ROOTS PROXIMITY OF MAXILLARY MOLARS TO MAXILLARY SINUS ON CBCT AMONG PATIENTS PRESENTED FOR ORAL AND MAXILLOFACIAL PROCEDURES

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ABSTRACT

Objectives: *To determine the distance between the maxillary first and second molar roots and the maxillary sinus floor on CBCT.*

Materials and Methods: *This descriptive cross sectional study was conducted in the department of oral and maxillofacial surgery Khyber College of dentistry Peshawar after approval from Ethical Review Committee of hospital. All adult patients full filling the inclusion criteria were included in the study. Data was collected on specially designed Performa. The vertical distance between maxillary 1st and 2nd Molar roots, Right and left side were measured on CBCT Coronal view. The data was analysed by SPSS version 22 for descriptive statistics. Student t test was used to compare the distances.*

Results: *Total 60 patients included in the study. Male to female ratio was 2:1. Maxillary second molar mesio-buccal root showed least distance from floor of maxillary sinus followed by maxillary 2nd molar palatal root and palatal root of 1st molar.*

Conclusion: *The preoperative assessment of the roots of maxillary molars is important for avoidance of sinus related complications because most of the times these roots are in close proximity with the maxillary sinus, particularly in the maxillary 2nd molar region as demonstrated in this study.*

Key words: *Maxillary sinus, CBCT, Maxillary First molar roots, maxillary second molar roots, dental implants*

INTRODUCTION

Maxillary sinuses are most extensive parannasal sinuses which are very small at birth and expand with pneumatization until completion of skeletal development.[1] Mostly maxillary sinuses extend from distal of maxillary canine up-to posterior wall of maxilla tuberosity region.[2] Relationship of maxillary molar roots with maxillary sinus floor is of great concern in dental procedures such as endodontic procedures, dental implant placement and alveolar surgeries.[3]

Assessment of maxillary molars roots and maxillary sinus relationship is important as it provide pathway for infection to spread from periodontal or peri-apical region to maxillary sinus and causing maxillary sinusitis.[4-5] Radiographic images are used for assessment of maxillary sinuses before surgical procedures. Three dimensional images such as cone beam computer tomography (CBCT) are modality of choice for pre surgical assessment of roots proximity with maxillary sinus.[5]

Several studies evaluated the relationship of maxillary sinuses with posterior maxillary teeth.[6-8] In a study conducted in South Korea it was found that 35.8% mesio-buccal(MB) roots of the second molars were extending in the maxillary sinus with the least vertical distance of 0.18mm to the maxillary sinus floor (MSF). Other studies determined that the disto-buccal (DB) root tips of the second molars were

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the closest on both sides and the maxillary first molar's palatal (P) root was in close vicinity to the sinus floor (44.3%).[9-11] In a study on Indian population, it was found that the root of second premolars and MB root of first molars were closest to the MSF.[12]

In Pakistan there is limited studies done for the root proximity with MSF therefore this study will provide a valuable addition to the data and will guide working maxillofacial surgeon during different procedures like implant placement, molar extractions to avoid maxillary sinus related complications. This study will provide us data to devise guidelines for dental procedures in proximity with maxillary sinus.

MATERIALS AND METHODS

This descriptive cross sectional study was conducted in the department of oral and maxillofacial surgery Khyber College of Dentistry Peshawar after ethical approval from hospital research review board. Data was collected on predesigned Performa in patients who have been advised CBCT during last 6 months. Sixty (60) patients who full filled the inclusion criteria were included in the study which was calculated by WHO sample size calculator by taking 95% confidence interval, 5% margin of error and 4% frequency of palatal root of maxillary first molar which just contacted with maxillary sinus. Adult patients who had maxillary first and second molars present bilaterally were included in the study while patients who had any peri-apical pathology in maxillary posterior teeth, having history of orthognathic surgery, trauma to maxillary sinuses, maxillary bony pathologies were excluded from the study.

Data collected was analyzed on SPSS version 22. Frequency, percentages, mean and standard deviation were determined for root distance of maxillary 1st and 2nd molar from maxillary sinus floor. Male to female ratio was determined.

