V21. The descriptive statistics were calculated and Shapiro Wilk test was used to analyze the normal distribution of data. Mann-Whitney U test compared the differences of SNA with SNA_X, SNA_Y, SNA_Z.

RESULT

The mean, standard deviation, standard error of mean and range of the measured parameters are given in Table 1. The measurements showed SNA: 81.50±3.39°, SNA_X:81.90±3.30°, SNA_Y: 82.25±3.23°, and SNA_Z: 85.22±3.48°. The data were not normally distributed when analyzed from Shapiro-Wilk test. Mann-Whitney U test showedthat there was a significant difference between SNA and SNA_Z. However, significant differences were not present whenSNA was compared withSNA_X and SNA_Y (Table 2).

DISCUSSION

The study of Tindlund et al and Bongaarts et alwere performed on lateral cephalograms of cleft patients.[7-8] Since the cleft patients had defect in the point A region, the alternate points relating the anterior maxilla, palatal plane and prosthion were utilized for cephalometric analyses. In the present study, the radiographs of skeletal Class I malocclusion without any anomalies were taken to evaluate whether there is any difference among the point A and alternate points.

According to the present study, there was a significant difference between Point A-A_Z but not among A-A_X and A-A_Y when angular measurements were compared.The point A_X was measured from the long axis of the root of maxillary central incisor. The proclination of incisor affects the position of point A. It might be the reason for insignificant difference between A and A_X. Similarly, the point A_Y is taken in reference to palatal plane formed by line joining ANS and PNS. The position of ANS have been found to affect the location of point A in vertical and anteroposterior plane.[10] Thus, the results might have shown A_Y as a reliable point. However, the point A_Z showed more forward position than point A when projected from prosthion which might be the reason behind the difference.

A study by Singh and Shivaprakash examined the reliability of these three points in vertical and horizontal relations.[11] Their result showed that the alternate point by Tindlund et al[7] was more reliable than other two methods. However, the present study showed that the alternate points as

Table 1: Descriptive statistics of parameters (in degrees)

Angles	Mean	SD	SEM	Range
SNA	81.50	3.38	0.39	73.50-86.50
SNA_X	81.90	3.30	0.38	76-88
SNA_Y	82.25	3.23	0.38	75.50-88.50
SNA_Z	85.22	3.48	0.41	78.50-92.50

Table 2: Mann-Whitney U test of the parameters (in degrees)

Group	Mean	Mean Rank	*p*-Value
SNA	81.50	70.67	0.597
SNA_X	81.90	74.33	
SNA	81.50	68.12	0.207
SNA_Y	82.25	76.88	
SNA	81.50	53.42	0.000*
SNA_Z	85.22	91.58	

*$p<0.05$ (significant)

described by Jacobson and Jacobson and Tindlund et al, were reliable. The difference in the results of point A_x (Jacobson and Jacobson) with our study might be due to population variation and sample size difference.

Patel et al compared the nearest alternative maxillary apical base landmark for point A substitution.[12] Their result showed that point A described by Jacobson and Jacobson closely approximated the point A which is in agreement with this study.

The alternate points to Point A are prone to measurement errors during tracing and digitization. Hence, the result of the studies should be interpreted with caution.[8] This study has a limitation as is based on a two-dimensional radiograph and manual tracing.

CONCLUSION

The alternate points to Point A as described by Jacobson and Jacobson (1980) and Tindlund et al (1993) were found to be reliable and could be used when Point A was obscured. The alternate point as described by Bongaarts et al (2008) overestimated the value of Point A and could not be alternatively used in Nepali samples.

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Histopathological Variations in Ameloblastoma – Cases in a Tertiary Care Center of Nepal

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ABSTRACT

Introduction: Ameloblastoma is a benign, slow-growing but locally aggressive epithelial odontogenic tumor with a male predominance in the third decade of life and mandible being the preferred site. The 2017 World Health Organization (WHO) classification divided ameloblastoma into three categories: conventional, unicystic, and peripheral. Histologically, the conventional type can be further divided into follicular, plexiform, acanthomatous, and granular cell morphological patterns; other less common histological variants are clear cell, basal cell and desmoplastic; while unicystic type presents three histological subtypes: luminal, intraluminal, and mural. The biological behavior of conventional ameloblastoma and the mural variant of unicystic ameloblastoma are considered more aggressive due to their higher incidence of recurrence.

Objective: The present study aims to clarify demographic and histopathological variations among Nepalese subjects and also find out the relationship between age, gender, and site of lesion with histological subtypes.

Materials and Method: Histopathologically diagnosed cases of ameloblastoma retrieved from the Department of Oral Pathology, reported between 2072 and 2077 were selected for the study. Formalin-fixed, paraffin-embedded tissue samples were stained with hematoxylin and eosin and were observed under the microscope. Slides were classified according to the World Health Organization of Odontogenic Tumors (2017). Patients' details considering age, gender, site of the lesion, and histological types of ameloblastoma were further analyzed.

Result: Out of 33 cases of ameloblastoma, 29(87.9%) were conventional type, the predominant histopathological pattern being plexiform 17(51.5%) followed by follicular 6(18.2%).The patient's age ranged from 14 to 65 years(mean, 29.24 years). There was male predilection 19(57.6%) and the posterior mandible 23(69.70%) was commonly affected. Chi-square test revealed there was no significant association of ameloblastoma with age, gender, or location ($p>0.05$).

Conclusion: These data may serve as baseline information on the occurrence of various histopathological types of ameloblastoma in Nepalese subjects along with the information of basic epidemiological features.

Keywords: ameloblastoma; follicular; odontogenic tumors; plexiform

INTRODUCTION

Ameloblastoma ("amel," meaning enamel, and, "blastos", meaning germ) is a benign, slow-growing yet locally aggressive epithelial odontogenic tumor.[1] This was termed as Adamantinoma in 1885 by Louis-Charles Malassez.[2] In 1930, Ivey and Churchill devised the term Ameloblastoma, considered it as a true neoplasm because of the resemblance with the cells of the enamel-forming organ.[3]The global incidence rate was estimated to be 0.92 per million population per year, with a male predominance and the peak age of incidence in the third decade of life. Mandible is the preferred site.[4] This tumor ranks as the most common odontogenic tumor in Asia and Africa.[5]

World Health Organization (WHO) defines it as locally invasive polymorphic neoplasm consisting of proliferating odontogenic epithelium, which usually has a follicular or plexiform pattern lying in a fibrous stroma.[6] The 2017 WHO classification divided ameloblastoma into three categories: conventional, unicystic, and peripheral.[7] Histologically conventional type can be further divided into follicular,

plexiform, acanthomatous, and granular cell morphological patterns; other less common histological variants are clear cell, basal cell, and desmoplastic while unicystic type presents three histological subtypes: luminal, intraluminal, and mural.[8] Apart from these typical lesions mentioned in the literature, there is another term, known as hybrid ameloblastoma, which is an unusual histopathological variant involving the combination of classical follicular or plexiform patterns along with desmoplastic type.[9] The biological behavior of conventional and the mural forms of unicystic ameloblastomas are considered more aggressive due to their higher rate of recurrence.[8] Owing to the increased recurrence rate of mural variant, the conservative treatment of this form is debatable. On the other hand, it is also assumed that the histological studies cannot predict the clinical behavior of ameloblastoma.[7]

Regardless of the vast number of studies on ameloblastoma in the literature, this has not been studied in the Nepalese population. Knowledge of basic features such as age, gender, location, radiographic appearances, and histological presentations can be extremely valuable in developing differential diagnosis and treatment. Thus, our study aims to clarify histopathological variations of ameloblastoma along with basic epidemiological features.

MATERIALS AND METHOD

Ethical approval and study setting

A cross-sectional study was conducted at the Department of Oral Pathology, Kantipur Dental College (KDC) Teaching Hospital and Research Center. The study protocol was approved by the Institutional Review Committee of KDC.

Study population and criteria

The sample size was calculated from the formula,

$n=Z^2pq/e^2$ where, z= standard normal deviate; set at 1.96 which corresponds to 95% confidence level, p= prevalence 4%[10], q= 1-p, e= margin of error(7%). Hence, the sample obtained was 30.11. By adding 10% of the sample size, to consider permissible error, the total sample size obtained was 33 cases of ameloblastoma. Clinically and histopathologically, diagnosed cases of ameloblastoma were retrieved for detailed analysis from the archives of the Department of Oral Pathology. The data of the patients reported between 2072 and 2077 were included. All patients who had been histopathologically diagnosed with ameloblastoma were included in the study. Our study excluded repeated biopsies of the same cases. Formalin-fixed, paraffin-embedded tissue samples were collected and stained by hematoxylin and eosin (H&E).

Hematoxylin and Eosin staining

Using semi-automatic microtome (AMOS Scientific AEM 460, Australia), 3 μm paraffin-embedded sections were cut. The slides were lifted onto the albumin coated adhesive glass slides and then dewaxed with the help of a hot plate at 70^{0}C. The slides were immersed in 3 changes of xylene for 2 minutes each for clearing. For rehydration, decreasing grades of alcohol (100%, 90%, and 80%) each for 3 minutes was used then distilled water for 2 minutes was used for washing. The sections were stained with Harris hematoxylin (Hi-Media Laboratories) solution for 5 minutes followed by washing with running tap water for 3 minutes, then were placed in 1% acid alcohol for 5-10 seconds and again washed. Following this, the slides were dehydrated with 95% alcohol and then immersed in 1% lithium carbonate (Thermo Fisher Scientific) for bluing followed by 100% alcohol for 3 minutes each. Specimens were stained in 1% Eosin Y (Hi-Media Laboratories) for 2-3 minutes and washed in running tap water for 3 minutes. Finally, the slides were mounted in Dibutylphthalate Polystyrene Xylene, DPX (Thermo Fisher Scientific), and covered by coverslips.

Microscopic interpretation and data collection

All stained slides were viewed under an optical microscope (Labomed Lx 400). The tumors were classified according to the 2017 WHO classification of odontogenic tumors. Patients' details considering age, gender, site of the lesion, and histological types of ameloblastoma were noted.

Statistical analysis

The obtained data were analyzed using Statistical Package for Social Sciences version 21.0 (SPSS Inc., Chicago, IL, USA). Descriptive analysis was done for age, gender, site of the lesion, and histological variants. Chi-square test was done to determine the association between the variables. P-value <0.05 was considered as significant value.

RESULT

A total of 33 cases of ameloblastoma were taken from the Department of Oral Pathology.

1. **Distribution of cases according to histopathological type**

   Of all the observed ameloblastoma cases, conventional ameloblastoma was found to be the most prevalent

Table 1: Prevalence of histological types of ameloblastoma

Histological type	Frequency (n)	Percentage (%)
Conventional	29	87.9
Unicystic	4	12.1
Peripheral	0	0.0
Total	33	100.0

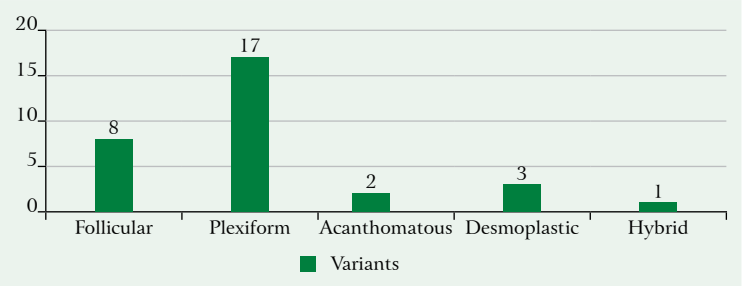

Figure 1: Variants of conventional ameloblastoma

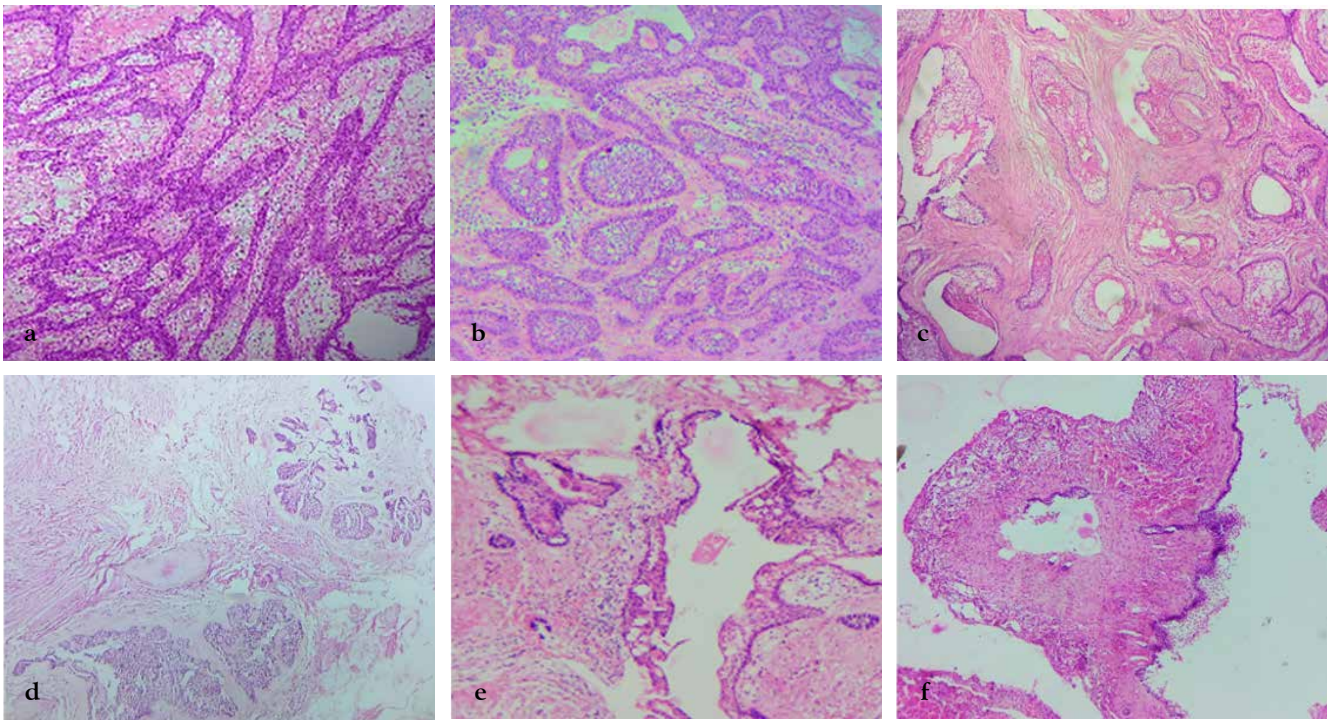

Figure 2: Histopathological variants of ameloblastoma in H&E stain, magnification ×400 (a) Plexiform, (b) Follicular, (c) Acanthomatous, (d) Desmoplastic, (e) Hybrid, (f) Mural (unicystic)

with 29 (87.9%) cases. Among the cases of conventional ameloblastoma, plexiform variant 17 (51.5%) was the most common subtype. Figure 2 shows the histopathological picture of different variants of ameloblastoma. All the cases of unicystic ameloblastoma were of an intramural variant.

