European Journal of Clinical Pharmacy
Print ISSN: 2385-409X **Online ISSN**: 3105-0409
Website: https://farmclin.com/

Original Research Article

Association Between Unilateral Impacted Maxillary Canine and Nasal Septum Deviation: A retrospective Cone Beam Computed Tomography Study.

Article History:

Name of Author:
Durga Varma[1], Ajay Bhoosreddy[2], Chetan Bhadage[3], Saylee Kankal[4], Viprada Pawar[5], Madhura Shahakar[6], Tejashree Deokate[7]

Affiliation: *[1]Post graduate student, Department of OMR, MGV'S KBH Dental College & Hospital, Nashik, Maharashtra, India*
[2]Professor, Department of OMR, MGV'S KBH Dental College & Hospital, Nashik, Maharashtra, India
[3]HOD, Professor, Department of OMR MGV'S KBH Dental College & Hospital, Nashik, Maharashtra, India
[4]Post graduate student, Department of OMR, MGV'S KBH Dental College & Hospital, Nashik, Maharashtra, India
[5]Post graduate student, Department of OMR, MGV'S KBH Dental College & Hospital, Nashik, Maharashtra, India
[6]Post graduate student, Department of OMR, MGV'S KBH Dental College & Hospital, Nashik, Maharashtra, India
[7]Post graduate student, Department of OMR, MGV'S KBH Dental College & Hospital, Nashik, Maharashtra, India

Corresponding Author:
Durga Varma

Received: 12-01-2026
Revised: 05-02-2026
Accepted: 20-02-2026
Published: *30*-03-2026

Abstract: ***Background:*** Nasal septum deviation (NSD) is a common anatomical variation that can compromise nasal airflow and contribute to mouth breathing, obstructive sleep apnoea, potentially influencing craniofacial growth and dental development. Maxillary canine impaction is frequently associated with alterations in maxillary morphology; however, the relationship between unilateral impacted maxillary canines (UIMC) and nasal septum deviation remains inadequately explored. The aim of this study was to evaluate the association between unilateral impacted maxillary canines and nasal septum deviation using cone beam computed tomography (CBCT). ***Materials And Methods:*** This retrospective CBCT-based study included scans of 48 patients aged 18–55 years. The sample was divided into two groups: Group A with normally erupted maxillary canines and Group B with unilateral impacted maxillary canines. The septal deviation angle and linear parameters related to the position of the maxillary canine cusp-to-midline distance, root-to-midline distance, cusp-to-occlusal plane distance, root-to-nasal cavity distance, and root-to-nasal contact surface were measured using Sidexis software. Data normality was assessed using the Shapiro Wilk test. Intergroup comparisons were performed using unpaired t-tests, and statistical significance was set at $p < 0.05$. ***Results*** The septal deviation angle was significantly greater in the impacted canine group compared to the normal canine group (27.69° ± 12.52 vs. 18.56° ± 6.45; $p = 0.003$). Impacted canines were positioned significantly closer to the midline ($p < 0.001$) and nasal cavity ($p < 0.001$) and showed a significantly greater vertical distance from the occlusal plane ($p < 0.001$). No statistically significant difference was observed in the canine root-to-midline distance or root-to-nasal contact surface between the groups ($p > 0.05$). ***Conclusion*** Unilateral impacted maxillary canines are associated with a significantly increased nasal septum deviation angle and altered spatial positioning relative to the midline, occlusal plane, and nasal cavity. These findings suggest a possible anatomical relationship between canine impaction and nasal septal morphology, highlighting the importance of comprehensive CBCT evaluation in diagnosis and interdisciplinary treatment planning involving orthodontics and otolaryngology.

Keywords: Unilateral impacted maxillary canine, Nasal septum deviation, Cone beam computed tomography, Maxillary canine impaction, Craniofacial asymmetry, Mouth breathing, Dentofacial morphology.

INTRODUCTION

Nasal breathing is the primary mode of air intake for humans, and it is essential for a supply of properly cleansed, moistened and warmed air for the lungs. If the primary airway is blocked, mouth breathing becomes obligatory to get air into the lungs.[1] Chronic mouth breathing in children leads to pathological adaptations in the postural and morphological characteristics of the stomato-gnathic system.[2]
Mechanical obstacles that may contribute to the blockage of the nasal passage and cause the child to shift to mouth breathing include anatomical variations that occur in the nasal cavity and the paranasal region during development, such as Haller cells, agger nasi cells, paradoxical middle turbinate and concha bullosa; as well as inflammatory sinonasal changes, such as recurrent chronic sinusitis and hypertrophy of the inferior nasal concha.[3]

A deviated nasal septum causes a restriction of nasal airflow. Restricted nasal airflow leads to mouth breathing. Mouth breathing causes some incompatible developments in the craniofacial structures. As a result of incompatible development that occurs with oral breathing, facial shapes called “adenoid face” or “long face syndrome” may occur. Studies on this subject have pointed out the role of enlarged adenoids and tonsils and allergic rhinitis on the breathing pattern.[4] It also results in muscle imbalance, which may lead to oral and craniofacial alterations.

