Original Study

STUDY POSTERIOR LINGUAL MANDIBULAR DEPRESSION BY CONE BEAM COMPUTED TOMOGRAPHY

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ABSTRACT

Aim: Posterior lingual mandibular depression is a normal clinical findings that needs to be on focus in dental implant. This study aimed at studying posterior lingual mandibular depression by Cone Beam Computed Tomograph

Materials & Method: This descriptive-analytical study is prospective in which images of Cone Beam Computed Tomograph of patients stored in maxi facial archive in dentistry department of Jondi Shapoor University were used and CBCT stereotypes of 184 patients were studied in order to measure posterior lingual mandibular depression..

Results: Mean posterior lingual mandibular depression in right side was 0.8 ± 1.01 mm in 1 cm distance from mental foramen and it was 0.79 ± 1.13 mm in 2 cm distance. Mean posterior lingual mandibular depression in left side was 0.66 ± 0.94 mm in 1 cm distance from mental foramen and it was 0.7± 1.03 mm in 2 cm distance. In this study depth of posterior lingual mandibular depression in right side was higher than left side in 10 m distance and 20 mm distance from foramen mental significantly ($p < 0.001$). However there was no difference in genders and different ages in mean mandibular depression in both sides ($p > 0.05$).

Conclusion: Results of the study shows that there is no significant difference between posterior lingual mandibular depression in both genders and different ages however depression depth in right side of mandible was higher than the left side.

Key words: *Dental Implant, Cone Beam Computed Tomograph , Posterior Lingual Mandibular Depression.*

Introduction

Dental implants are used as an alternative for tooth. Although implanting is a predictable process, there are some anatomic restrictions which necessitate accurate plan for treatment before placing implant.[1]

Various studies reported damage of nerves and side effect of surgery during implanting in posterior mandible. These side effects include sever bleeding and hematoma formation and air path obstruction due to perforation of lingual cortex.[2,3]

Important anatomic structures of posterior mandible in treatment planning are chin hole, lingual mandible curve and inferior alveolar canal.[4-6] Foramen is an opening on the external surface of mandible for divisions of the chin nerve to pass through. If this nerve is damaged during operation, anesthesia may happen in lower lip or chin area.[5-6] Mandibular lingual depression is an important anatomic element in posterior mandible which causes some restrictions in operation process.[7]

As different studies reported, posterior lingual mandibular depression is 10-68% prevalent.[5-8] Perforation of lingual cortex of this area may be damaged during implanting.[7] Particularly when fossa is very deep, it makes risk of perforation very high.[9,10] If lingual plate is torn down accidentally, it can make the situation very complicated for both patients and the surgeon. So it is very important to have accurate planning before implanting, specifically accurate study of possible depression in posterior lingual mandibular depression.[7]

Pretreatment examinations consists of clinical and radiography studies.[1] Technics of radiography for examining area without tooth which is candidate of implanting includes preapical or panoramic radiographies.[1,11] These radiographies create two dimensional images with no information about bucco-lingual dimension.[8,12,13] Other disadvantages of radiographies are enlargement, distortion, super imposition.[14]

In order to observe and study cross sectional dimension of mandible and maxilla in candid area of implant, conventional tomography or Cone Beam Computed Tomograph or computer tomography were used. CT has high quality, however it is very expensive and it has high degree of ray for head and neck area. In addition, image quality might be reduced by patient move and metal restorations in his/her mouth. Nevertheless, conventional tomography can shows transverse section of the bone, it is not used more frequent than CBCT due to difficulty of controlling patient move and alittle lack of clarity.[14]

Using CBCT, for evaluations before implant surgery has provided information in three spacial plans which facilitated accurate examination of vital anatomic structures.[15] Studying these structures particularly in posterior mandible has been very crucial in implant surgeries and can decrease risks of implant surgery such as nerve damage (paresthesia and anesthesia) or perforation of mandible lingual cortex (sever bleeding and hematoma creation.[1,6,7]

Since knowledge of conventional anatomic variation of critical structures is very important, this study examines depth of posterior lingual mandibular depression in CBCT images and compares it in female and male patients in both side of jaw.

Materials & Method

This descriptive-analytical study is prospective in which images of Cone Beam Computed tomography of patients

stored in maxi facial archive in dentistry department of Jondi Shapoor university were used and CBCT stereotypes of 184 patients were studied in order to measure posterior lingual mandibular Depression. Samples included 87 men and 97 women averagely 33.67 years old. All images were provided by (NewTom 3G ,QR, Verona, Italy) computed tomography and then they were stored by the software (NNT Viewer, QR, Verona, Italy) exposure parameters included KVP110 ، FOV 8×8 and their size was 0.125 pixel.