2. Distribution of cases according to Age-group

The age range of patients varied between 14 to 65 years with the mean age of 29.24 years. Our study revealed that the diagnosed cases occurred most commonly in the 2nd decade (Figure 3).

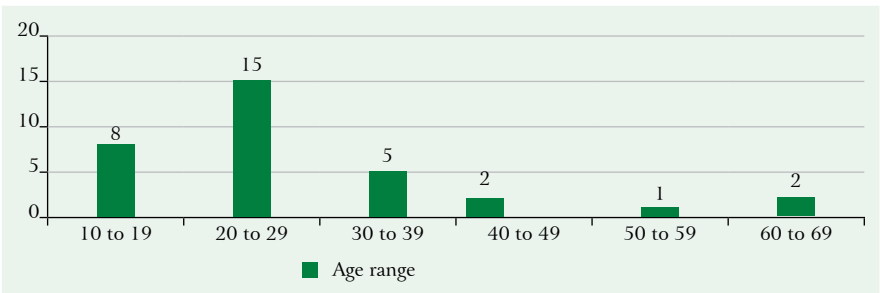

Figure 3: Age-group distribution of ameloblastoma

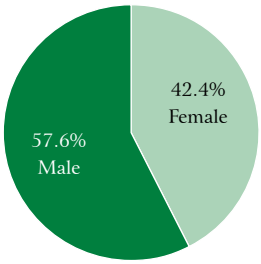

Figure 4: Distribution of cases according to gender

3. **Distribution of cases according to gender**

Regarding gender distribution, ameloblastoma showed male predominance 19 (57.6%) with a male: female ratio of 1.35:1(Figure 4).

4. **Distribution of cases according to Site**

All of the cases were located in the mandible of which the molar-premolar area was the most affected region with 23 cases (69.70%)(Table 2).

Table 2: Distribution of cases according to the site

Site	Frequency (n)	Percentage (%)
Anterior	5	15.15
Posterior (molar-premolar)	23	69.70
Posterior-most (ramus, angle, condyle, coronoid)	5	15.15
Total	**33**	**100.0**

5. **Association between the demographic and histopathological type of ameloblastoma**

Chi-square test revealed there was no significant association of ameloblastoma with age, gender, or location (p>0.05)(Table 3).

Table 3: Comparison of different parameters using Chi-square test

Site		Histopathological type		p-value
		Conventional	Unicystic	
Age	<30 years	21	2	0.351 (N.S.)
	>30 years	8	2	
Gender	Male	17	2	0.574 (N.S.)
	Female	12	2	
Site	Anterior	5	0	0.372 (N.S.)
	Posterior (molar-premolar)	19	4	
	Posterior-most (ramus, angle, condyle, coronoid)	5	0	

DISCUSSION

Ameloblastoma, a clinically significant neoplasm of odontogenic epithelium is commonly encountered with diverse histopathological variations. It is an inexplicable tumor with strong propensity to recur after treatment.[11] The recurrence rate may range from 15.9% to 20.6 %. It may take longer than 20 years to become evident, so the resulting rate of incidence could be higher.[10] A variety of risk factors, tumor subtype, site, treatment methods, clinical features, radiographic appearances and tumor behavior are believed to be the result of the recurrence of ameloblastoma.[12]

Our descriptive analysis revealed that plexiform was the most common histological type followed by follicular. This finding was similar to Shekhar et al. 2019[13] while several studies showed the follicular predominance. The result is in line with the review of Hendra et al. 2019[4] where they encountered the plexiform pattern was dominated in Asia while in other continents follicular variant was the most common. In our study, none of the cases of peripheral ameloblastoma was noted. This could be because peripheral ameloblastoma does not usually produce gross disfigurement[5] and as a result patient may not seek medical attention.

The peak incidence of ameloblastoma was found to be in the second decade of life, which was also noted in other studies.[13,14] Talking about the global incidence, the peak incidence was in the third decade.[4] This difference may possibly reflect more accessibility to medical care; as this age group would be more concerned to have regular check-ups and routine radiographic investigations. The results also showed that there was no significant association between age and the lesion. However, Rahman et al. 2019[10] revealed the relation of age with histological type was statistically significant. They found that plexiform type was found commonly in younger age group.

Regarding gender distribution, almost all studies showed that males were more commonly affected than females similar to our findings. The gender distribution reported in 2019[4] and 1995[15] male predominance while Shekhar et al., 2019[13] presented female predominance. There are also studies which revealed equal prevalence among both genders.[14] Our study also demonstrated no significant association between gender and the histological types of ameloblastoma.

It is documented that the site of predilection for

ameloblastoma is mandible, mostly in the posterior region.[17] For analytical convenience, the mandible has been divided as anterior (from midline to distal surface of canine), posterior (from mesial surface of first premolar to the distal surface of the third molar), and posterior-most (angle, ramus, condyle, coronoid process).[5] In the present study, most of the cases occurred in the posterior molar-premolar region which was in accordance with the study by Dhanuthai et al.[5] Though the regions were not specified in several studies, mandible was the predominant site of occurrence.[4,10,13,14] Also, no significant association between the site of lesion and type of ameloblastoma was found in the study. However, Rahman et al., 2019[10] showed follicular or plexiform ameloblastoma occurred more in the posterior mandible and showed a significant association between location and histological type.

These demographic parameters with the histological types from the present study provide the baseline information of Nepalese subjects. However, the relationship between clinical presentation and radiographic characteristics with histopathological types could be evaluated. So, we recommend that further studies should be done in a larger sample size to establish clinico-pathological correlations.

CONCLUSION

Although benign, ameloblastoma frequently invades locally and occasionally metastasize. Hence, it is important to establish a precise diagnosis since the biological behavior and treatment varies according to the diagnosis. This study provides a broad analysis of various types of ameloblastoma in the Nepalese subjects using various demographic parameters.

ACKNOWLEDGMENT

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Conflict of interest

This study had been presented as a paper by the author at the 2nd Annual Conference of Nepal Association for Dental Research on 19th December 2020, Kathmandu.

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Prevalence and Bilateral Symmetrical Distribution of Three Rooted Mandibular Permanent First Molar among Patients visiting Kantipur Dental College and Hospital

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ABSTRACT

Introduction: Mandibular first molar is the first posterior tooth to erupt and is more likely to be affected by bacteria leading to dental caries, pulp, and periapical pathology, hence seeking the root canal treatment. Thorough knowledge of root morphology and its variations is important to avoid missed canals during treatment causing failure of the treatment. Usually, mandibular molars have two roots (mesial and distal) and three canals (mesiobuccal, mesiolingual, distal), three roots and four canals are also found. The occurrence of the extra root has generally been associated with racial, genetic, and external factors that affect the process of odontogenesis. However, the role of gender has the least importance during the formation of the radix roots

Objectives: To determine the prevalence of three rooted mandibular permanent first molars and to observe the association with gender, race and side among patients visiting Kantipur Dental College and Hospital.

Materials and Method: A total of 100 CBCT images of the patient (64 male, 36 female) visiting Kantipur Dental College and Hospital were selected with the bilateral presence of mandibular first molar (total of 200 teeth). The presence of the unilateral or bilateral third root was recorded and the chi-square test was used to test its association with gender, race and occurrence according to side.

Result: Prevalence of the third root was 7 % (6% on left side, 8% on right side), the prevalence of bilateral symmetrical distribution was 35.7%, and prevalence was 11.1% for females and 7.8% for the male patient. No statistically significant difference was found between gender and occurrence according to right and left side. The prevalence of three rooted mandibular first molar was found to be more among the Mongolian population.

Conclusion: Awareness among clinicians regarding the prevalence of the third root should be taken into consideration during endodontic treatment to avoid missed root canals to get successful outcomes.

Keywords: First Molar; Radix entomolaris; Radix paramolaris; Supernumerary root;Three roots

INTRODUCTION

The first posterior permanent teeth to erupt in the oral cavity is the mandibular first molar which is more likely to be affected by bacteria leading to dental caries, pulp, and periapical pathology. This tooth also displays considerable anatomic variation and abnormalities regarding the number of roots and root canals.[1] Most commonly, mandibular first molars exhibits two roots (one mesial and one distal). In addition, clinicians encounter with extra root either distolingually (radix entomolaris), or mesiobuccally (radix paramolaris).[2,3] Carabelli (1844)[4] was the first to explain and coin the terms Radix Entomolaris (RE) which is a major anatomical variant of the two rooted mandibular first molar. Radix Paramolaris (root is placed buccally) is even a rarer entity (1.2%) as described by Bolk.[4-7] Radix Entomolaris is seen infirst, second, and third mandibular molar, with the least prevalence on the second molar. They may be separated from or partially fused to other roots of the molars. The extra distolingual root is usually smaller than the other roots and usually curved, requiring special attention when endodontic intervention is considered.[4,5]

Prevalence of three roots in mandibular first molar is found to be 13.3%, 4.55%, 1.2% in a study done by Chandra SS et al.,[1] Garg AK et al.[8] and Duman SB et al.[9] respectively.

Proper and sound knowledge of the morphology of the root canal system is a must to clinicians/ endodontists to carry out thorough cleaning, shaping followed by 3- dimensional

obturation of the root canal system. It is required to prevent failure of nonsurgical endodontic treatment is caused by an inability to identify and negotiate additional roots/canals.[1]

Different methods like CBCT, dental operating microscope, orthopantomogram (OPG), peripheral quantitative computed tomography (CT), spiral CT, plain digital radiographs, contrast medium-enhanced digital radiographs, canal staining, and tooth clearing techniques have all helped to study root canal morphology of human teeth. Variations in root canal morphology highlight the importance of advanced technologies for their proper studies. CBCT is one of the most important imaging techniques that produce a 3-dimensional (3-D) image with greater resolution and provides many detailed images.[10] Cohenca et al. (2015) found that CBCT is a reliable option for identifying root canals and anatomical variations.

MATERIALS AND METHOD

The CBCT images of the patients referred to Kantipur Dental College and Hospital within the study period were selected. Sample size was calculated using the data from the study of Chandra et. al.[1] using the following formula,

$$\text{Sample Size (n)} = \frac{z^2pq}{e^2}$$

$$= (1.96^* \ 1.96^*0.133^*0.867)/ (0.05^*0.05)$$

$$= 177.2$$

Where Z= 1.96 at 95 % confidence interval, p (estimated prevalence in the population) = 13.3%, q= (100-p) = 100-13.3 = 86.7% with maximum tolerable error (e)= 0.05

The total number of samples was 200 teeth of 100 patients including 64 males and 36 females. CBCT images of patients aged above 10 years with the bilateral presence of mandibular first molars with fully matured apices and good quality images were included in the study. The samples involved were those suffering from traumatic injuries to tooth and jawbones, those that were having periapical abscess and cyst, and the ones who needed preoperative assessment for further treatment plans like an implant, orthodontic treatment, and endodontic consultation. CBCT with poor-quality images was excluded. Data information sheets were developed to collect information from the samples. CBCT examinations were done on the enrolled participants based on principles of as low as reasonably achievable (ALARA) by using adequate personnel protection in terms of lead aprons, thyroid shields. The patients had been explained the process of CBCT and its side effects if any. The CBCT was done with a Carestream Health Inc. (USA) CS9300 model machine. The field of view (FOV) was selected for the same which ranged from 10X5 cm. The images were evaluated by using Digital Imaging and Communications in Medicine (DICOM) Carestream (CS) 3-D imaging software version 3.5.18. The patient was exposed to a dose area product of 958 milligrays.cm^2. The images were assessed in axial, coronal, sagittal, and orthoradial section views. The slice thickness was kept at 90 μm. The slices were used to visualize step by step from the pulp chamber to the apex to find out the associated variations with permanent mandibular first and second molar teeth. The frequency of the number of roots was calculated (one, two, and three).

Ethical clearance was obtained from Institutional Review Committee, Kantipur Dental College prior to data collection. Data was entered in Microsoft Excel and analyzed using Statistical Package for Social Sciences) SPSS version 16. Data was presented in the form of frequency, percentage, mean and standard deviation. Chi-square test and Fisher's Exact test were used to assess the association between the number of roots and gender/ side/ race with significance set at p-value < 0.05.

RESULT

A total of 100 study samples were included in this study of which 64 (64%) were male and 36 (36%) were females. The mean age of study participants was 31.3±12.4years with a range of 16-69 years. Seventy two (72%) belonged to the Aryan race and 28 (28%) belonged to the Mongolian race.

A total of 200 teeth were examined, the prevalence of the third root in the mandibular molar was 6% on the left side and 8% on the right side as in Figure 1.

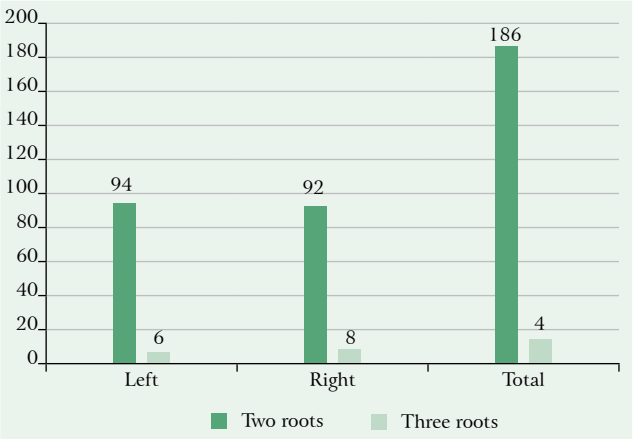
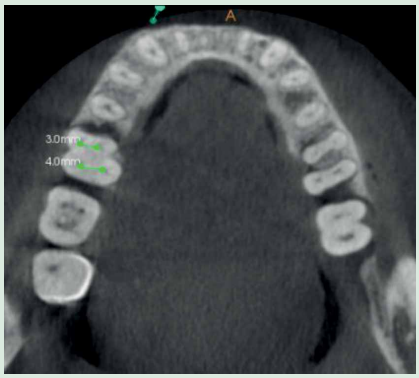


Figure 1: Distribution of the numbers of roots in mandibular first molars



Variables	Mean distance (mm)	Standard deviation
DB- DL	3.54 (2.3-4.8)	0.73
MB-ML	2.63 (2-3.3)	0.42

DB = Distobuccal canal orifice
DL = Distolingual canal orifice of radix entomolaris
MB =Mesiobuccal canal orifice
ML = Mesiolingual canal orifice

Figure 2: Mean distance between the canals measured in CBCT

The prevalence of bilateral symmetrical distribution was 35.7%, and the prevalence of third root was 7.8% for males and 11.1% for females (Table 1).