Evaluating nasal septum deviation in patients with impacted canine helps in identifying contributory airways related factors also the incidence of headaches, oxidative stress. For the patient, the purpose to undergo a septoplasty is to improve nasal and olfactory functions or as a cosmetic procedure along with the dental sequelae resulting from altered maxillary growth and eruption patterns persist and require targeted oral intervention.[5]

Mouth breathing children have a significant decrease in tongue pressure. Children with mouth breathing resulting from upper airway obstruction tend to have a downward position of the lingual muscles, which disturbs the balance, contributing to the compression of the upper dentition and constricted maxillary dental arch, as well as the crossbite of posterior teeth.[6] Maxillary canines are the most commonly impacted teeth, second only to third molars. Maxillary canine impaction occurs in approximately 2% of the population and is twice as common in females as it is in males.

The incidence of canine impaction in the maxilla is more than twice that in the mandible. Of all patients who have impacted maxillary canines, 8% have bilateral impactions. Approximately one third of impacted maxillary canines are located labially and two-thirds are located palatally. Canine impaction can be caused by various factors.[7] The impaction might cause changes in the alveolar bone’s dimensions or disrupt the dental angulations of surrounding teeth. Subjects with maxillary canine impactions showed a transverse maxillary deficit in the anterior section of the dental arch, according to McConnell et al.[8]

The effect of canine impaction on alveolar maxillary dimensions has been evaluated in several studies.[9,10,11] Compared with the unaffected side, Tadinada et al.[11] found that buccal-palatal width, height of floor of nasal cavity to alveolar ridge, and dental arch perimeter were significantly reduced towards the affected side. Lateral incisor roots near the affected palatal canines are more angulated than those of the lateral incisors near canines that erupt normally, according to Kanavakis et al.[8] On the affected side, D’Oleo-Aracena et al.[9] found reduced arch width in the area of the primary premolars and increased distal angulation of lateral incisors.

With the advent of cone-beam computed tomography (CBCT), more specifically, by rendering three-dimensional (3D) views of teeth and bone at high resolution, detailed characteristic of alveolar bone dimensions can be obtained at the impacted side. Finding specific morphological differences in patients with palatally displaced canines could help to revise and maybe add to the accepted interceptive measures: extraction of the deciduous canine.[12]

Rationale of the study: The relationship between a unilateral impacted maxillary canine (UIMC) and nasal septum deviation (NSD) is a critical area of study in orthodontics, maxillofacial surgery, and otolaryngology.[13] Understanding this correlation has several clinical and diagnostic implications as Developmental and Anatomical Influence, Airway and Functional Implications and Facial Asymmetry and Aesthetic Concerns.[14] Advanced imaging techniques like Cone-Beam Computed Tomography (CBCT) can help evaluate both UIMC and NSD in three dimensions. This aids in accurate diagnosis, treatment planning, and prognosis assessment by providing detailed insights into the spatial relationship between the impacted canine and nasal septum.

The aim of the study is to evaluate the relationship between unilateral impacted maxillary canines (UIMC) and nasal septum deviation (NSD) using Cone-Beam Computed Tomography (CBCT).

The present study successfully achieved its aim of evaluating association between unilateral impacted, maxillary canine and nasal septum deviation and demonstrated a discernible association between unilaterally impacted maxillary canine and nasal septum deviation, there by confirming that the aim was achieved.

Materials And Methods:

It is a retrospective analytical CBCT study.

Ethics approval: The Present study will be conducted in the Department of Oral Medicine and Radiology after obtaining the approval from institutional ethical committee.

Sample size calculation and participants:

Level of

significance = 5%, Power = 80%, Type of test = two-sided.

Formula of calculating is Sample size for correlation coefficient ‘r’:

n=〚((Z1+Z2)/Cr)〛^2 **where** $Cr = \frac{1}{2}\{LOGe\frac{(1+r)}{(1-r)}\}$

where

N	Estimate of Correlation coefficient for relationship between unilateral Impacted Maxillary Canine and Nasal Septum Deviation	0.4
Cr	Fisher’s arctanh transformation	0.423
1-α	Set level of confidence (<1.0)	0.95
1-β	Set level of power of test (<1.0)	0.8
Z1	Z value associated with alpha	1.96
Z2	Z value associated with beta	0.8416
n	Minimum Sample size	47

Assuming all the factors, sample size comes around to final 47 subjects.

So, the study population consist of CBCT scans of 48 patients, in order to equally divide the samples in two groups.

Sampling Technique: The samples will be divided using Random Sampling technique.

Cone beam computed tomography scan data will be visualized using the measuring and other accessory tools of sidexis software.