Samples were performed by convenience method. Inclusion criteria were good quality of image, information about age and gender of patients and at least on posterior mandible in images. Exclusion criteria were pathology in posterior side of mandible.

In order to investigate existence and depth of depression, cross sectional mandible with 1 mm thickness and distance were provided. For creating similar situation, all investigations were conducted in sections with 10 and 20 mm distance from posterior border of mental foramen (in first and second mandibular molar). Posterior lingual depression in left side and right side of mandible in posterior mental foramen in women and men in different ages was studied. if there was a depression, depth of depression was measured, that is, the upper and lower side of mandible lingual depression were detected and contact line was drawn. Distance between this line and the deepest part of lingual depression was considered as depression deep. [Figure 1]

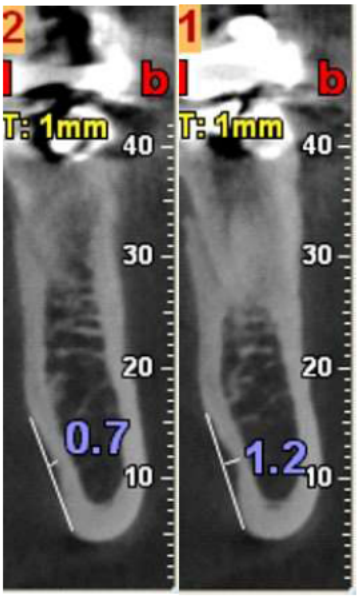

Figure 1: Determining depression depth in 1 and 2 cm distance from mental foramen

Existence and depth of depression in left side and right side of mandible in area with tooth and without tooth in women and men in different ages were studied data were analyzed in SPSS 15th version. level of significance (*p* value) was 0.05.

Results

Out of 184 patients, 87 patients (47.3%) were male and 97 patients (52.7%) were female. patients were divided into four age group: 20-30, 30-40, 40-50 and older than 50. average age was 33 to 67 with 8.41 as standard deviation.

Comparing depth of mandible depression in right and left side, variance analysis test indicated that lingual depression depth in right side of mandible was higher in both 1 and 2 cm spaces from mental foramen than left side ($p<0.001$). in addition, comparing depth of lingual depression in both genders in both sides in 1 and 2 cm distance from mental foramen did not show significant difference in men and women. However, right side depression mean in men and left side depression mean in women was higher ($p>0.05$). [Table 1]

		1 cm distance in Right side	2 cm distance in Right side	1 cm distance in Left side	2 cm distance in Left side
	Numbers	Mean (Standard Deviation)	Mean (Standard Deviation)	Mean (Standard Deviation)	Mean (Standard Deviation)
Male	87	1.06 (0.84)	1.16 (0.78)	0.87 (0.68)	0.94 (0.69)
Female	97	0.97 (0.77)	1.11 (0.79)	1.01 (0.65)	1.11 (0.72)
Total	184	1.01 (0.8)	1.13 (0.78)	0.94 (0.66)	1.03 (0.71)
p value		0.44*	0.67*	0.15*	0.09*

Table 1: Relationship between lingual depression depth in both genders

** p≥0.5 is not significant*

In comparing mandible depression in different age ranges, there was no significant difference in two point with 1 and 2 cm distance from mental foramen ($p>0.05$). However, this was higher in 41-50 years old patients rather than other decades ($p>0.05$) [Table 2]

		1 cm distance in Right side	2 cm distance in Right side	1 cm distance in Left side	2 cm distance in Left side
Decades	Numbers	Mean (Standard Deviation)	Mean (Standard Deviation)	Mean (Standard Deviation)	Mean (Standard Deviation)
20-30 years	87	1.029 (0.77)	1.19 (0.78)	1.02 (0.68)	1.05 (0.71)
31-40 years	56	0.89 (0.84)	0.99 (0.8)	0.88 (0.59)	0.94 (0.66)
41-50 years	34	1.21 (0.73)	1.27 (0.66)	0.81 (0.6)	1.08 (0.63)
Higher than 50 years	7	0.74 (1.16)	0.77 (1.1)	1.00 (1.14)	1.2 (1.26)
Total	184	1.01 (0.8)	1.13 (0.79)	0.94 (0.66)	1.03 (0.71)
p value		0.26	0.18	0.67	0.515
Variance test value		1.34	1.62	1.001	1.108

Table 2: Relationship between lingual depression depth in different decades

Discussion

Posterior lingual mandibular depression is a normal anatomic variation which needs to be focused during dental implant.[7] This depression is a predictive sign for lingual plate tearing in anterior and posterior mandible and also damage of lower alveolar nerve during implant placing.[7,16,17] Accordingly, if lingual depression is approved, CBCT scan is required for assessing form and shape of the bone and determining implant's angle and dimensions.[7,18] This study aimed at comparing depth of posterior lingual mandibular depression in both genders in different age groups and in both side of jaw.