The prevalence of three rooted mandibular first molar was found to be more among the Mongolian population (25%) as in Table 2.

No statistically significant association was found between gender (p-value 0.58) and occurrence on right and left side (p-value 0.26) as in Table 3 and Table 4.

Table 1: Distribution of three rooted mandibular first molars among the study participants

Variables	No of Patients	Unilateral				Bilateral		Total	
		Left		Right					
		No	%	No	%	No	%	No	%
Male	64	1	1.6	2	3.2	2	3.2	5	7.8
Female	36			1	2.8	3	8.1	4	11.1
Total	100	1	1	4	3	5	5	9	9
Total Teeth	200	1	0.5	3	1.5	10	5	14	7

Table 2: Racial predilection of three rooted teeth

Race	Number of patients	Three rooted teeth	
Aryan	72	2	2.70%
Mongoloid	20	7	25%
Total patient	100	9	9%
Total tooth	200	14	7%

Table 3: Association between three roots and side

Mandibular first molars	Present n (%)	Absent n (%)	Total n (%)	*p*-value
Left	6 (6)	94 (94)	100 (100)	0.58
Right	8 (8)	92 (92)	100 (100)	
Total	14 (7)	186 (93)	200 (200)	

Table 4: Association between three roots and gender

Gender	Present n (%)	Absent n (%)	Total n (%)	*p*-value
Male	7 (5.5)	121 (94.5)	128 (100)	0.26
Female	7 (9.7)	65 (90.2)	72 (100)	
Total	186	14	200 (100)	

DISCUSSION

In the present study, the prevalence of three-rooted mandibular first molars was 9% of all patients and 7% of all teeth examined. This figure is higher than the result of the study by Garg et. al.[8] (5.97% of all patients and 4.55% of all teeth examined).Tratman found that the prevalence of three-rooted mandibular molars was common in the permanent dentition (9% among Malay individuals and 11% among Javanese individuals).[11] According to Chandra SS et. al.[1,] Radix Molaris is seen in 13.3% of the South Indian population. It is lower than that of Mongoloid race, so this feature is considered an Asiatic trait.

According to Chandra et al.[1] 10.2% of males and 8.4% females had 3- rooted mandibular first molar. There was no significant difference according to gender in the appearance of 3- rooted first molar. Radix Molaris is morphological feature observed more frequently in the Asian race than in other racial groups (5-40%). According to these investigations, prevalence of radix, Entomolaris was 18.6% (93/500) of all patients examined and 13.3% (133/1000) of all the teeth examined. It is common in people of Thai, Japanese, Taiwanese, and Chinese descent.[5,12] A radiographic study conducted by Nagaveni et. al.[13] revealed that an additional distolingual root was prevalent in 5.6% of 1408 samples of mandibular first primary molars.

The study conducted by Tu et. al.[14] showed that three-rooted mandibular first molars were prevalent in 21.09% of the population. This incidence is common on the right side than the left side of the mandible. There was no significant relationship, between this variation and the gender of the population.

Kim et. al.[15] concluded that prevalence of radix was 25.82 % , bilateral prevalence rate was 69.13% for extra distal roots. Third root is prevalent in right side compared to left side. The prevalence of radix Entomolaris was 9.2% with prevalence of bilateral symmetric distribution 52% according to Duman et. al.[9] Male has higher prevalence of third root than females. The incidence of third root is more frequent in left side.

Radix Entomolaris is prevalent in 9% of the teeth examined.It is more frequent in male population than female population and common in left side as mentioned by Dube et. al.[16]

According to Song et. al. additional roots were present in 33.1%, 27.8%, and 9.7% of the first permanent, second primary, and first primary molars, respectively. It was higher in male than in females and were higher on the right than on the left in the second primary and first permanent molars only.[17] However, some investigators have suggested that 3 rooted molars are common on the left side of the mandible than the right side.[18,19]

In the present study, the interorifice distances between DB and DL canals is higher than that of MB and ML canals in case where extra distal canal was found which is similar to study done by Kim Y et al.[20] where they have stated that, increased interorifice distance is usually associated with a high prevalence of 2 separate foramina. Knowledge of such relationships can help us to predict the canal configuration when locating orifices..

CONCLUSION

Knowledge of root anatomy and thorough radiological assessment before initiation of endodontic therapy is required for early prediction of tooth morphology and this decreases the chances of re-treatment due to missed canals.CBCT produces a clearer image of the tooth morphology that helps in early prediction of the variation .Since Mongolian trait have high prevalence such traits should be considered during endodontic therapy so that early prediction can be made. The interorifice distances between DB and DL canals varied according to root and canal numbers and shapes.

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Conflict of Interest: Nil

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Prevalence of Low Back Pain among Dental Students of Kathmandu

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ABSTRACT

Introduction: Globally Prevalence of Low back pain is higher in dental students. This is a common Musculoskeletal Disorder (MSD), related to occupational health hazards in working population. Musculoskeletal disorder is a group of condition that involves muscles, nerves, tendon, joints, cartilage, and spinal disc. Dental professionals are at high risk of developing musculoskeletal disorder because high visual demand results sitting in a static or improper posture for a prolonged time and use of excessive force. There has not been any study done to evaluate the prevalence of low back pain among dental student in Nepal. So, the aim of this study is to determine the prevalence of Low back pain among dental student of Kantipur Dental College.

Materials & Method: A descriptive cross sectional study using non probability sampling technique was conducted among 146 clinical year dental students of Kantipur Dental College, Kathmandu. A validated Self-Administered Standard Nordic Questionnaire for Low Back Pain was distributed in the class of the participants. Descriptive statistics and inferential statistics (chi square-test) was done for the analysis of data using SPSS version 16.

Results: Out of 120 respondents, the prevalence rate of back pain was 63.3%, among them males reported higher rate than females. The study reported higher prevalence in 5th year student (75.0%), Intern (69.2%), 4th year student (60%), 3rd year (56.4%) respectively. No significant associations were found between gender and clinical year dental students level with low back pain.

Conclusion: The present study showed high prevalence of low back pain 63.3%. The study reported increased back pain in student involved in clinical practice especially 5th year and Intern of Kantipur Dental College.

Keywords: Clinical years Dental Student; Low Back pain; Prevalence

INTRODUCTION

Low back painis a common Musculoskeletal Disorder (MSD) which is related to occupational health hazards in working population.[1]MSD is a group of condition that involves muscles, nerves, tendon, joints, cartilage, and spinal disk.[2,3] These disorders are considered to be work related which occur due to hazardous working environment and the performance of work contributing factors.[2] Dental professionals are at high risk of developing musculoskeletal disorder due to improper posture and sitting static for a prolonged time.[4,5] High prevalence rate of low back pain has been seen in dental hygienists and dental students.[6] The prevalence of low back pain among dental practitioners in eastern region of Nepal was high compare to other conditions such as neck and shoulder pain[7].The objective is to determine the prevalence of low back pain among the dental students of Kantipur Dental College and to identify the association between low back pain among gender and clinical year dental student level.

MATERIALS & METHOD

A descriptive cross sectional study was done among dental student of Kantipur Dental College, Kathmandu, by using Non-probability sampling technique. All the 3rd, 4th, 5th year students and dental interns involved in clinical practice agreed to participate were included in the survey. Student not exposed to clinical work and past history of back pain were excluded. An official permission letter was taken from Vice Principal & Research Co-ordinator of Kantipur Dental College and IRC of Kathmandu University School of Medical Science. Verbal and written consent was taken from all subjects prior to data collection. The data was

collected by the researcher himself. Self-Administered Standard Nordic Questionnaire for Low Back Pain was distributed in the class of the participants. A total of 120 students out of 146 clinical year BDS student participated in the study. Some students were excluded according to exclusion criteria and some were not interested to participate in the study. Descriptive statistics and inferential statistics (chi square-test) was used for the analysis of data.

RESULT

Out of 120 respondents, 73.3% were female and 26.7% were male. The prevalence of back pain was 63.3%, among them 65.6% of male and 62.5% female reported back pain (Table 1). The prevalence rate is higher in 5th year dental students (Table 2).

The study showed no statistical significant association with low back pain and gender and among clinical year dental students; 0.832 and 0.525 respectively (Table 3).

Table 1: Prevalence of Low Back pain among gender

Gender	Low back pain		Total
	Present	Absent	
Male	21 (65.6%)	11 (34.4%)	32 (26.7%)
Female	55 (62.5%)	33 (37.5%)	88 (73.3%)
Total	76 (63.3%)	44 (36.7%)	120 (100%)

Table 2: Prevalence of Low Back pain among clinical year dental students

Clinical year dental students	Low back pain		Total
	Present	Absent	
3rd year	22 (56.4%)	17 (43.6%)	39 (32.5%)
4th year	18 (60.0%)	12 (40.0%)	30 (25.0%)
5th year	9 (75.0%)	3 (25.0%)	12 (10.0%)
Intern	27 (69.2%)	12 (30.8%)	39 (32.5%)
Total	76 (63.3%)	44 (36.7%)	120 (100%)

Table 3: Association of Low back pain with gender and clinical year

Low Back Pain	Gender		Clinical year dental students			
	Male	Female	3rd	4th	5th	Intern
No	11(25%)	33(75%)	17(38.6%)	12(27.3%)	3(6.8%)	12(27.3%)
Yes	21(27.6%)	55(72.3%)	22(28.9%)	18(23.7%)	9(11.8%)	27(35.6%)
p value	0.832		0.525			

DISCUSSION

A descriptive cross sectional studywas conducted among 120 dental students of Kantipur dental college, Dhapasi, Kathmandu. The research finding showed that the prevalence of low back pain was 63.3% among the participants. The findings were comparable to clinical year dental students in Malaysia 64%[5], India 72%[8], Saudi Arabia 79.1%[9] and Australian dentists reported 53.7%[10].

Findings of this study indicate that low back pain was higher in males than females. Similarly study reported that males adopted lumbar spine angles that were well within the range for flexion relaxation whereas female spine angle were at the lower margin of this range. Flexion relaxation has been proposed as a mechanism for low back pain during sitting through potential stretching of passive tissue responsible for bearing load moment after the muscles shut off further maintaining near neutral posture.The typical female sitting position helps to avoid excessive spine flexion and maintain more upright posture thus, leading to less prevalence of low back pain as compared to males[11,12].

In current study, fifth year and Intern reported high prevalence of lower back pain. Another study conducted by Madan et al reported high prevalence in Interns followed by fourth year.[8]

The present study revealed that there was no significant association between low back pain and gender which is in contrast to Bennet et al; reported that male students had significant association and severe pain in lower back region[13].

The present study revealed no significant association between prevalence of low back pain and clinical level of dental students. This is in contrast to the study conducted by Khan et al[14] which showed significant difference between prevalence of low back pain and dental students in their clinical and non-clinical years. This can be attributed to difference in the nature of work, practicing pattern and working hours between clinical and non-clinical years of dental education. Bennet et al[13] reported increase in pain prevalence with the number of years spent in the dental school and this was more related to students in clinical years acquiring clinical skills and providing routine dental procedures.

CONCLUSION

The study reported high prevalence of low back pain among dental students and clearly indicates a concern for the future occupational health in dental profession. Prevalence of low back pain was high in fifth year clinical student.

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Cephalometric Assessment of Sagittal Discrepancies: A Review

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ABSTRACT

The evaluation of anteroposterior relationship is crucial for orthodontic diagnosis and treatment planning. Various cephalometric parameters for assessing the sagittal relationships have been described. Cephalometrics is based on angular and linear parameters having their own obvious merits and demerits. These parameters have been used for the determination of discrepancies in anteroposterior or sagittal direction, and to establish an effective treatment plan. This article appraises sagittal parameters with their general introduction, anatomical landmarks, normative values, advantages and disadvantages in a tabulated form.

Keywords: Cephalometric parameter, orthodontics, sagittal discrepancy.

INTRODUCTION

Diagnosis and treatment planning are important steps in the practice of orthodontics and dentofacial orthopaedics. They have significant correlation with the technological and mechanical utilities as they are used to measure and record the size and form of craniofacial structures. The main objective of these technological aids is to accurately replicate or portray the precise three dimensional anatomies in both static and functional forms. Cephalometry is a radiographic diagnostic tool in dentistry introduced by Broadbent in 1931.[1] It provided a broader way of approaching skeletal discrepancies and establishing a precise treatment plan by the means of cephalometric analysis.

A number of cephalometric landmarks and parameters have been described by researchers including Downs',[2] Steiner,[3] Tweed,[4] Ricketts,[5] Jacobson[6] etc. They have gained popularity and contributed a lot in establishing the norms in assessing the discrepancy. Other analyses such as Coben,[7] Wylie,[8] Sassouni,[9] Enlow,[10] Beatty,[11] Di Paolo,[12] William,[13] Yang[14] are also cited. Among the three anatomical planes i.e. vertical, sagittal and transverse, sagittal discrepancies are most commonly encountered in day-to-day practice. There is a great importance in the evaluation of sagittal or anteroposterior apical base relationship. Cephalometric analyses include angular and linear measurements. Angular measurements are generally preferred over linear measurements.[15] Both the measurements have their obvious advantages and disadvantages owing to various factors.

Classification

A newer classification system has been devised for sagittal jaw discrepancies based on the measurement system.