Workstation computer monitors. CBCT scans taken from radiographic data base of CBCT unit:- Model designation- ORTHOPHOS XG 3D/Ceph Company :- Sirona

Study design and eligibility criteria of participant:

Inclusion criteria:

1. CBCT scans of patients within the age range of 18-55 years.
2. CBCT scans depicting Unilateral Impacted Maxillary Canine and normally erupted canine
3. CBCT scans showing complete anatomy of nasal septum.

Exclusion criteria:

1. CBCT scans of individuals with any syndrome in the craniofacial region or an anomaly affecting the craniofacial

region, pathological lesions in the craniofacial region, multiple missing teeth, previous orthodontic treatment
2. CBCT scans depicting Bilaterally Impacted Maxillary Canine
3. CBCT scans showing extreme morphological variations of impacted canine.
4. CBCT scans showing Low image quality, artifacts, partial image.
5. CBCT scans showing radiographic evidence of trauma and surgery in area of interest.
6. CBCT scans of patients with radiographic evidence of systemic diseases affecting bone metabolism like, osteoporosis, Medication related osteonecrosis of the jaw (MRONJ), Paget’s disease, hyperparathyroidism, etc.

Study Groups:
The present study will include-selected CBCT scans of patients in the age group of 18-55 years with,
Group A: CBCT scans with Unilateral Impacted Maxillary Canine
Group B: CBCT scans with Normally Erupted Maxillary canine

Definitions of the variables and measurement procedure:
The variables and definitions used in the study are mentioned in the Table-1.
The liner and angular measures were done using sidexis software.

Table-1: The variables and definitions used in the study

Variable	Definition
The septal deviation angle (SDA)	The angle between the line drawn from crista galli to anterior nasal spine and line drawn from crista galli to point of maximum deviation on nasal septum in coronal section.
U3cusp-midline distance (U3CMD)	Horizontal distance between the maxillary canine crown tip to midline in axial section
U3root-midline distance (U3RMD)	Horizontal distance between the maxillary canine root tip to midline in axial section
U3-occ. Distance (U3OD)	Vertical distance between maxillary canine crown tip to occlusal plane in sagittal section
U3root-nasal cont. surface (U3NC)	the amount of contact surface of the maxillary canine root with the nasal cavity in the coronal section
U3root-nasal cavity distance (U3ND)	the closest distance of the maxillary canine root to the nasal cavity in the coronal section

By using the sidexis software septal deviation angle will be assessed. By using the line drawing tool in sidexis software, a line will be drawn from the crista galli to the ANS and the line drawn from the crista galli to the point of maximum deviation on the septum in the coronal section. The angle formed by these two lines will be measured.

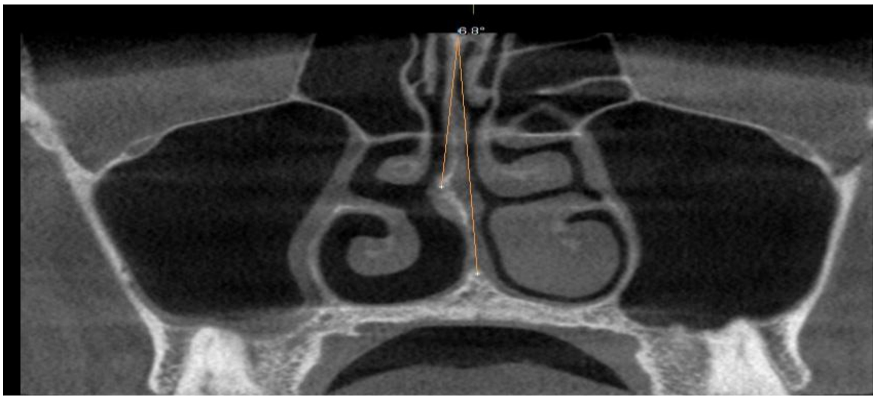


Fig-1: The septal deviation angle: The angle between the line drawn from crista galli to anterior nasal spine and line drawn from crista galli to point of maximum deviation on nasal septum in coronal section.

To measure the horizontal distance from the maxillary canine crown tip to the midline in the axial section, a line will be drawn from tip of the crown of the impacted maxillary canine to the midline and length of this line will be measured.