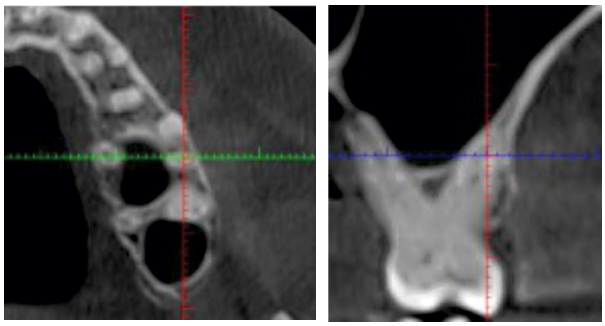

Fig 1: Maxillary 1st Molar roots relation in axial and Coronal view of CBCT

RESULT

In this study total 60 patients were included out of which 68.33% were male and 31.67% were female. Male to female ratio was 2:1. On right side maxillary first molar tooth palatal root was near to the maxillary sinus followed by mesio-buccal root. On left side maxillary first molar palatal root was most nearer to maxillary sinus floor followed by disto-buccal root as on right side while on right side 2nd molar and left side 2nd molar mesio-buccal roots were most nearer root to maxillary sinus floor. Details of each root frequency and percentages are following.

On right side maxillary 1st molar palatal root in 36 cases (59%) was 0mm away from MSF while in 2 cases (3.3%) root was protruded into maxillary sinus, mesio-buccal root distance in 36 cases (59%) was 0mm while in 2 cases (3.3%) root was protruded in Maxillary sinus and disto-buccal root 32 cases (62.3%) was 0 mm away and in 38% has 2-6.4mm distance details are given in tab 5.

On left side maxillary first molar palatal root was 0mm away from MSF in 57% cases and protruded in 10% cases, mesio-buccal root 0mm away in 45.9% cases and protruded in 6.6% cases, disto-buccal root was 0mm away in 63.9% and protruded in 3.3%) cases details are given in tab6. Right side maxillary 2nd molar palatal root was 0 mm away in 62% cases and protruded in 10% cases, mesio-buccal root was 0 mm away in 45.9% cases and in 21% cases it was protruded into maxillary sinus, disto-buccal root was 0mm away in 62.3% and protruded in 6.6%cases details are given in tab7.

Left side maxillary 2nd molar palatal root was 0 mm away in 65.6% cases and protruded in maxillary sinus in 3.3% cases, mesio-buccal roots were 0mm away in 52.5% and in 16% cases protruded in maxillary sinus and disto-buccal root was 0mm away in 65.6% and protruded in maxillary sinus in 6.6% cases details are given in tab 8.

DISCUSSION

Use of CBCT in dental practice make linear measurement from vital structure more accurate, acceptable and is widely used for surgical planning in implant dentistry.[13] Root distance of maxillary molar roots from maxillary sinus floor differs for

Table-1. Right Maxillary 1st Molar roots

Statistics	Maxillary 1st molar palatal root (mm)	Maxillary 1st molar mesio buccal root(mm)	Maxillary 1st molar disto buccal root(mm)
Total	60	60	60
Mean	1.259	2.074	1.296
Maximum	6	11.60	6.40
Minimum	-2.40	-1.60	0
St deviation	2.05	3.27	1.89

Table-2. Left side 1st Maxillary molar

Statistics	Left 1st molr palatal root (mm)	Left 1st molar mesio-buccal root (mm)	Left 1st molar disto-buccal root (mm)
Total	60	60	60
Mean	0.7945	2.0700	1.0492
Std.Deviation	2.375	3.57	1.943
Minimum	-4.20	-2.40	-1.50
Maximum	7	14	7

Table-3. Right Maxillary 2nd Molar roots

Statistics	Right 2nd Molar Palatal root (mm)	Right 2nd Molar mesio-buccal root (mm)	Right 2nd molar Disto-buccal root (mm)
Total	60	60	60
Mean	0.3307	0.191	0.494
Std-Deviation	2.1015	2.650	1.726
Minimum	-6.00	-8.00	-4.20
Maximum	4.80	5.70	5