A. Angular measurements
   1. AB plane angle (Down's)[2]
   2. Angle of convexity (Down's)[2]
   3. ANB angle (Riedel)[3]
   4. APDI (Kim & Vietas)[16]
   5. AXB angle (Freeman)[17]
   6. JYD angle (Jarvinen)[18]
   7. FH to AB plane angle (Yang & Suhr)[19]
   8. β angle (Baik & Ververidou)[20]
   9. μ angle (Fattahi et al)[21]
   10. Yen angle (Neela et al)[22]
   11. W angle (Bhad et al)[23]
   12. SAR Angle (Agrawal et al)[24]
   13. HBN Angle (Dave et al)[25]
   14. MKG angle (Chachada et al)[26]
   15. P Angle (Singh et al)[27]

B. Linear measurements

1. Wylies method (Wendel L. Wylie)[8]
2. Jenkin's 'a'plane (David H. Jenkin)[28]
3. Taylor's AB linear distance (Taylor)[29]
4. Wits appraisal (Jacobson)[6]
5. Quadrilateral analysis (Di Paolo)[12]
6. Maxillo-mandibular differential (Mc Namara)[30]
7. AF-BF distance (Chang)[31]
8. APP-BPP distance (Nanda & Merill)[32]
9. Overjet predictor (Zupancic et al)[33]
10. Dentoskeletal overjet (AL Hammadi)[34]
11. Mount Vernon Index (Doshi et al)[35]
12. Yen linear (Shetty et al)[36]

C. Combined angular and linear measurements

1. AXD angle & AD'(Beatty)[11]
2. Pi analysis (Kumar et al)[37]

DISCUSSION

The description about various sagittal jaw parameters mentioning the anatomical landmarks, normal range of magnitude and their advantages and disadvantages are presented below in the comparative tabular forms (Table 1,2,3).

Table 1. Sagittal jaw parameters based on angular measurements

A-P parameter	Author/Year	Landmarks used	Magnitude	Advantage	Disadvantage
1.AB Plane[2]	WB Downs' (1948) (N=20)	Formed by joining A-B plane and N-Pog plane in relation to facial plane.	Skeletal Class I: -9°to 0° (-4.6°) Class II: < -9°to 0° Class III: > -9°to 0°	Indicative for obtaining correct axial inclination, overjet and overbite.	Nasion point might alter during growth.
2.Angle of convexity[2]	WB Down's (1948) (N=20)	Formed by Nasion-Point A and Point A-Pogonion.	Class I: +10°- 8.5°. Class II: > +10°- 8.5° Class III: < +10°-8.5°	Measure maxillary protrusion of the face to the total profile.	Limited sample size
3.ANB[3]	Riedel (1952), Cecil C Steiner (1953) (N=52)	Formed by SNA and SNB angles.	Class I: 2° ± 2° Class II: > 2° ± 2° Class III: < 2° ± 2°	Most commonly used, considered more reliable.	Nasion, rotation of jaw, length of cranial base, anterior facial height affects ANB.
4. APDI[16]	Kim YH & Vietas JJ (1978) (N=874)	Obtained by tabulating the Facial angle ± A-B plane angle and ± Palatal plane angle.	Class I: 81.4°±3.79° Class II: <81.4°±3.79° Class III: >81.4°±3.79°	Combinations of three measurements provide sufficient information.	Provides antero-posterior relationship of the dentition rather than the jaw.
5. AXB angle[17]	Robert S Freeman (1981)	A line from Point X (perpendicular drawn from Point A to FH) to Point B forms AXB angle.	Normal value: ~ 4°. A variation to this is to draw perpendicular from Point A to SN plane (X point), giving an angle of 6.5°.	Point X is used instead of Nasion.	Steepness of SN plane, variation in Point A, excessively long or short faces, exceptionally large or short mandible is not considered.
6. JYD[18] angle	S Jarvinen Seppo (1982) (N=42)	Formed by intersection of line from Point J and Point D to Point Y.	Class I: 5.25° ± 1.97° Class II:>5.25°± 1.97° Class III: <5.25°± 1.97°	Eliminates Point A and Point B.	Affected by jaw rotation and vertical facial growth.

A-P parameter	Author/Year	Landmarks used	Magnitude	Advantage	Disadvantage
7. FH to AB plane angle[19]	Sang D Yang & Cheong H Suhr (1995) (N=110)	Formed by FH plane and AB line.	Class I: 80.91°±2.93° Class III: > 80.91°±2.93° Class II: < 80.91°±2.93°	Accurate measurement in predicting AP skeletal dysplasia than AF-BF or AFB angle.	Accurate identification of Porion is difficult.
8. Beta Angle[2]	Chong Yo Baik & Maria Ververidou (2004) (N=120)	Formed between AB line and Point A perpendicular to CB line.	Class I: 28°-35° Class II: < 28°-35° Class III: >28°-35°	Avoids the use of functional plane and is not affected by jaw rotations.	Point A and Point B may be remodeled by growth and orthodontic treatment.
9. μ Angle[21]	HR Fattahi et al (2006) (N=115)	Formed between AB line and perpendicular line from Point A to mandibular plane.	Class I: 16.1°-23.9° Class II: < 16.1°-23.9° Class III: >16.1°-23.9°	Acceptable specificity and sensitivity.	Point A and Point B are affected by tooth movement.
10. Yen Angle[22]	Praveen Kumar Neela et al (2009) (N=75)	Formed between lines SM and MG.	Class l: 117°-123° Class II: < 117°-123° Class III: >117°-123°	Uses more stable landmarks and eliminates difficulty in locating Point A and Point B.	Rotation of jaws can mask true sagittal dysplasia.
11. W Angle[23]	WasundharA Bhad et al (2011) (N=142)	Measured between the perpendicular line from Point M to S-G line and M-G line.	Class I: 51°-56° Class II: <51°-56° Class III: >51°-56°	Reflects true sagittal dysplasia and is not affected by growth rotations.	Point S is an unstable landmark.
12. SAR Angle[24]	Sonahita Agrawal (2014) (N=60)	Measured between perpendicular line from Point M to W-G line and M-G line.	Class I: 55.98°±2.24° Class II: 50.18°± 2.70° Class III: 63.65°±2.25°	W-SE remains unchanged in all periods of pubertal growth.	Not influenced by growth, jaw rotations and orthodontic treatment.
13. HBN Angle[25]	Harsh Bhagvati Prasad Dave et al (2015) (N=667)	Angle between line perpendiculars from Point M to CG and MG.	Class I: 39°-46° Class II: < 39°-46° Class III: >39°- 46°	Does not depend on jaw rotation, cranial landmarks or functional occlusion plane and Point A/B.	Does not indicate which jaw is at fault.
14. MKG Angle[26]	Achint Chachada et al (2020) (N=60)	Constructed between lines drawn from Point M to Point KR and Point KR to Point G.	Class I: 51°-59° Class II: > 51°-59° Class III: <51°-59°	Point M and Point G are not affected by bone remodeling. Assess growth vector of maxilla and mandible.	Rotation of jaws can affect readings. Key ridge result in errors in identification and variability.
15. P Angle[27]	Pavan Kumar Ramsharan Singh et al (2021) (N=130)	Angle formed between the line from Point A perpendicular to S-Gn line and line A-Gn.	Class I: 53.7° ±1.86° Class II: 47.92± 1.51° Class III: 58.8° ±1.9°	Used as an adjunct for W angle during pre-treatment cephalometric tracing.	Affected by growth changes, Point A, genioplasty Cannot determine which jaw is at fault.

Table 2: Sagittal jaw parameters based on linear measurements

A-P parameter	Author/ Year	Landmarks used	Magnitude	Advantage	Disadvantage
1.Wylies[8]	Wylie (1947)	Perpendiculars from glenoid fossa, sella turcica, pterygomaxillary fissure, buccal groove of maxillary 1st molar and ANS are projected to FH plane and horizontal distances measured. Mandibular length is assessed by projecting perpendiculars from pogonion and posterior surface of condyle to a tangent drawn to lower border of mandible.	Maxillary length: Class I: 52 mm Class II: > 52 mm (negative sign) Class III: < 52 mm (positive sign).	Quantitative method.	Standard value is not applicable for all ages.
2.Jenkin's 'a' plane[28]	David H Jenkin (1955) (N=180)	Uses occlusal plane as a reference plane. A plane was dropped perpendicular to occlusal plane from Point A.	Mean value: Linear distance from 'a' plane to Point B (+3mm), Gnathion (+5mm) and mandible (+2mm) incisors.	Occlusal plane is the only plane to which teeth of each jaw are intimately related.	Normally, it is not a plane, but a complex curve; which is very difficult to define.
3. Taylor's AB' linear distance[29]	Taylor CM (1969)	Linear distance between Point A and Point B'. Point B' is the perpendicular from Point B to SN plane.	Mean value: 13.2 mm	Reflects apical base relationship.	Point B changes after treatment.
4.Wit's Appraisal of jaw disharmony[6]	Alex Jacobson (1975) (N= 46)	Perpendiculars from Point A and Point B on maxilla and mandible, respectively, are drawn onto the occlusal plane. The points of contact are labelled AO and BO, respectively.	Class I: BO coincides with AO in females; BO is 1mm ahead of AO in males. Class II: BO positioned well behind point AO (positive value). Class III: BO positioned ahead of point AO (negative value).	Does not change with age.	Occlusal plane is not accurately reproducible and can be easily affected by tooth eruption and orthodontic tooth movement.
5.Quadrilateral Analysis[12]	Rocco J Di Paolo (1962)	Average of anterior and posterior lower facial height equals to denture base length. Maxillary base length = mandibular base length = ALFH + PLFH/2	Based on the concept of lower facial proportionality. There is 1:1 proportionality between maxillary and mandibular length.	Reliable and accurate method of assessing orthodontic, surgical or combined outcome.	Provides less information related to facial profile.
6. Maxillomandibular Differential[30]	James A. Mc Namara (1984)	Calculated by subtracting effective midfacial length from effective mandibular length. Effective midfacial length is calculated from condylion to Point A, effective mandibular length from condylion to anatomic Gnathion.	Normal values: Small: 20 mm Medium: 25-27 mm Large: 30-33 mm	Gives an idea whether skeletal Class II or Class III problem is positional or dimensional.	Complex and not beneficial for minor orthodontic correction procedures.

A-P parameter	Author/ Year	Landmarks used	Magnitude	Advantage	Disadvantage
7. AF-BF Distance[31]	Hong Pu Chang (1987) (N=80)	The distance of Point A to Nasion vertical (A-NV) defines horizontal location of maxilla and distance of Point B to Nasion vertical (B-NV) determines AP position of the mandible. AF-BF (points of contact of perpendiculars onto FH plane from Point A and Point B) distance is equal to difference between two values.	Normal values: Male: 3.4±2.93 Female: 3.87±2.63	Eliminates Nasion. Not affected by vertical displacement of Point A or Point B.	Inclination of FH plane, Point A and Point B may affect measurement.
8. APP-BPP distance[32]	Ram S Nanda and Robert M. Merill (1994)	Perpendicular dropped from Point A and Point B on palatal plane.	Normal value: Female: 5.2±2.9 Male: 4.2±3.6	Independent on variation of Nasion. Palatal plane is considered to be more stable.	No significant difference in APP-BPP measurements among Class I, Class II division 2 and Class II subdivision.
9. Overjet as a predictor of sagittal dysplasia[33]	S Zupancic et al (2008) (N=83)	Overjet value is measured on study casts and cephalometric parameters.	Class I: 3.8±2 mm Class II div 1 6±2.8 mm Class III: 0±2.9 mm	Good predictor for Class II div 1 malocclusion in sagittal plane.	Permits significant variability of ANB, Wits appraisal, and convexity at Point A.
10. Dentoskeletal overjet[34]	AL-Hammadi et al (2011) (N=250)	Incisolabial line angle (Point 1) - junction between labial surface and incisal edge of most prominent lower central incisor. Incisopalatal line angle (Point 2) junction between palatal surface and incisal edge of most prominent upper central incisor. Dentoskeletal overjet = (NB-Point 1) + Overjet - (NA-Point 2)	Class I: -1 to 2.5mm Class II: >2.5mm Class III: < -1mm	Inclination in functional occlusal plane does not affect the final reading.	Represents only specific population.
11. Mount Vernon index[23]	Jigar Doshi et al (2011) (N=100)	Perpendicular distance in mm (d) between Point B and line from Nasion through Point A. Determined by measuring the distance (d) between Point B and a line extending from Nasion through Point A.	For Class I: Male: 4.35±0.59 mm Female: 4.30±0.58 mm	A reliable parameter used to assess sagittal discrepancy.	Does not replace complex evaluation systems.
12. YEN Linear[36]	Sandeep Shetty et al (2013) (N=120)	Perpendicular from Point M and Point G on the functional occlusal plane.	Class I:- 1-2.5 mm Class II: >1-2.5 mm Class III: <1-2.5 mm	Point M and Point G are not affected by bone remodeling.	Does not localize the problem whether it is in maxilla or mandible.

Table 3: Sagittal jaw parameters based on combined angular and linear measurements

A-P parameter	Author/Year	Landmarks used	Magnitude	Advantage	Disadvantage
1. AXD angle & AD'[11]	Edward Betty (1975) (N=50)	Interior angle formed by intersection of lines extending from Point A and Point D at the X intercept on SN plane. AD' linear measurement is from Point A to line DD' as A-D' (D' is the perpendicular from D to SN plane).	Angular value: AXD angle: 9.3° Linear value: A-D' distance: 15.5 mm.	Point D is not affected by changes in incisor position and chin. Eliminates Nasion point.	Point A is affected by orthodontic tooth movement.
2. Pi Analysis[37]	Santosh Kumar et al (2012) (N=155)	Perpendicular line is drawn from G point to intersect with the true horizontal at G', with a further line constructed from G' to M point. Connecting the points G'G and G'M forms the angle GG'M, or Pi angle. A virtual line is drawn from M point to intersect perpendicular to the true horizontal at M'. Pi linear is the distance between points G' and M'.	Angular value: Cl I: 3·40±2·04° Cl II: 8·94±3·16° Cl III: -3·57±1·61° Linear value: Cl I: 3.40±2.20 mm Cl II: 8.90±3.56 mm Cl III: 23.30±2.30 mm	Point G and Point M are not affected by bone remodeling. NHP is the orientation position for the evaluation of craniofacial morphology.	Pi angle is minimally affected by vertical movement of Nasion.