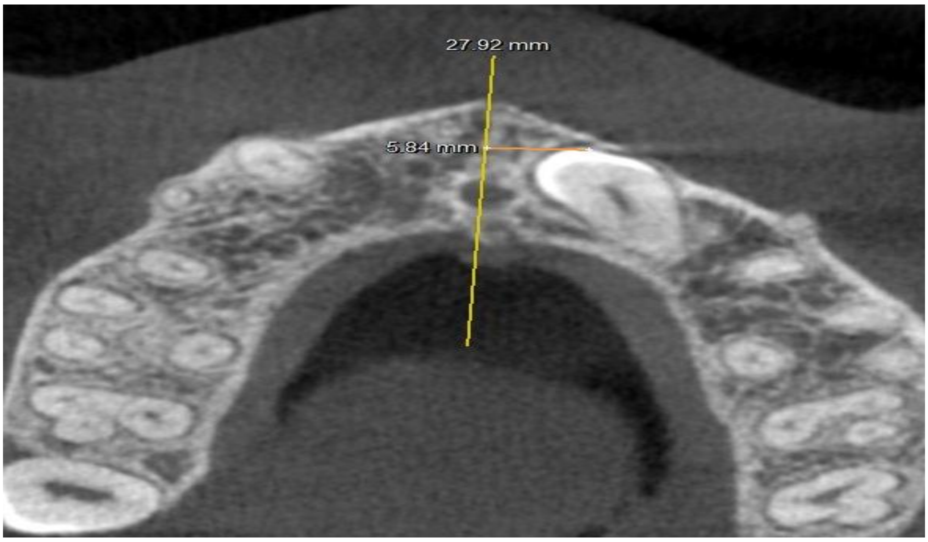


Fig-2: U3cusp-midline distance: Horizontal distance between the maxillary canine crown tip to midline in axial section

To measure the horizontal distance from the maxillary canine root tip to the midline, a line will be drawn from the tip of the root of impacted maxillary canine to the midline, and the length of this line will be measured.

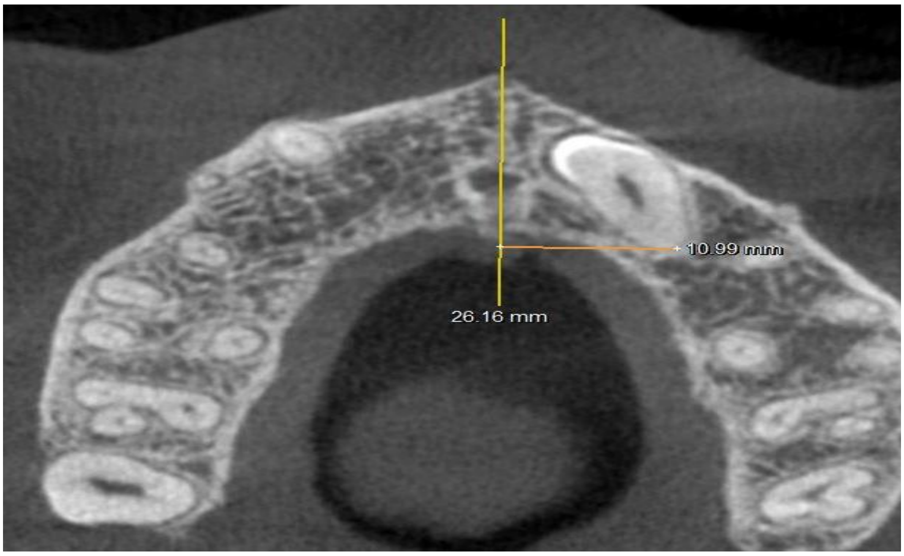


Fig-3: U3root-midline distance: Horizontal distance between the maxillary canine root tip to midline in axial section

To measure the vertical distance from the maxillary canine crown tip to the occlusal plane in the sagittal section, a line will be drawn from crown tip of impacted maxillary canine to the occlusal plane in sagittal section and length of this line will be measured.

Fig-4: U3-occ. Distance: Vertical distance between maxillary canine crown tip to occlusal plane in sagittal section

To measure the amount of contact surface of the maxillary canine root with the nasal cavity in the coronal section, a line will be drawn on the area of contact of impacted maxillary canine and the nasal cavity, and the length of the line will be measured.

Fig-5: U3root-nasal cont. surface: the amount of contact surface of the maxillary canine root with the nasal cavity in the coronal section

To measure the closest distance of the maxillary canine root to the nasal cavity in the coronal section, a line will be drawn from the closet point on the root of impacted maxillary canine and nasal cavity, and the length of this line will be measured.