Mean posterior lingual mandibular depression in right side was 0.8 ± 1.01 mm in 1 cm distance from mental foramen and it was 0.79 ± 1.13 mm in 2 cm distance. mean posterior lingual mandibular depression in left side was 0.66 ± 0.94 mm in 1 cm distance from mental foramen and it was 0.7± 1.03 mm in 2 cm distance. in this study depth of posterior lingual mandibular depression in right side was higher than left side in 10 m distance and 20 mm distance from foramen mental significantly (p<0.001). However there was no difference in genders and different ages in mean mandibular depression in both sides (p>0.05)

Chan *et al*(2011)[7] performed cross-sectional analysis of the mandibular lingual concavity using cone beam computed tomography. they evaluated mandibular lingual depression in 103 samples. Mean mandibular lingual depression depth was 2.4±1.1 mm which was 2.5±1.1 for men and 2.4±1.1 for women.

They reported that mean posterior lingual mandibular depression depth in first molar area was 2.3mm in 71.4 for men and 63.2% for women and its range was 0.5 to 5.1 mm. in this study, there was no significant relationship between mandible lingual depression depth in 2 m distance from lower alveolar canal while method of measurement in this study was different.

Kamburoglu *et al*(2015)[18] studied metric, volumetric, and surface area measurements in submandibular concavity and sublingual in Turkish people. Submandibular concavity depth was 2.052±2.26 and 0.582±0.68 for women in left and right side and it was 2.572±2.20 and 1.562±0.81 for men in left and right side. Results showed that the differences between the presence of concavity and dental status (dentate/edentulous) were statistically insignificant (p > 0.05). Similar to our study, all 4 measurements were higher in males than females, but the differences were not statistically significant.. in addtion, inverse ratios were found between age and volume and between age and surface area. so that by getting older, this ratio is lower (p>0.05). However there was no significant difference between age, depth and concavity.[21]

Panjnoush *et al*(2016)[19] the prevalence of mandibular lingual and maxillary buccal concavity, mean concavity depth and angle and its relation to age and gender in Iranian population.in compatible with our study, this research reported linear relationship between mandibular concavity depth and age (p=0.007). They indicated that by getting older, concavity depth is reduced. Variable results can be due to place of measuring concavity. Concavity depth mean was 1.40±1.6 in male and 1.20±1.40 in female. Similar to this study, relationship between concavity depth and gender was not significant statistically (p>0.05). in this study, depth of depression in first molar area was studied. While in our study, posterior border of mental foramen was studied.

Herranz-Aparicio *et al*(2016)[10] studied prevalence and the degree of posterior mandibular region in first molar tooth in 151 CT images. Concavity depth was reported by 2.1±3.6 mm. compatible with our results, relationship between concavity depth and gender was not significant however there was reverse and significant relationship between depression and age (p>0.05).

Yoon *et al*[20] studied length and angle of concavity in first mandibular molar. They studied different indices however in both sides there was statistical significant difference in age and vertical length of concavity. in elderly these indices were lower. Results were compatible with our results and there was no significant difference between both genders.

Parinia *et al*[1] studied depth of submandibular depression in CT images in Iranian people. In this study method of measurement was the same as ours. However evaluation was conducted in another place in 1 and 2 cm distance from mental foramen. In this study, Maximum depth was the target. Average depth of depression for men was 2.7±0.91 and it was 5.7±0.2 mm for women. In this research not relationship was found between age and gender with submandibular depression dimensions. However, in contrast to this study statistical difference in right and left side was not significant (p>0.05).

de Souza *et al*[21] used 100 patients CBCT images and studied submandibular in different areas of jaws. Results showed there is significant relationship between measurement place and depression depth that is in more posterior areas depression depth was higher. In addition results indicated that in areas with thicker bone depth was higher. In this study, depression depth mean was reported in 2mm distance higher rather than 1 mm. however it is not studied statistically.

Difference in findings of various studies which is related to depression depth mean in mandibular lingual can be due to race difference, or differences in factors such as age, bone pattern and dentate/edentulous area.[7,18] Or difference in selecting place of depression depth measurement or other differences in the study. It is recommended that in other studies factors such as dentate/edentulous effect on concavity depth is studied.

Conclusion

Results of the study shows that there is no significant difference between posterior lingual mandibular depression in both genders and different ages however depression

depth in right side of mandible was higher than the left side.

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