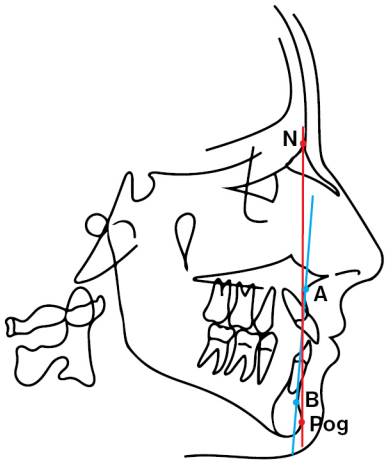

Figure 1: Downs AB plane angle

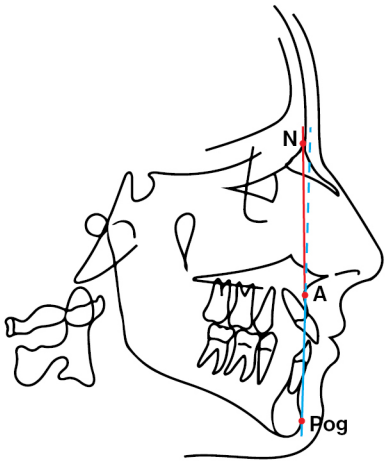

Figure 2: Angle of Convexity

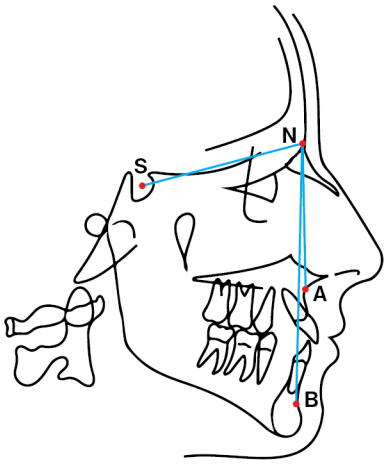

Figure 3: ANB angle

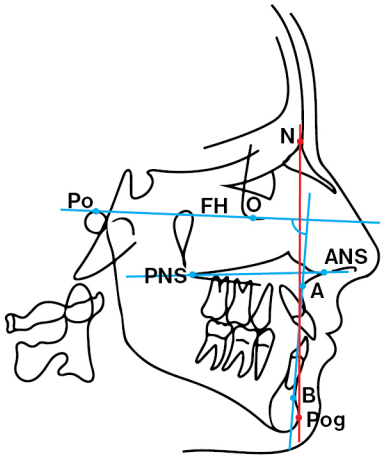

Figure 4: APDI angle

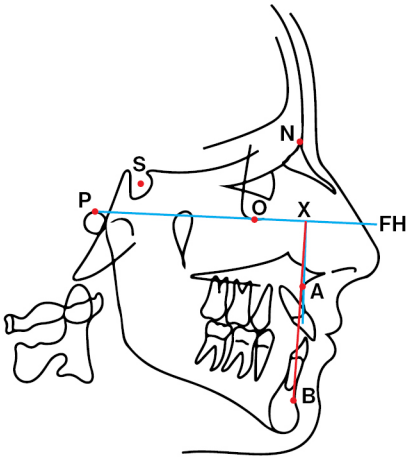

Figure 5: AXB Angle

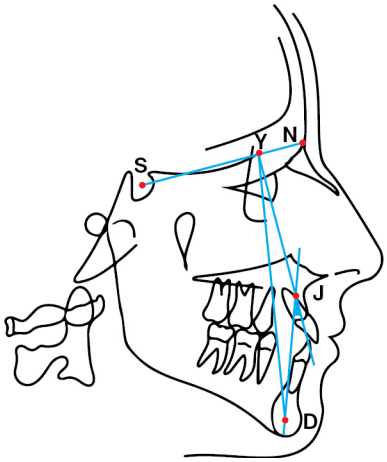

Figure 6: JYD Angle

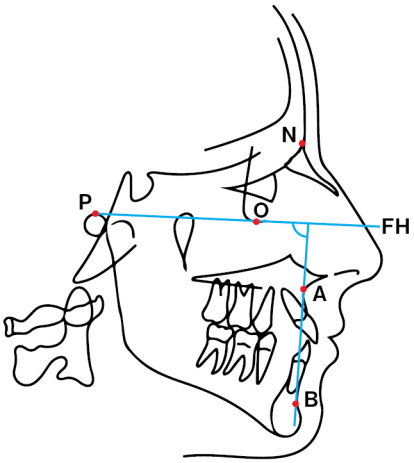

Figure 7: FH to AB Plane Angle

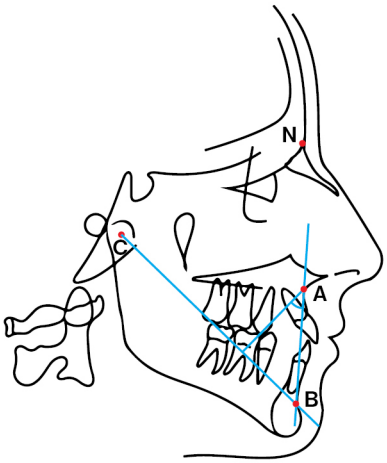

Figure 8: Beta Angle

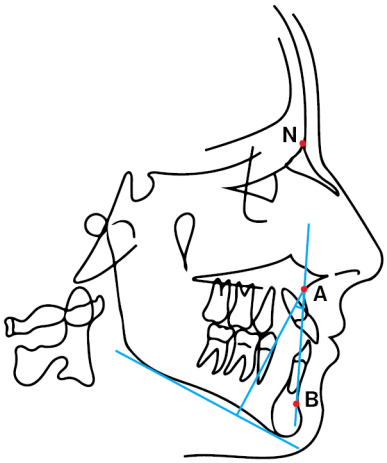

Figure 9: μ Angle

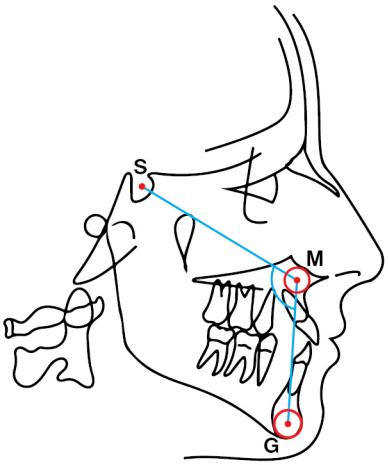

Figure 10: Yen Angle

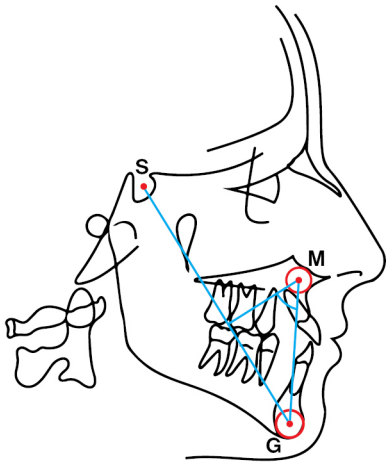

Figure 11: W Angle

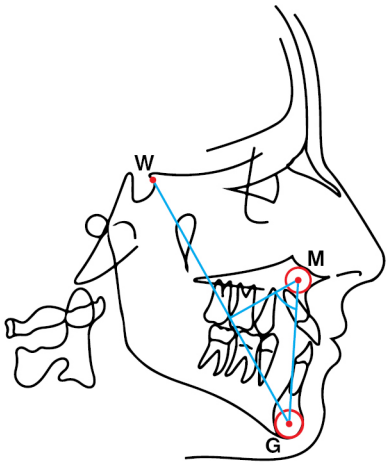

Figure 12: SAR Angle

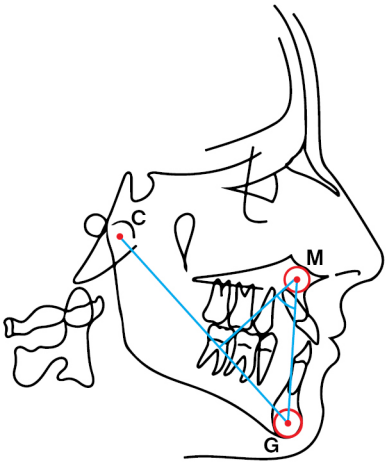

Figure 13. HBN Angle

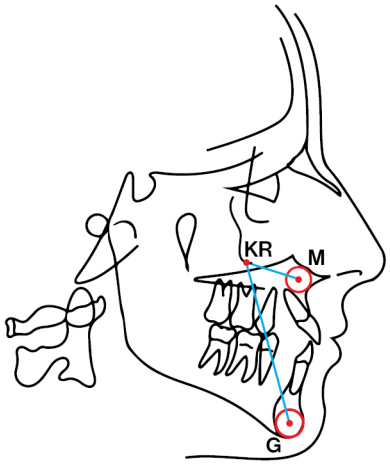

Figure 14. MKG Angle

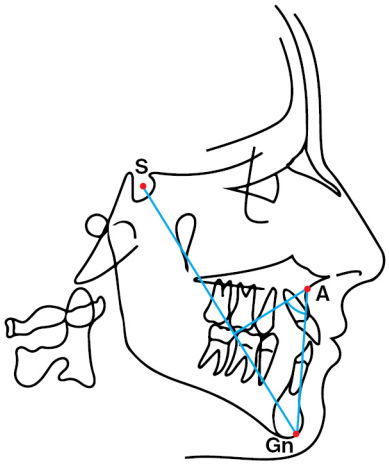

Figure 15. P Angle

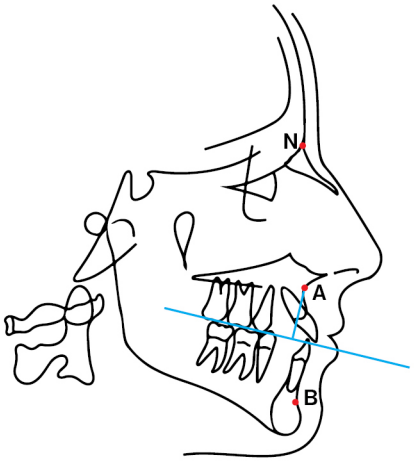

Figure 16. Jenkin's 'a' plane

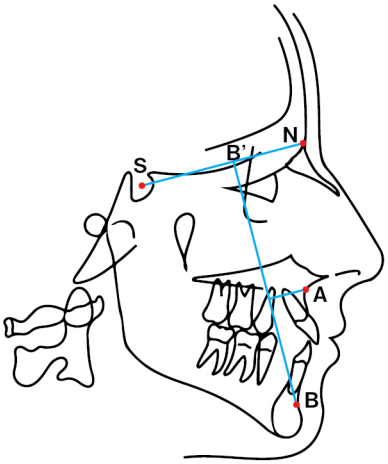

Figure 17. Taylor's AB' linear distance

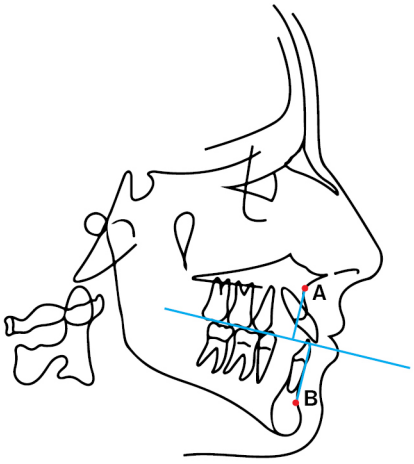

Figure 18. Wit's Appraisal

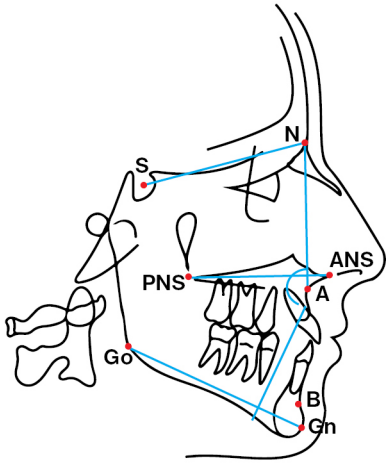

Figure 19. Quadrilateral Analysis

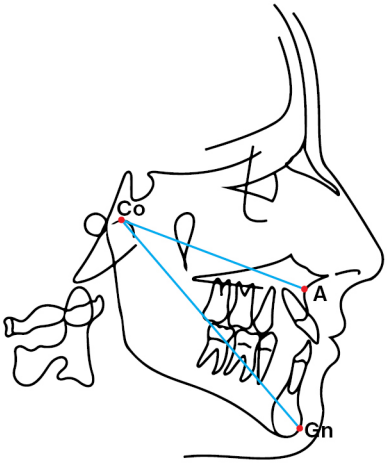

Figure 20. Maxillomandibular differential

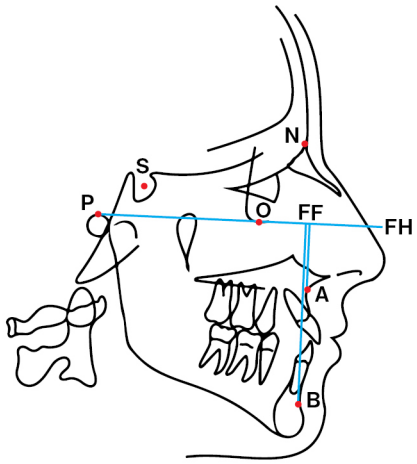

Figure 21. AF-BF Distance

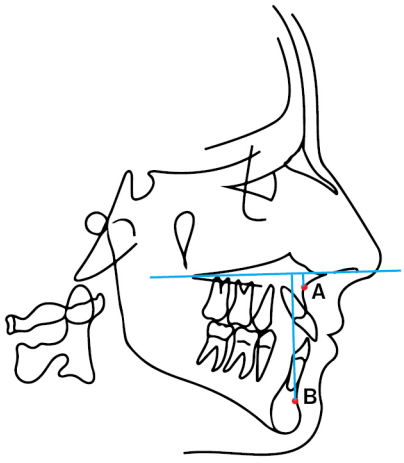

Figure 22. APP-BPP Distance

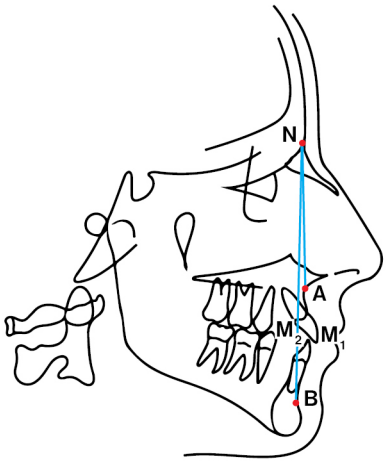

Figure 23. Dentoskeletal overjet

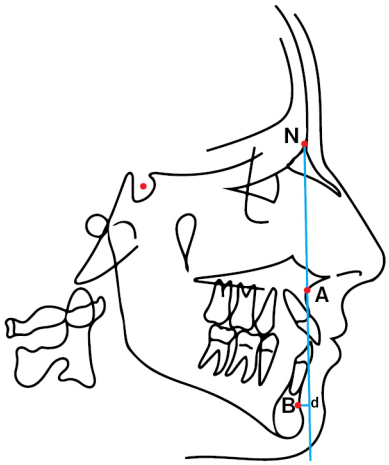

Figure 24. Mount Vernon Index

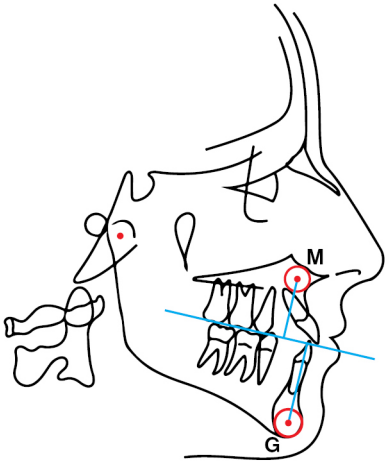

Figure 25. Yen Linear

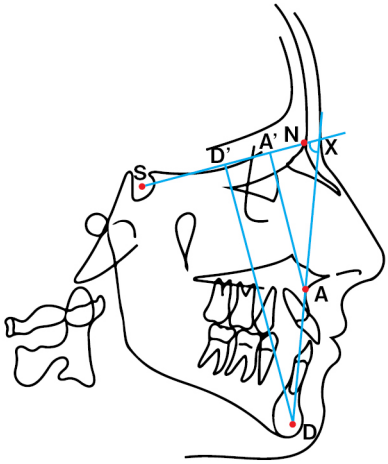

Figure 26. AXD Angle and AD'