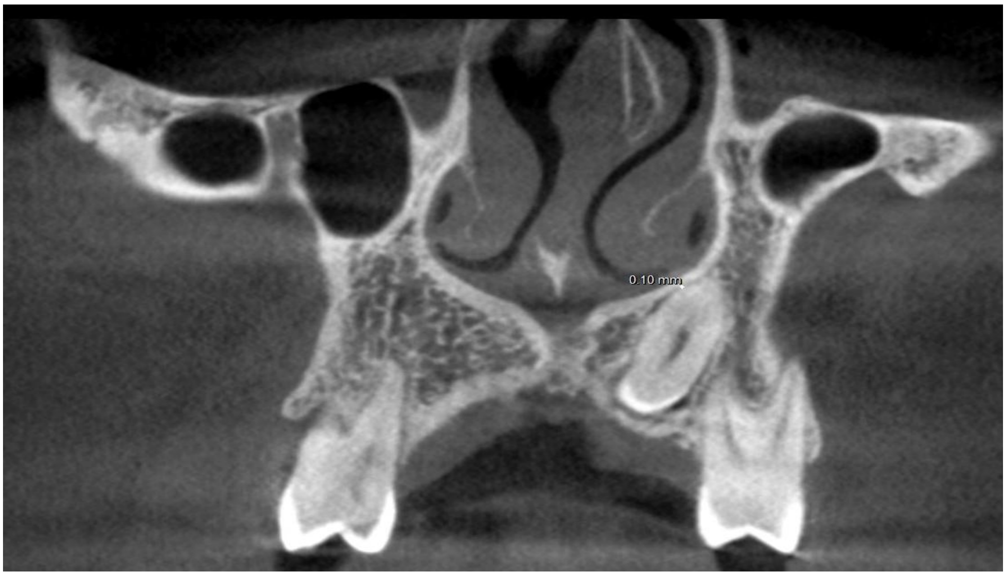


Fig-6: U3root-nasal cavity distance: The closest distance of the maxillary canine root to the nasal cavity in the coronal section

Statistical analysis:

Statistical analysis will be performed using Statistical Product and Service Solution (SPSS) version 21 for Windows (SPSSInc, Chicago, IL). Descriptive quantitative data will be expressed in mean and standard deviation respectively. Descriptive qualitative data will be expressed in percentage/proportion. Data normality will be checked by using Shapiro – Wilk test. Confidence interval is set at 95% and probability of alpha error (level of significance) set at 5%. Power of the study set at 80%. Correlation between study parameters will be done using Pearson or Spearman ‘r’ correlation coefficient test. Association between study parameters will be done using Chi square test.

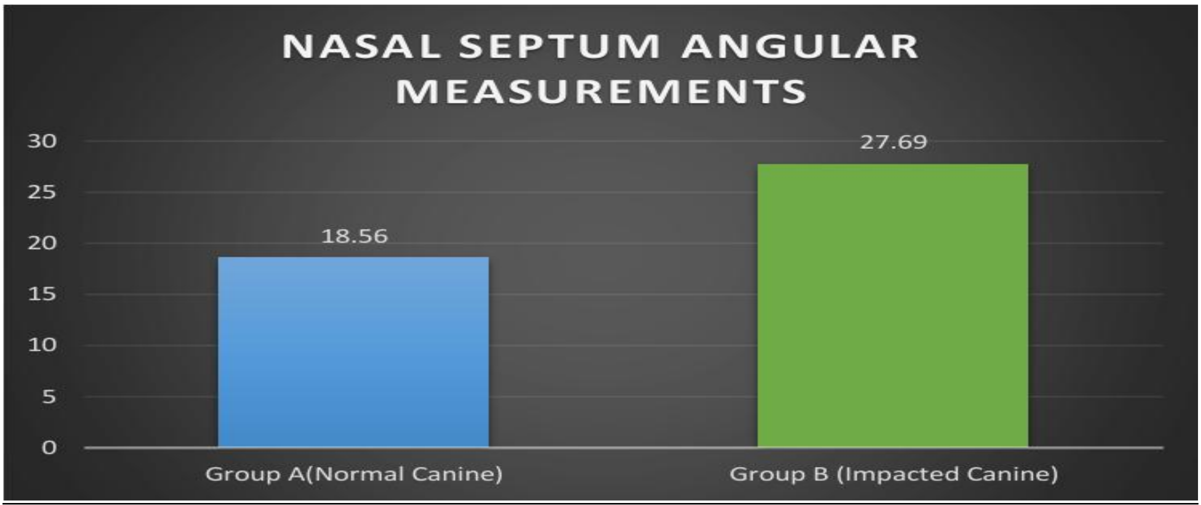
RESULTS

Table 1: Comparison of nasal septum angular parameters (in degrees) between Group A (Normal canine) and Group B (Impacted canine) respectively

(In degrees)	Group A (Normal canine) Mean (SD)	Group B (Impacted canine) Mean (SD)	Mean Difference (SE)	Unpaired t test	P value, Significance
SDA	18.56 (6.45)	27.69 (12.52)	9.12 (2.87)	t = -3.174	p=0.003*

*p<0.05 – significant difference

Group B(Impacted canine) has statistical significantly higher SDA angle as compared to Group A (normal canine)