Table-4. Left side Maxillary 2nd molar

Statistics	Left maxillary 2nd molar Palatal root (mm)	Left maxillary 2nd molar mesio-buccal root (mm)	Left maxillary 2nd molar disto-buccal root (mm)
Total	60	60	60
Mean	0.69	0.42	0.64
Std-Deviation	1.605	2.06	1.93
Minimum	-3.20	-4	-5
Maximum	7	4.47	4.50

Table-5. Right 1st molar roots distances from MSF

Palatal root distance	Mesio-buccal root distance	Disto-buccal root distance
-2.40 mm (3.3%)	-1.60 (3.3%)	0 mm (62.3%)
0 mm (59%)	0 mm (59%)	2- 6.4mm (38%)
1.60-6mm (38%)	2-11.6 mm (38%)	

Table-6. Left maxillary 1st molar roots distance from MSF

Palatal root distance	Mesio-buccal root distance	Disto-buccal root distance
-2 to -4.2mm (9.9%)	-2 to -2.40mm (6.6%)	-1.5mm (3.3%)
0mm (57.4%)	0mm (45.9%)	0mm (63.9%)
1to 7mm (31.6%)	1 to 14mm (46%)	1.65 to 7mm (33%)

Table-7. Right 2nd molar roots distances from MSF

Palatal root distance	Mesio-buccal root distance	Disto-buccal root distance
-2 to -6mm (9.9%)	-1 to -8mm (19.8%)	-3.40 to -4.20mm (6.6%)
0mm (62.3%)	0mm(45.9%)	0mm (62.3%)
1.60 to 4.8mm (26%)	1.20 to 5.7mm (33.33%)	1.6 to 5mm (30%)

Table-8. Maxillary left 2nd molar roots distances from MSF

Palatal root	Mesio-buccal root	Disto-buccal root
-3.20 mm (3.3%)	-1.65 to -4mm (16.5mm)	-2.15 to -5 mm (6.6%)
0mm (65.6%)	0mm(52.5mm)	0mm (65.6%)
1.60 to 7mm (30)	1.20 to 4.47mm (30%)	2 to4.5 mm (26.6%)

different roots on CBCT. In present study total 60 patients CBCTs who were fulfilling inclusion criteria were included. Male female ratio was 2:1. Linear distance of maxillary 1st molars right and left side measured and results shows that on right and left side maxillary first molar palatal root was most near to the maxillary sinus floor with mean distance 1.25mm ±2.05 and 0.79mm±2.37 respectively and statically significant symmetrically same in same individual followed by disto-buccal root. Mesio-buccal root was 2.07mm±3.27mm away from sinus floor on right side and 0.74mm±3.27mm on left side. Maximum distance was of mesio-buccal root 11.60mm followed by disto-buccal 6.40mm and palatal 6mm on right side while on left side mesio-buccal root maximum

distance was 14mm followed by disto-buccal and palatal roots 7mm. Maxillary 2nd molar roots relation was that mesio-buccal root was most nearer root to maxillary sinus floor with minimum distance 0.19mm±2.65 on right side and 0.42mm±2.06mm on left side followed by palatal root 0.33±2.1 on right side and 0.69mm±1.60mm on left side. In this study mesio-buccal root of maxillary second molar root was most nearer to maxillary sinus floor with least mean distance and 10% cases shows negative values in mm which shows root penetration in sinus. Our study results are similar with study done by Aqeel Al Saeedi et al which state that mesio-buccal root of maxillary second molar was most near to the maxillary sinus floor of mean distance -0.03mm±2.451mm on right side and -0.09mm±2.332mm on left side.[14] Another study done by Momina et al shows results similar with our study according to which mean distance of maxillary posterior teeth roots from the sinus floor was 0.44±3.05mm, which is in accordance to our study.[15] Other studies done by Jung & Cho and Pagin et al shows results similar to our study.[16,17] These different studies from different population of the world shows slight difference in mean distance from MSF but at the end result is same in all studies that mesio-buccal root is most nearer root to maxillary sinus floor relative to other roots of maxillary first and second molar which shows that different ethnic groups have slight variation in mean distances.

CONCLUSION

The preoperative assessment of the roots of maxillary molars is important for avoidance of sinus related complications because most of the times these roots are in close proximity with the maxillary sinus as demonstrated in this study.

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