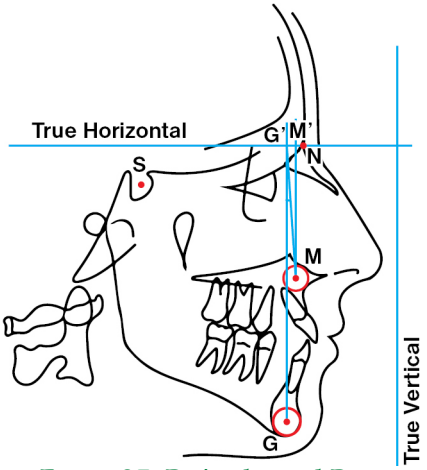

Figure 27. Pi Angle and Pi linear

CONCLUSION

Numerous cephalometric parameters for assessing the sagittal relationships have been described till date and have their obvious merits and demerits. Cephalometrics is not an exact reproduction of the maxillomandibular relationship, and the various parameters based on angular and linear parameters have their own obvious limitations. So, the orthodontist must be vigilant to select two or more cephalometric parameters in order to provide optimal diagnosis and treatment planning. It is also necessary to correlate the cephalometric findings clinically considering the ethnic and individual variations.

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Achieving Pink and White Balance by Replacement of Unaesthetic Metal-Ceramic Crowns with Zirconia

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ABSTRACT

Metal-ceramic restorations have been extensively used as a restoration of choice. In recent past, metal free restorations are gaining popularity among both the dental practitioners and the patients. Patients often complain of the non-translucent nature of the PFM restoration, more bulk and the grayish discoloration of the gingival margin of the metal-ceramic crowns. And there are growing number of patients who ask for the replacement of metal-ceramic restoration with metal-free options. This case report describes the esthetic enhancement of such patients with old metal-ceramic restoration with zirconia along with gingitage.

Keywords: aesthetics, gingitage, metal-free restorations, provisional crown

INTRODUCTION

Restoration of teeth in esthetic zone is a major challenge in dentistry. The choice of material and appearance of gingival tissue is of paramount importance in anterior aesthetics especially if the patients has gummy smile. Metal-ceramic restorations have been extensively used as a restoration of choice. Since alloys used in dentistry come into close and prolonged contact with the gingiva and oral mucosa, the problem like the grayish discoloration at the margins of the restorations, chipping of the porcelain, allergy to the metal and difficulty in shade matching due to the metal beneath[1]. Metal free restoration are chosen over conventional PFM's because of its superior strength, durability, and excellent aesthetics. The gingival shape, texture, margin, symmetry and contour significantly affect the harmonious appearance of both natural and prosthetic dentition. There are various approach for gingival modification involving surgical and non-surgical techniques. Tripodakis et al. describes the use of provisional restoration to improve the contour of gingiva by application of pressure on soft tissue in an attempt to create the illusion of the restoration emerging from the tissue. In this case, provisional restoration was used to maintain the gingival contour after gingitage.

CASE REPORT

A 47 year old female patient reported to the Department of Prosthodontics with the chief complaint of blackish gums and unpleasant smile. On clinical examination, a greyish discoloration at the margins of restoration and unaesthetic gingival contour was seenalong with the bulkier restorations. Thus, the treatment plan was to replace PFM crown with zirconia along with non-invasive gingival contouring.

Figure 1: preoperative photograph

Figure 2: After removal of PFM crown

Figure 3: Tooth preparation modified

Figure 4: Provisional crown irt 11& 21

Figure 5: Gingival contour after temporization

Figure 6: Cementation of zirconia crown irt 11&12

Figure 7: Before treatment

Figure 8: After treatment

Clinical Procedures

PFM crown was sectioned and removed in respect to 11 and 21. After the removal of crown greyish discoloration was observed on the gingival margin with unaesthetic gingival contour (Figure 2).

Tooth preparation was modified to receive zirconia crown the subgingival radial shoulder finish line was prepared. The gingival contouring was done (Figure 3).

Provisional crowns were fabricated using tooth color acrylic which was slightly over contoured. It was then cemented with non-eugenol temporary luting cement (Figure 4). Patient was recalled for review after 2 weeks. After achieving the desired gingival contour (Figure 5), final impression was made. Zirconia crowns were fabricated and cemented with glass ionomer cement. (Figure 6).

DISCUSSION

Great efforts through research and clinical trials have been made to achieve the goal of a healthy coexistence between restorations and surrounding periodontal structures[2]. Location of margins is the most important aspect in the success of restorations[3]. Historically, it was debated that the most desirable location for crown margins is either supragingival or equi-gingival when possible[4]. In this case, zirconia crown with the subgingival margins was preferred due to the aesthetic concern. Research have shown that zirconia crown are superior in strength with good aesthetic can be used for posterior teeth as well as anterior teeth with heavy discoloration[5]. The correction of unaesthetic gingival contour was done with gingitage and the contour was maintained by slightly over contoured provisional restoration. A gradual controlled pressure application

with the help of a provisional restoration transform a compromised tissue contour into a favorable one[6].

CONCLUSION

Esthetic anterior restorations can restore feeling of well-being, security and confidence. The detailed treatment plan and the ability of dentist to consider the esthetic and functional parameters helps in developing pleasing smile and facial expressions. The use of gingitage and provisional restoration to recontour soft tissue is attractive to the patient, and metal-free crowns improve the esthetics providing a pleasant smile for the patient.

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Reattachment of Fractured Tooth Fragment: Case Series

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ABSTRACT

Traumatic injuries of teeth involve varying degrees of damage to the supporting soft tissues and the teeth itself. The injury may be either complicated or uncomplicated fracture. With recent developments in restorative material, placement techniques, preparation designs, and an adhesive protocol, the process of fragment reattachment has become conservative, simplified and more reliable. Reattachment of the original tooth fragment to the fractured tooth helps in maintaining the tooth's color, wear resistance, morphology and translucency in the restoration. This paper describes the reattachment of fractured fragment using fiber post in maxillary central incisor.

Keywords: Fractured fragments; Fiber post; Reattachment; Trauma

INTRODUCTION

Fracture of teeth following traumatic injuries are most common in maxillary anterior regions due to their position in the arch.[1,2] The consequences of tooth fracture are; problems in function, esthetic, and phonetic.[3] Various treatments; crowns, laminate veneers and direct composite resin restorations are indicated in such condition. However, these treatment options are time-consuming, high priced, and not conservative. Therefore, reattachment can be an alternative for restoration of fractured teeth. The fractured teeth fragments if recovered by the patient within reasonable time, the fragments may be reattached to the remaining tooth structure.[2] Chosack and Eidelman in 1964 described the restoration of fractured teeth using the dental fragment.[4] Now, with the advancement in dental adhesive materials reattachment of fractured fragment has become the first choice of treatment which is conservative, safe, simple, and cost-effective. This paper reported three cases of coronal tooth fracture managed by tooth fragment reattachment in the Department of Conservative Dentistry and Endodontics, Kantipur Dental College and Hospital.

CASE REPORTS

Case 1

A 54-year-old male with chief complain of pain and mobile (grade II) maxillary left central incisor while chewing hard food. Clinical and radiographic examination revealed a complicated oblique crown fracture on 21 that was extended 1 mm subgingivally on the labial aspect and supragingivally on palatal aspects (Figure 2). Biological width was not invaded and crown lengthening in the labial aspect was sufficient for access and isolation for the reattachment procedure. The fractured segment was held in place by gingival attachment. Periapical radiographs

Figure 1: Preoperative condition

Figure 2: Detached fractured fragment

Figure 3: Preoperative IOPA

Figure 4: After Gingivectomy

Figure 5: Post-operative IOPA

Figure 6: Resin Cement

Figure 7: Follow up after one month

Figure 8: Follow up after one month palatal view

revealed an intact periodontal ligament space, complete root formation with no root fracture and condensing osteitis was found at periapical region (Figure 3). No significant medical history was reported by the patient. Single visit root canal treatment (RCT) on 21 followed by reattachment with fiber post reinforcement was planned and explained to the patient. After patient's approval, treatment was carried out. The removed fractured tooth fragment was stored in isotonic saline solution. Single visit root canal treatment was done. Post space was prepared on canal as well as on fractured tooth fragment. Double tapered esthetic fiber post no 2 was selected. Trial for the fit of post was done. Gingivectomy of 1mm of marginal and interdental gingival was performed under LA via electro cautery (Figure 4). Tooth fragment was etched with non rinse conditioner and adhesive was applied and tooth fragment was reattached to tooth along with fiber post using resin based cement (paracore slow transparent) (Figure 6). In subsequent follow up, 1 mm depth chamfer was placed in the fracture line on the palatal surface with a diamond round bur. After the superficial etching and bonding, a layer of resin composite was applied to the chamfer surface and light cured for 40 seconds. The repaired surface was polished and esthetic result was obtained. The occlusion was carefully checked and adjusted. Instructions were given as to avoid heavy forces on the tooth and to follow regular oral hygiene practices. On follow-up visit, the tooth was asymptomatic and bite was relieved in first treatment and patient was kept on an observation for condensing osteitis. After one month follow-up gingival healing was satisfactory, tooth was not mobile and non-tender (Figures 7 and 8).

Case 2

A 28-year-old male with Ellis class III fracture in the right maxillary central incisor extending subgingivally at alveolar crest level was reported in the department of Conservative Dentistry and Endodontics (Figure 9). On probing, the biological width was being encroached on the palatal aspect. Biological width was minimally invaded and crown lengthening in the palatal aspect was sufficient for access and isolation for the reattachment procedure. In this case, bone recountouring was not done as patient was not willing for further surgical intervention. Root Canal Treatment (RCT) and reattachment were planned. After RCT and gingivectomy, fiber post and fractured fragment were reattached using resin based cement (Figure 13).

Figure 9: Preoperative

Figure 10: Post space created on tooth fragment

Figure 11: Post selection

Figure 12: After gingivectomy

Figure 13: Reattached tooth fragment with fiber post and resin cement

Figure 14: Initial IOPA

Figure 15: Post-operative IOPA after reattachment

Figure 16: One week follow up IOPA

Figure 17: (a) Palatal and (b) Labial view after one week

Figure 18: Pre-operative labial aspect

Figure 19: Pre-operative palatal aspect

Figure 20: Tooth fragment placed in normal saline

Figure 21: Fracture fragment at the junction of incisal and middle third (reassembled)

Figure 22: Post-operative palatal aspect

Figure 23: Post-operative labial aspect

Case no 3

A15 years old male patient visited the department of Conservative Dentistry and Endodontics, with chief complain of broken upper front teeth due to traumatic injuries while playing. On clinical examination, Ellis class II fracture was observed and tooth was found to be vital (Figures 18, 19). Since the patient came with fractured coronal fragment and patient's desire for preservation of his own natural tooth fragment, reattachment was planned. Tooth fragment was disinfected and kept in normal saline for rehydration (Figure 20). For fractured tooth, surface roughening, beveling was done. Light cure Calcium hydroxide liner was placed on pulpal area and with proper etching and bonding the fragment was reattached using resin based cement. Then fracture line along with defective areas was further camouflaged with composite resin. Finishing and polishing was done (Figures 22, 23) and patient was kept under observation to check for vitality of tooth

DISCUSSION

Coronal fractures of permanent incisors represent 18-22% of all trauma to dental hard tissues, 28-44% simple (enamel +dentin) and 11-15%, complex (enamel +dentin +pulp). Among total percentage of trauma to permanent incisors, maxillary central incisors represent about 96% because of their position in oral cavity.[1] In young patients and adolescents, prosthetic rehabilitation or an implant is indicated but due to the limitation of age, reattachment can be carried out as a provisional restoration or treatment. Reattachment provides the fine way to reinstate the natural shape, contour, surface texture, occlusal alignment, and color of the fragment conserving maximum tooth structures.[5] The present document reported 3 cases of reattachment of fractured segment of maxillary anterior teeth. When natural tooth is used instead of other restorative options, the opposing tooth is abraded at the same rate. If fractured fragment is available then reattachment must be selected as the first choice of treatment .[6, 7]

Various factors affect the reliability and success of reattachment treatment including the site of fracture, size of fractured remnants, periodontal status, pulpal involvement, maturity of root formation, biological width invasion, occlusion, time and resources of the patient.[8]

Rehydration of fractured fragment is needed to prevent discoloration, retaining its original color translucency, and ensures adequate bond strength.[9, 10] Tooth fragments were kept in normal saline solution in all the cases. However, different authors have mentioned different rehydration medium like normal saline, distilled water, water, saliva, milk and hanks balanced solution.[11]

In first two cases, fractured margin was placed subgingivally, in such case biological width has to be taken into

consideration. Only minimal encroachment on biological width was present so gingivectomy via electro cautery was carried out for proper isolation, to get better marginal finish and good periodontal health. If the fracture margin is below bone level violating biological width then we have to plan for osteotomy or other alternative like orthodontic extrusion followed by surgical crown lengthening.[12]

If two-third or more of the crown is involved in fractured fragment fiber post is required which acts as an intraradicular splint. Fiber post has high elastic modulus and durability and aids in dissipating occlusal stress.[10, 13, 14] In first two cases, fiber post was used similar to case reported by Sapna et al.[10] Paracore resin based luting cement was selected for cementation as this cement provides monoblock bond interface, superior bond strength and increases the durability.