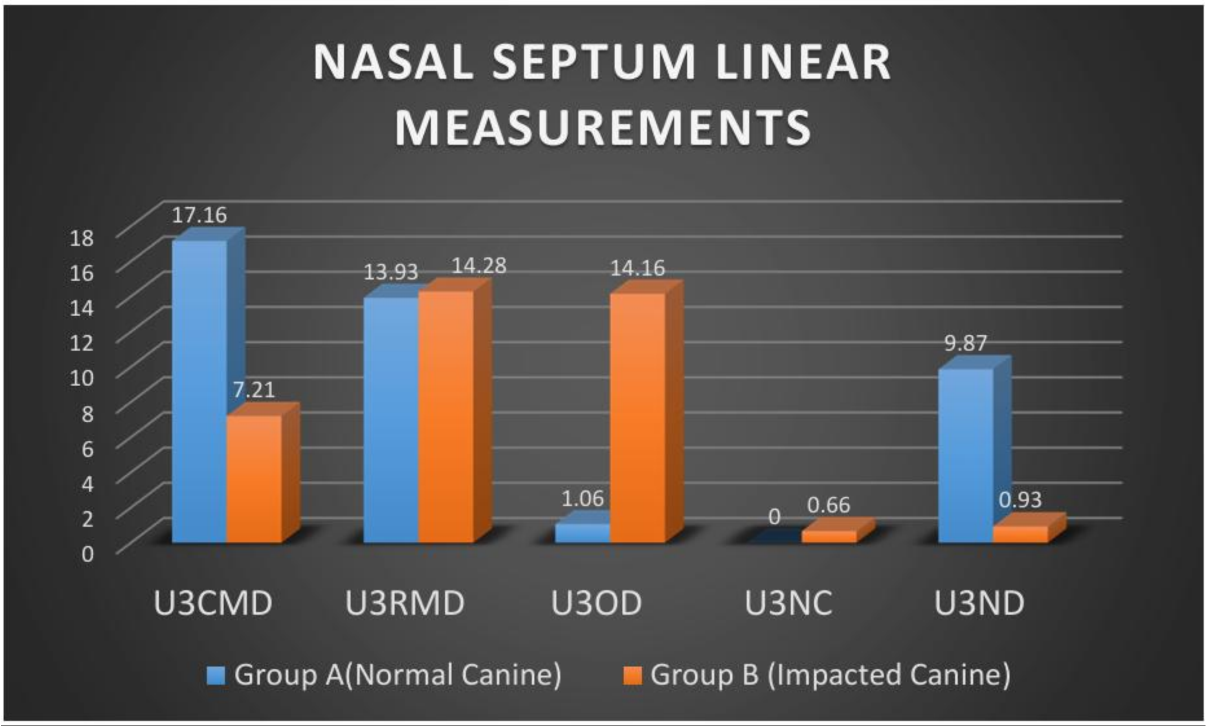


The comparison of nasal septum angular parameters between Group A (normal canine) and Group B (impacted canine) reveals a statistically significant difference. Group A demonstrated a mean SDA of **18.56° (SD 6.45)**, whereas Group B showed a markedly higher mean value of **27.69° (SD 12.52)**. The mean difference of **9.12° (SE 2.87)** was tested using an unpaired t-test, yielding **t = -3.174** with a **p-value of 0.003**, which is statistically significant ($p < 0.05$). This indicates that individuals with impacted canines exhibit a significantly greater nasal septum deviation angle compared to those with normal canine eruption, suggesting a possible association between canine impaction and altered septal angular morphology.

Table 2: Comparison of nasal septum linear parameters (in mm) between Group A (Normal canine) and Group B (Impacted canine) respectively

(In mm)	Group A (Normal canine)	Group B (Impacted canine)	Mean Difference (SE)	Unpaired t test	P value, Significance
U3CMD	17.16 (1.88)	7.21 (4.25)	9.951 (0.949)	t = 10.476	p<0.001**
U3RMD	13.93 (2.41)	14.28 (5.08)	0.353 (1.148)	t = -0.308	p=0.760 (NS)
U3OD	1.06 (0.66)	14.16 (7.03)	13.097 (1.44)	t = -9.083	p<0.001**
U3NC	0.0 (0.0)	0.66 (1.83)	0.663 (0.373)	t = -1.77	p=0.082 (NS)
U3ND	9.87 (3.77)	0.93 (1.54)	8.932 (0.831)	t = 10.737	p<0.001**

p>0.05 – not significant *p<0.05 – significant *p<0.001 – highly significant



The linear measurements of the nasal septum show varied outcomes across different parameters when comparing Group A (normal canine) and Group B (impacted canine):

- **U3CMD (Canine–Midline Distance):** Group A had a mean of **17.16 mm (SD 1.88)**, while Group B showed a much lower mean of **7.21 mm (SD 4.25)**. The mean difference of **9.95 mm (SE 0.949)** was highly significant (**$t = 10.476$, $p < 0.001$**). This suggests that impacted canines are positioned much closer to the midline compared to normally erupted canines.
- **U3RMD (Canine–Right Midline Distance):** The values were **13.93 mm (SD 2.41)** for Group A and **14.28 mm (SD 5.08)** for Group B, with a mean difference of **0.353 mm (SE 1.148)**. The unpaired t-test result (**$t = -0.308$, $p = 0.760$**) indicates no significant difference. This implies that the right midline distance is not influenced by canine impaction.
- **U3OD (Canine–Occlusal Distance):** A striking difference was observed, with Group A showing **1.06 mm (SD 0.66)** compared to Group B’s **14.16 mm (SD 7.03)**. The mean difference of **13.097 mm (SE 1.44)** was highly significant (**$t = -9.083$, $p < 0.001$**). This highlights that impacted canines are located much deeper relative to the occlusal plane, reflecting their abnormal eruption pathway.
- **U3NC (Canine–Nasal Cavity Distance):** Group A had a mean of **0.0 mm**, while Group B showed **0.66 mm (SD 1.83)**. The mean difference of **0.663 mm (SE 0.373)** was not statistically significant (**$t = -1.77$, $p = 0.082$**). This suggests that nasal cavity proximity is not consistently altered in impacted cases.
- **U3ND (Canine–Nasal Distance):** Group A recorded **9.87 mm (SD 3.77)**, whereas Group B had a much lower mean of **0.93 mm (SD 1.54)**. The mean difference of **8.93 mm (SE 0.831)** was highly significant (**$t = 10.737$, $p < 0.001$**). This indicates that impacted canines are situated significantly closer to the nasal structures compared to normally erupted canines.

DISCUSSION

Nasal septum deviation (NSD) is a frequent anatomical variation that can compromise nasal breathing and lead individualities to mouth breathing, which in turn has been shown to impact craniofacial growth and dental development. Several authors have stressed the part of altered respiratory patterns in the development of maxillary constriction, dental crowding, and eruption disturbances. Farid and Metwalli demonstrated significant craniofacial acclimations in mouth-breathing individualities using computed tomography, emphasizing the interaction between nasal airway inhibition and dentofacial morphology. also, Lin et al. reported that habitual mouth breathing may affect in transverse maxillary insufficiency and altered dental eruption patterns, thereby adding the threat of tooth impaction. The present study builds upon this being substantiation by specifically assessing the association between unilateral impacted maxillary canines (UIMC) and nasal septum deviation using CBCT.

The most significant finding of the present study was the presence of a markedly increased nasal septum divagation angle in cases with unilateral impacted maxillary canines compared to those with normally erupted canines. This observation is in strong agreement with the findings of Kucukkaraca, who reported significantly larger septal divagation angles in individualities with unilateral and bilateral impacted maxillary canines using CBCT analysis. The similarity in issues reinforces the thesis that unilateral disturbances in maxillary development may be associated with asymmetric nasal septal morphology. The present study further supports this relationship by demonstrating a mean septal deviation angle difference of further than 9 degrees between the two groups, indicating clinically applicable septal angular alterations.

In discrepancy, Mladina et al., in their large transnational study on nasal disturbances, emphasized that septal diversions may occur irrespective of dental anomalies and are frequently elaborated by inheritable and experimental factors. While their findings suggest that NSD can occur as an insulated object, the present study indicates that when unilateral impacted canines are present, the inflexibility of septal divagation tends to be lesser. This distinction may be attributed to differences in study design, imaging modality, and the absence of dental parameters in Mladina et al.'s analysis.

The direct measures assessed in the present study revealed that impacted canines were located significantly near to the midline and nasal depression and were located at a significantly lesser perpendicular distance from the occlusal plane. These findings are harmonious with those of Tadinada et al., who reported reduced alveolar bone range and altered perpendicular positioning of impacted canines on the affected side using CBCT. also, D'Oleo- Aracena et al. observed reduced transverse arch confines and skeletal asymmetry in cases with unilateral palatally impacted canines, supporting the conception that canine impaction is associated with localized maxillary morphological differences.

Kanavakis et al. also reported altered angulation of lateral incisor roots conterminous to impacted canines, suggesting that impacted teeth play impactful changes in surround structures structures. The present study complements these findings by demonstrating that impacted canines are positioned significantly near to important anatomical structures similar as the midline and nasal depression, thereby buttressing the idea that canine impaction isn't simply a localized dental miracle but part of a broader anatomical variation.

Interestingly, the present study did not find a statistically significant difference in root- to- midline distance or root- to- nasal contact between impacted and typically erupted canines. This observation contrasts with Sharma et al., who reported significant bilateral skeletal and dentoalveolar asymmetry in unilateral impacted canine cases. The variation in findings may be due to differences in sample size, addition criteria, or the type and inflexibility of impaction estimated. Also, the present study included a wider adult age range, whereas growth-related changes may have been more pronounced than in youngish cohorts estimated in other studies.

The significantly reduced distance between the impacted canine root and the nasal cavity observed in this study has important clinical counter accusations. Manne et al. emphasized the significance of accurate three- dimensional imaging in impacted canine operation to avoid complications during surgical exposure and orthodontic objectives. CBCT, as used in the present study, allows precise visualization of the spatial relationship between impacted teeth and nasal structures, thereby easing safer interdisciplinary treatment planning involving orthodontists, oral radiologists, and otolaryngologists.