Reattachment of fractured fragment in anterior teeth have good survival rate.[1511] A study by Ninawe et al also stated successful follow up result for 1.5 years in similar case. In the present case, the teeth were asymptomatic during one month follow up. However, more studies with long term follow up are recommended.

CONCLUSION

With recent development in restorative materials, placement techniques, preparation designs and an adhesive protocol, the process of fragment reattachment has become conservative, simplified and more reliable.

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Desquamative Gingivitis as a Clinical Sign of Mucous Membrane Pemphigoid – A Case Report

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ABSTRACT

Desquamative gingivitis (DG) is characterized by erythematous gingiva, desquamation and erosion of gingival epithelium, and blister formation. This term alone is not a diagnosis rather is a specific clinical symptom. This article reports ongoing case of "Mucous Membrane Pemphigoid" presenting as desquamative gingivitis.

A female patient reported with the chief complain of wounds and burning sensation on gums since 4 months. Clinical findings along with tissue specimen sent for histopathological examination and direct immunofluorescence provided the final diagnosis of Mucous Membrane Pemphigoid. Subsequently, the management was done with regular follow ups.

Desquamative gingivitis can be the clinical symptom of some dermatitis and mucocutaneous diseases therefore, underlying primary cause should be evaluated meticulously and should be treated accordingly.

Keywords: deflazacort; desquamative gingivitis; management; mucous membrane pemphigoid; Nepal

INTRODUCTION

Desquamative gingivitis (DG) is a descriptive term that indicates the presence of diffuse desquamation, erythema, erosion, and blistering of the attached and marginal gingiva.[1]It was first recognized and reported in 1894[2],and the term chronic desquamative gingivitis was coined by Prinz in 1932.[3] Approximately 50% of DG cases are localized to gingiva, although patients can have involvement of other intraoral and extraoral sites.[4] It encompasses a broad clinical spectrum of mucocutaneous disorders ranging fromimmune-mediated vesicobullous diseases (VBDs) to various allergic reactions.[5]Lichen planus and Mucous membrane pemphigoid (MMP) account for 84% of theDG cases.[6]

Mucous membrane pemphigoidis a group of putative autoimmune, chronic inflammatory, sub-epithelial blisteringdiseases predominantly affecting mucous membranes; characterized by linear deposition of IgG, IgA, or C3 along the epithelial basement membrane zone (BMZ).[7] The clinical manifestations (blistering/ desquamation) are due to abnormal production, for unknown reasons, of autoantibodies directed against various components of BMZ (hemidesmosomes); followed by complement activation and leukocyte recruitment which cleave BMZ, usually at the level of the lamina lucida; thus, sub epithelial split occurs. In most cases, immune responses are directed against Bullous Pemphigoid(BP) antigen 2; less often, against BP1, epiligrin (laminin 5), and β4 integrins.[4]Scarring and associated loss of function are majorsequelae.[7]

In the present case report, we present the diagnosis and management of patient with MMP with chronic generalized mild periodontitis.

CASE REPORT

The patient, a 52 years old female, presented to Department of Periodontics, Kantipur Dental College and Hospital complaining of blisters in her upper gum region; developed 4 months before and associated with burning sensation and pain.No history of burning micturition or pain on coitus. She had attended nearby clinicsfor the same problem where she was prescribed with 0.1% chlorhexidine gel, antibiotics, vitamin C and 1% clotrimazole gel which could not relieve the symptoms. Her medical history revealed that she was under medication for pshycotic disordersince 5 years (Risperidone 1 mg) and Hypertension since 7 years (Losartan 50mg). Menstrual history revealed of menopause 2 years back.

Figure 1: Baseline presentation with blister, desquamation and ulcerations

Figure 2: Healing after 2 weeks

On base line examination, there werenot any significant extraoral findings with no evidence of ocular involvement and no lesions elsewhere in the body. Intra- oral examination revealed generalized gingival erythema with blister (1*1 mm^2) on interdental papilla with respect to (w.r.t) 11 and 21, multiple small ulcers on attached gingiva w.r.t 24, 25, 26 and areas of desquamation on buccal attached gingiva w.r.t 17, 16, 15, 24, 25, 26, 37, 36, 35, 34 and on lingual attached gingiva w.r.t. 35 and 36(Figure 1). Areas were tender on palpation. Nikolsky and Asboe-Hansen signs were positive. Because of the sensitivity of gingiva (VAS score 5/10), the periodontal examination was not completed. Provisional diagnosis of pemphigus vulgaris was made with differential diagnosis of mucous membrane pemphigoid, bullous pemphigoid and bullous lichen planus. Patient was advised for routine blood investigations and biopsy was performed on perilesional tissue w.r.t 24, 25 and sent for histopathological examination anddirect immunofluorescence (michel's solution). Patient was prescribed with 0.1% triamcinolone acetonide gel (topical corticosteroid) three times a day (TDS)and benzydamine mouthwash (NSAID)twice a day (BD)and recalled after 2 weeks for evaluation.

After 2 weeks, healing of the biopsy site was uneventful with regression of gingival lesions (Figure 2) and mild pain relief (VAS score 2/10). Disease control phase was achieved. Histopathologic examination revealed parakeratinized stratified epithelium with separation from basement membrane suggestive of sub-epithelial splitting and increased number of neutrophils and few lymphocytes and plasma cells were appreciated sub epithelially (Figure 3). And on direct immunofluorescence, I_gG and C_3 were shown strong positive and I_gA moderate positive at dermo-epidermal junction. (Figure 4) The final diagnosis

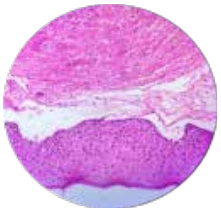

Figure 3: Histopathological section showing parakeratinized epithelium with sub- epithelial split and connecting tissue with increased inflammatory cells

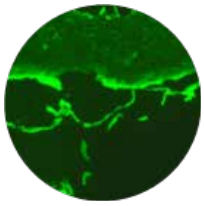

Figure 4: Immunofluorescence examination showing I_gG and C_3 strong positive and I_gA moderate positive at dermo-epidermal junction.

Figure 5: One and half month follow up with approximately 90% of healing

Figure 6: Four and half month follow up with complete healing

of MMP was given. Complete periodontal examination revealed chronic generalized mild periodontitis. After dermatological, ophthalmic and psychiatric consultation, non-surgical periodontal therapy was performed, proper brushing and flossing techniques were demonstrated and soft bristle toothbrush was advised. The medication was changed to Deflazacort (systemic corticosteroid) 36 mg once a day(OD) for 10 days tapered as 30 mg followed by 24 mg each OD for 10 days; along with Chlorhexidine mouthwash 0.2% 10ml BD for 7 days.

On 1 and half month follow up, 90% of the oral lesions showed healing of the desquamative areas (Figure 5). No new lesions were seen. End of consolidation phase was achieved. But she developed swelling of face. It was identified as the side effect of systemic corticosteroid. The medication was then changed to Prednisolone gargle (10mg tablet in ½ glass of water) 10 minutes BD for 2 weeks and 0.1% triamcinolone acetonide gel (topical corticosteroid) TDS.

The medication was continued and the patient was kept on regular follow up visits. Over the due course of 4 and half months, gingiva showed complete healing and periodontal parameters were consistent with periodontal health (Figure 6).

DISCUSSION

McCarthy (1960) suggested that DG is not a specific disease entity instead isa gingival response associated with variety of conditions; Lichen planus, cicatricial pemphigoid, other mucocutaneous autoimmune conditions (e.g., bullous pemphigoid, pemphigus vulgaris, linear immunoglobulin A disease, dermatitis herpetiformis, lupus erythematosus, chronic ulcerative stomatitis). Without a systematic diagnostic approach, the cause of DG cannot be elucidated. Among patients who first see a dentist, the eyes are affected in approximately 25% whereas, among patients who first see a dermatologist, 66% have

conjunctival lesions and in ophthalmic studies, 100% of patients have ocular involvement.[4]

In our case, the patient first reported to the dentist as oral lesions are first to show and last to go. There were no ocular involvements. Timely diagnosis and management was done which minimized the systemic complications. The medication initially prescribed was topical corticosteroid (group III). Due to unresponsiveness of the patient, the medication was changed to systemic corticosteroid which was later again changed into topical corticosteroid gel with the steroid mouth-rinse due to the adverse effects of edema of face. Our case highlights the important role of dentists forearly diagnosis of vesicobullous lesions and timely management such that severe systemic manifestations can be prevented.

The initial step in diagnosis is the exclusion of differential diagnosis on the basis of clinical manifestations. MMP shows a predilection for women (average age 60 years) with oral, conjunctival, nasal, esophageal, laryngeal or vaginal mucosa.[8] However, confirmation via histopathological and immunofluorescence studies is essential.[9] Site selection for gingival biopsies is important to obtain diagnostic samples in patients with DG.Biopsy site should be chosen from an area of intact epithelium including lesion and/or perilesion tissue. A stab-and- roll biopsy has been shown to preserve epithelium during biopsy procedures in DG casesrather than conventional techniques. Regarding site for biopsy, there is no significant difference in immunofluorescence detection rate between perilesional and distant sites.[10] Patients with positive immunofluorescence present with severe and persistent disease, require aggressive treatment with systemic corticosteroids and longer follow ups.[11]

After correct diagnosis, there are no strict guidelines for the choice of therapy for MMP. However, some guidelines have been purposed (Figure 7).[12] It is suggested patients with localized oral lesions often responds effectively to topical treatment.[4]Triamcinolone acetonide 0.1%, fluocinonide (0.05%) and clobetasol propionate (0.05%) can be used TDS for up to 6 months for mild to moderate lesions with no systemic involvement.[13] Prednisolone is the drug of choice for systemic corticosteroid therapy by practioners. However, deflazacort is being tried due to its lower side effects and better pharmacokinetics and lesser side effects.[14] In our case, we also prescribed deflazacort. But it also showed side effects despite of resolving the lesion. Whenever the administration of corticosteroids is sought, the practitioner needs to be concerned about the side effects. Low dose, dose tapering and lag periods are advisable.

Studies show positive correlation between DG and periodontitis. Indirect mechanism of impaired oral hygiene and direct mechanism of shared pathogenetic mechanisms/ mediators have been hypothesized.[15]Therefore, apart from pharmacotherapy, the oral hygiene is utmost important in cases of DG. Plaque and its retentive factors should be eliminated and patient should be provided with proper oral hygiene instructions. The compliance and maintenance of the patient should be accessed and reinforced in every visit.

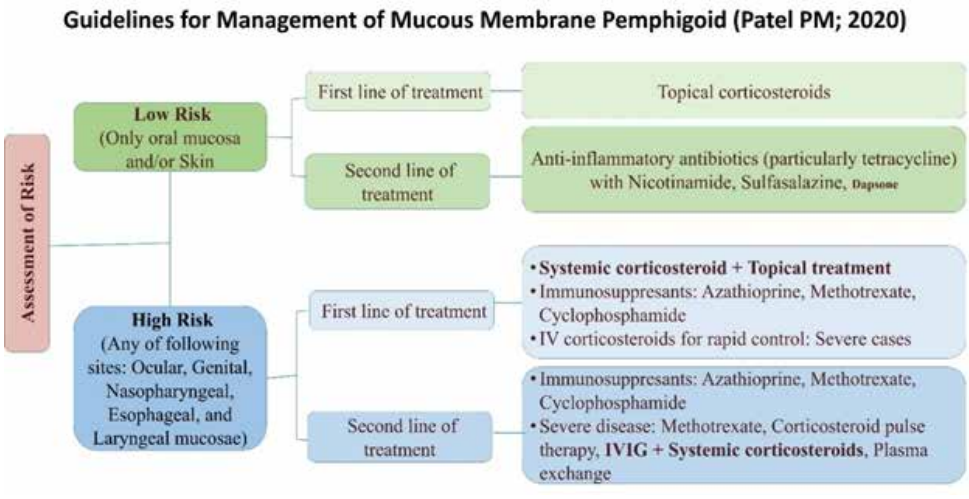

Figure 7: Guidelines for the management of MMP

CONCLUSION

Early diagnosis of DG holds a great value in minimizing the severe cases and systemic complications. Therefore, dentists should be aware of the systemic conditions predisposing to the gingival manifestations. Underlying conditions should be ruled out before any diagnosis is made. In cases of MMP, oral hygiene and periodontal health holds importance as significant as pharmacotherapy for the resolution. Patients should be kept on long term follow ups to track the disease recurrence.

CONFLICT OF INTEREST

This case report has been presented by the first author in 7th PG Convention of Nepalese Society of Periodontology and Oral Implantology in 8th January 2021.

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Mucocele on the Edentulous Ridge: A Case Report

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ABSTRACT

Mucocele of the oral cavity results from an alteration of minor salivary glands due to mucous accumulation. Extravasation phenomenon is usually of traumatic origin that causes mucin accumulation resulting in limited swelling. The most common location of the extravasation mucocele is the lower lip. Typically, the patient presents with a history of recurrent swelling that develops over days or weeks, ruptures, and then recurs after few weeks. Diagnosis is principally clinical; therefore, the diagnosis should be carried out correctly, looking for previous history of trauma. Special care should be taken to avoid injury to the adjacent glands and ducts while placing sutures as this is also a cause for reappearance. Herein, we present a case of a 21 years old female patient with a recurrent lesion of extravasation mucocele on the alveolar ridge, which was surgically excised. There was no evidence of recurrence during follow-up. The histopathological examination along with special stains was used for the confirmation of the diagnosis.

Keywords: Alcian blue; alveolar ridge; mucocele; trauma.

INTRODUCTION

Mucocele is used as a collective term for mucous extravasation and mucous retention cysts.[1] 'Mucous extravasation cyst' is a pseudocyst in which mucus has extravasated into adjacent soft tissue. 'Mucous retention cyst' is employed to describe mucocele that results from dilatation of the ducts and is lined by epithelium.[1] Majority of the extravasation mucocele is found on the lower lip, but other sites subjected to trauma may also be involved. These lesions are uncommonly found in other intraoral regions where salivary glands are located, probably because of lower susceptibility to trauma.[2] Some mucoceles get ruptured and healed by themselves, but in many cases local surgical excision is necessary.[3] The present case report deals with the mucocele present on the alveolar mucosa in a 21-years-old female which was surgically excised.

CASE REPORT

A 21-year-old female patient undergoing orthodontic treatment in Kantipur Dental College & Hospital for two years revealed a painless swelling on the 23 and 24 area on routine dental examination. She gave a history of similar swelling in the same region after therapeutic extraction of 24 four months back. There was negative history of any trauma or deleterious oral habits. The lesion was removed surgically but no histopathological examination was done. On intraoral examination, a well-circumscribed, soft, fluctuant, mobile, non-tender, solitary lesion measuring about 6 mm x 5 mm on the alveolar ridge with respect to 24 was seen. (Figure 1) The extra-oral examination did not show any facial swelling or lymphadenopathy. She had an unremarkable medical history.

Figure 1: Intra-oral pictures of the lesion.

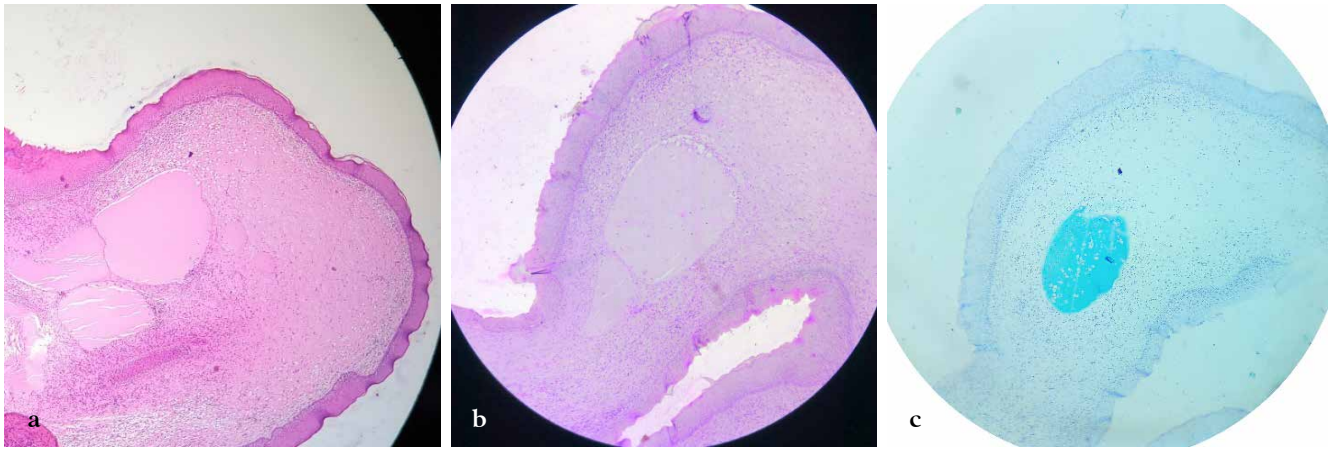

Figure 2: Histopathological pictures. a) H&E stain, b) PAS stain and c) Alcian blue stain.

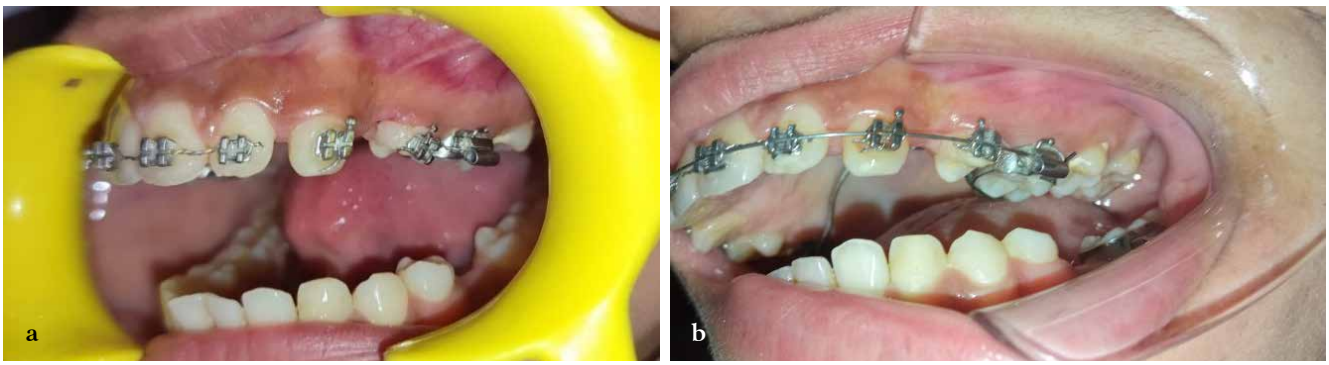

Figure 3: Follow-up pictures. a) one week, b) six months.

Under local anesthesia, the lesion was resected from the base with scalpel 15C and periodontal dressing (COE-PAK™, GC AMERICA INC. ALSIP, IL 60803 U.S.A.) was given. The obtained sample was sent for histopathology. Histopathological examination revealed a cystic cavity filled with mucin pool surrounded by connective tissue stroma. The connective tissue was composed of dense bundles of collagen fibers with spindle to angular fibroblasts. There were numerous muciphages (foamy cells), lymphocytes, and plasma cells. The overlying epithelium consisted of atrophic parakeratinized stratified squamous epithelium with melanin pigmentations. The given tissue was also subjected to special stains for mucin i.e., Periodic Acid-Schiff (PAS) and Alcian blue stain. PAS stain showed positivity for mucin. Alcian blue stain (pH 2.5) showed a positive reaction for mucin indicating that it is acidic and sulfated mucopolysaccharide.(Figure 2) Based on these evidences, the definitive diagnosis of mucus extravasation cyst was made.

The patient was examined on a follow-up after one week, and the postoperative healing was uneventful. On further follow-ups of one month, three months, and six months no recurrence of the lesion was seen. (Figure 3)

DISCUSSION

Chi et al.[4] preferred to reserve the term "mucocele" (also known as mucus extravasation phenomenon or mucus escape reaction) for lesions caused by mucin spillage from a ruptured salivary duct.[4] They also used the term "salivary duct cyst" (mucus retention cyst, sialocyst, or mucus duct cyst) for cysts lined by salivary ductal epithelium.[4] Extravasation mucocele is less common than retention type (5%, 95% respectively).[5] Prevalence of mucocele is 1.4 per 1000 persons among the salivary gland lesions.[6] Adolescents and children are more commonly affected than adults.[2] These lesions can affect people of any age, though they commonly appear in the first three decades of life.[7] Both the males and females are affected in the same proportion.[8] Our case presents a mucocele in a young female patient.

Mucoceles are normally found in the regions where mucous glands are seen. These frequently occur in the lower lip, however, they can also be found on the buccal mucosa, palate, floor of the mouth, cheek, and tongue involving Blandin-Nuhn. Other sites include the retromolar area, rarely gingiva, and other unspecified locations.[9] When

located on the floor of the mouth, these lesions are called ranulas because the lesion resembles the belly of a frog.[10] Lip biting and other parafunctional activities may favor its development on the lower lip.[11] Additionally, the downward forces of gravity may play a role in the higher prevalence in the lower lip.[4] In our case, the location is edentulous alveolar ridge, which is the rare site of occurrence.

Both extravasation and retention mucoceles have the same clinical appearance as vesiculobullous lesions. Mucous extravasation cysts are typically raised and fluctuant masses.[1] The superficial lesions appear vesicular and present as bluish, soft, and transparent cystic swelling that resolve spontaneously.[7] The blue tint is caused by vascular congestion, tissue cyanosis, and accumulation of fluid below the epithelium. However, coloration may vary depending on the size of the lesion, its proximity to the surface and the elasticity of overlying tissue.[3] The deeper lesions are covered by normal-appearing mucosa.[7] Mucoceles are usually asymptomatic but can caused is comfort if they interfere with speech, chewing, or swallowing.[7]

Extravasation mucoceles are caused by fluid escaping from surrounding tissue ducts or acini. Salivary secretion can leak into the submucosal tissue due to physical trauma.[12] Another plausible explanation for the development of such lesions may be due to the rupture of an acinar structure caused by increased pressure from ductal blockage.[3] Proteolytic enzymes could also play a role in the pathogenesis of these lesions.[13] Bagán et al.[5] proposed that extravasation mucoceles undergo three evolutionary phases. In the first phase, mucous spills diffusely from the excretory duct into connective tissues containing some leucocytes, muciphages and histiocytes (Figure 4a). The extravasated mucins coalesce to form the larger area. The second phase is the resorption phase where granuloma forms around the pooled mucin. The granuloma consists of histiocytes, macrophages, and multinucleated giant cells associated with a foreign body reaction (Figure 4b). In the final phase, connective tissue cells form a pseudocapsule without epithelium (Figure 4c).[5] This lack of epithelium can be demonstrated histopathologically which helps in differentiation between an extravasated mucocele from the retention type. Our case was of early phase containing mucous spillage in the connective tissue along with inflammatory infiltrates.

The lesion on histopathology lacks an epithelial lining. However, the overlying epithelium may be intact or flattened.[8] There are variations in the histologic features depending on the age of the lesion. An early lesion consists of a moderately well-defined and occasionally circumscribed cavity within the soft tissue that is filled with an eosinophilic material that stains positive for mucin. Within the material, an admixture of acute and chronic inflammatory cells, and foamy histiocytes may be found. The surrounding connective tissue is composed of compressed fibrovascular tissue which may be mistaken for flattened epithelial cells. A variable number of inflammatory cells may be seen. Salivary

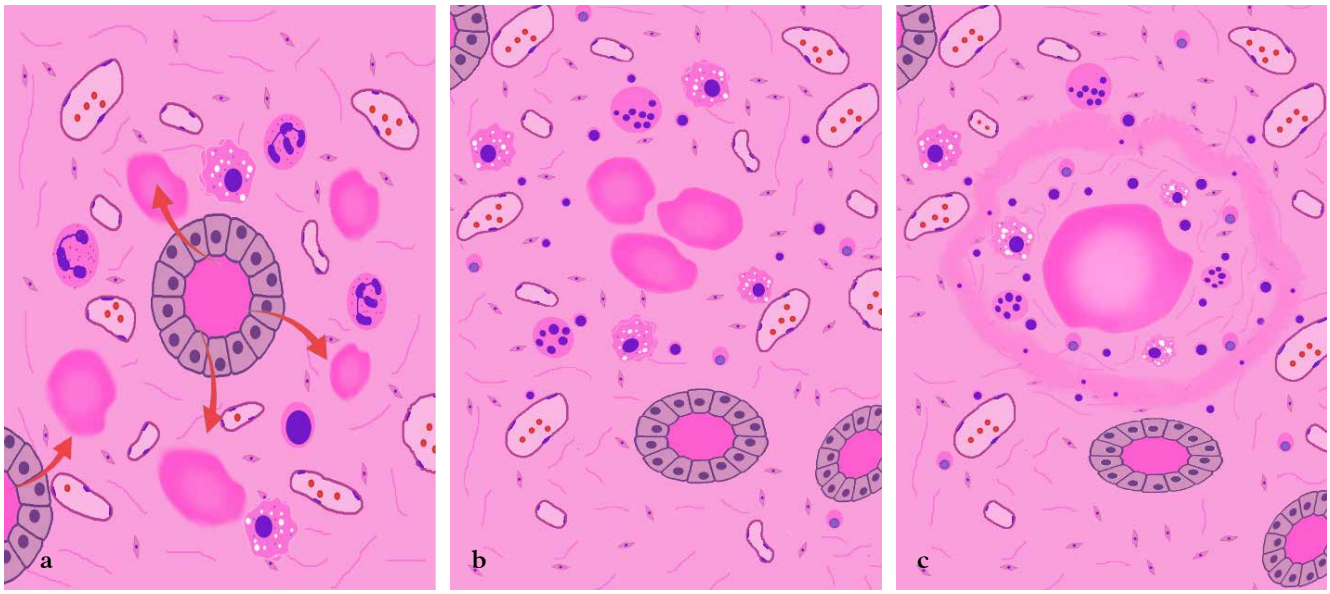

Figure 4: Evolutionary phases of mucocele, a) First phase:mucous spills diffusely from the excretory duct into connective tissues; b)Second phase:granuloma forms around the pooled mucinand c) Third phase: connective tissue cells form a pseudocapsule around the mucin.

gland acini or ductal elements adjacent to the lesion are a frequent finding. However, the presented case did not show salivary gland components or ductal elements. This might be due to inadequate depth or absence of salivary components surrounding the lesion. As the lesion matures the granulation tissue progressively grows into the cavity and slowly obliterates the defect. During this phase, the term organizing mucocele is applied. This represents an attempted repair of the lesion by the body. Changes may also be seen in the salivary gland adjacent to the lesion.[14]

Special stains for mucin such as PAS, alcian blue, mucicarmine, and colloidal iron may help exclude other non-salivary gland lesions.[14]

The various differential diagnosis includes benign or malignant salivary gland neoplasms, oral hemangioma /lymphangioma, venous varix, lipoma, fibroma, oral lymphoepithelial cyst, gingival cyst in adults, soft tissue abscess, and cysticercosis. Superficial mucoceles may be confused with cicatricial pemphigoid, bullous lichen planus, and minor aphthous ulcers.[3]

Small mucoceles may not require surgery if the patients find them to be of no hindrance. Larger lesions require surgical treatment. The lesion with its associated salivary gland lobules should be removed completely to prevent recurrences.[1] Other treatment options include marsupialization, cryosurgery, laser excision and injection of a sclerosing agent.[7] This article describes a case report of mucocele on the alveolar mucosa treated by surgical excision. Despite the small size of the lesion, the patient was concerned about recurrence and discomfort, thus it was entirely resected in our case.

After excision, there is a chance of recurrence, but this is less likely if the adjacent salivary gland acini are also removed.[8] The overall recurrence rate was found to be 2.8%.[15] In our case the recurrence of the lesion might be due to trauma. Hence, histopathological evaluation of any excised mass is a must to rule any suspected pathological lesions.

CONCLUSION

Mucoceles are mainly benign and self-limiting, and can be easily detected based on clinical presentation and accurate history. However, it is crucial to rule out other possible pathologic conditions that may mimic mucocele such as gingival cyst, apthous ulcer or vascular lesions. Hence, it is important to evaluate any suspicious lesions histopathologically.

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