Overall, the findings of the present study suggest that unilateral impacted maxillary canines are associated with increased nasal septum deviation and altered spatial positioning relative to the midline, occlusal plane, and nasal depression. These results align with preliminarily published CBCT- grounded studies while also highlighting areas of discrepancy, emphasizing the multifactorial nature of both nasal septal deviation and canine impaction.

Limitations of the study: The present study has certain limitations. The sample size was relatively limited and derived from a single institution. Future studies with larger samples and inclusion of congenital septal defects may provide further insight into the clinical significance of this association.

Conclusions:

The angular and linear measurements collectively demonstrate that impacted canines are associated with greater nasal septum angular deviation and markedly altered linear positioning compared to normal canines. Specifically, impacted canines are closer to the midline and nasal structures, while being positioned deeper relative to the occlusal plane. These findings underscore the anatomical variations linked to canine impaction, which may have clinical implications for diagnosis, treatment planning, and surgical intervention in orthodontics and maxillofacial practice.

References:

1. Farid M, Metwalli N: Computed tomographic evaluation of mouth breathers among paediatric

patients . Dentomaxillofac Radiol. 2010, 39:1-10. 10.1259/dmfr/80778956

2. Cattoni DM, Fernandes FD, Di Francesco RC, Latorre Mdo R. Characteristics of the stomatognathic system of mouth breathing children: anthroposcopic approach. Pro Fono 2007;19:347.
3. April MM, Zinreich SJ, Baroody FM, Naclerio RM. Coronal CT scan abnormalities in children with chronic sinusitis. Laryngoscope 1993;103:985–990
4. Kucukkaraca E. Is There a Relationship Between Unilateral/Bilateral Impacted Maxillary Canines and Nasal Septum Deviation? Cureus. 2023 Oct 29;15(10):e47931. doi: 10.7759/cureus.47931. PMID: 38034237; PMCID: PMC10684973
5. Alghamdi FS, Albogami D, Alsurayhi AS, Alshibely AY, Alkaabi TH, Alqurashi LM, Alahdal AA, Saber AA, Almansouri OS. Nasal Septal Deviation: A Comprehensive Narrative Review. Cureus. 2022 Nov 10;14(11):e31317. doi: 10.7759/cureus.31317. PMID: 36514566; PMCID: PMC9736816.
6. Lin L, Zhao T, Qin D, Hua F, He H. The impact of mouth breathing on dentofacial development: A concise review. Front Public Health. 2022 Sep 8;10:929165. doi: 10.3389/fpubh.2022.929165. PMID: 36159237; PMCID: PMC9498581.
7. Manne R, Gandikota C, Juvvadi SR, Rama HR, Anche S. Impacted canines: Etiology, diagnosis, and orthodontic management. J Pharm Bioallied Sci. 2012 Aug;4(Suppl 2):S234-8. doi: 10.4103/0975 7406.100216. PMID: 23066259; PMCID: PMC3467862.
8. McConnell TL, Hoffman DL, Forbes DP, Janzen EK, Weintraub NH. Maxillary canine impaction in patients with transverse maxillary deficiency. ASDC J Dent Child. 1996. May Jun;63(3):190–
9. D Oleo-Aracena MF . Arriola-Guillén LE, Rodríguez-Cárdenas YA, Ruíz-Mora GA. Skeletal and dentoalveolar bilateral dimensions in unilateral palatally impacted canine using cone beam computed tomography. Prog Orthod. 2017;18:1–7.
10. Kanavakis G, Curran KM, Wiseman KC, Barone NP, Finkelman MD, Srinivasan S, et al. Evaluation of crown-root angulation of lateral incisors adjacent to palatally impacted canines. Prog Orthod. 2015. Feb;16(1):4. 10.1186/s40510-015-0074-0
11. Tadinada A, Mahdian M, Vishwanath M, Allareddy V, Upadhyay M, Yadav S. Evaluation of alveolar bone dimensions in unilateral palatally impacted canine: a cone-beam computed tomographic analyses. Eur J Orthod. 2015. Dec;37(6):596–602. 10.1093/ejo/cju098
12. Sharma S, Sharma P, Rathore A, Raza M. 3-D assessment of skeletal and dentoalveolar bilateral dimensions in unilateral impacted palatal canine cases - A CBCT study. J Clin Exp Dent. 2023 Dec 1;15(12):e1007-e1015. doi: 10.4317/jced.60982. PMID: 38186918; PMCID: PMC10767739.
13. Iman D, Narmada IB, Yusuf MR, Putri R. A multidisciplinary approach of impacted and transposed maxillary canine: A case report. J Orthod Sci. 2023 Nov 2;12:85. doi: 10.4103/jos.jos_23_23. PMID: 38234653; PMCID: PMC10793863.
14. Mladina R, Cujić E, Subarić M, Vuković K. Nasal septal deformities in ear, nose, and throat patients: an international study. Am J Otolaryngol. 2008 Mar-Apr;29(2):75-82. doi: 10.1016/j.amjoto.2007.02.002. PMID: 18314016.

