Current and related literature abstracts

Author: Dr Barry A. Kaplan, USA

Relationship between preoperative Cone Beam Computed Tomography and intraoperative findings in sinus augmentation (Int J Oral Maxillofac Implants. 2015 Nov-Dec;30(6):1244-8.) (Figs. 1a & b).

Maxillary posterior areas present problems for placing implants due to diminished bone height, low bone density and anatomic restrictions of the maxillary sinuses that lie above the alveolar ridges. When the residual ridge is 5 mm or less, a sinus augmentation procedure is commonly used to augment the amount of available bone for implant placement. The maxillary sinus must be completely evaluated for anatomic and/or pathologic findings prior to any surgical intervention. Failure to do so could lead to post-operative surgical morbidity, such as infection. Cone Beam Computed Tomography (CBCT) is becoming the gold standard for pre-operative Sinus examination due to its low distortion and comparatively low radiation compared to conventional CT. Although the radiation dosage is slightly higher than a panoramic X-ray, you have the added advantage of viewing the sinuses in 3 dimension. The most common complication during sinus surgery is membrane perforation resulting during the opening of the bony window or during elevation of the membrane. This study compared pre-operative CBCT to intraoperative findings to see if there was greater risk of perforation during elevation in the presence of bony septum, thin Schneiderian membranes and reduced residual ridge height. Preoperative Scans from an ICAT Next Gen CBCT (Imaging Sciences International, Hatfield, PA) were taken and evaluated for several criteria. Bony septum were evaluated using axial slices, Membrane thickness was measured using the coronal slices and the residual ridges evaluated using sagittal slices. Also, intraoperatively, it was noted whether perforation occurred and how long the surgery took. The results were that membrane perforation occurred in 24.5 % of the cases. In cases with the presence of septum, membrane perforation occurred 57.1 % of the time. Other studies have suggested that the presence of septum is the reason for membrane thinness. While the mean membrane thickness in the study was 3.96 ± 2.01 mm, there was no significant correlation between membrane thickness and occurrence of perforation. Also, the residual ridge bone height had no significant correlation with the occurrence of membrane perforation. In summary, CBCT is an important tool in the preoperative patient evaluation so that sinus septum can be identified to reduce the risk of membrane perforation.

Accuracy and reliability of Cone Beam Computed Tomographic measurements of the bone labial and palatal to the maxillary anterior teeth (Int J Oral Maxillofac Implants. 2015 Nov-Dec;30(6):1249-55.) (Figs. 2a & b).

Maintaining the integrity of the maxillary buccal plate during immediate implant extraction is critical to the aesthetic outcome. Direct clinical measurement of the facial plate in other studies showed the facial plate to range from 0.8 to 1.4 mm. Conversely, mea-
Measurements of the facial plate using CBCT have shown a labial thickness ranging from 0.6 to 1.73 mm. This study evaluated buccal and palatal bone thicknesses in the anterior maxilla by CBCT and compared these with direct clinical measurements.

After extraction, the labial plate was measured at 1 mm, 4 mm and 8 mm from the osseous crest and the palatal wall was measured from 1 mm and 4 mm from the osseous crest using a caliper. Additionally, measurements were taken from a pre-surgical CBCT (NewTomVG, Voxel size 0.3mm). Mean thickness of the labial bone was 0.50 ± 0.32 mm and 0.76 ± 0.37 mm for direct and CBCT measurements respectively. The majority of the buccal sites had a thickness of <1 mm. For the palatal thickness, 1.16 ± 0.53 mm and 1.41 ± 0.51 mm for direct and CBCT respectively. CBCT measurements overestimated measurements in 77% of the cases. As the thickness of the labial and palatal bone increased in thickness (greater than 1 mm) the discrepancy between the two methods of measurements decreased. Overall, the differences between CBCT and direct measurement were not clinically significant. Although, most studies have found that CBCT underestimates bone thickness this study found the opposite. One explanation for the overestimation might be the result of partial bone volume averaging and blurring of thin bone layers. In conclusion, CBCT is a useful tool for visualising the maxillary roots and their proximity to the sinuses.

Evaluation of periapical lesions and their association with maxillary sinus abnormalities on Cone Beam Computed Tomographic images (J Endod. 2016 Jan;42(1):42-6.) (Figs. 3a & b)

Pain in the maxillary posterior areas can sometimes be difficult to diagnose due to the proximity of the teeth to the maxillary sinus and they share a common nerve supply. Roots of maxillary teeth can come in very close proximity and even protrude into the sinus. When periapical infections of the maxillary roots occur, infection can spread into the maxillary sinus causing inflammation. Sinus membrane thickening can be a sequelae in the presence of inflammation. When this occurs, it may be difficult to elucidate the source of the infection with a two-dimensional X-ray. CBCT offers better diagnostic capabilities because of its 3-D reconstructed images that can be viewed in several planes. This retrospective, cross-sectional study compared the presence, size and distance of periapical radiolucencies (RL), with the presence of sinus abnormalities using CBCT.

Images from I-CAT Cone Beam (Imaging Science International, Hatfield, PA) were evaluated using a resolution of 0.25 mm voxels. Maxillary sinuses were assigned a number from 1–6 based on the type of pathology seen (e.g. mucosal thickening, presence of polyps, opacifications). Periapical RLs were graded based on size. The results showed that 64.3% of the teeth with periapical RLs had maxillary sinus abnormalities. The larger the periapical RL, the greater its association with maxillary sinus abnormalities (>8 mm had the highest correlation). Additionally, greater association with maxillary sinus abnormalities when the periapical lesion was <2 mm from the sinus floor. Mucosal thickening was the most common finding when associated with a periapical lesion. In general, however, sinusitis of odontogenic origin accounts for 10–20% of all maxillary sinusitis cases. This is because the sinus floor acts as a barrier to dental infection. In conclusion, the study showed sinus abnormalities were highly correlated with periapical RLs that were in very close proximity to the sinus. CBCT is a useful tool for visualising the maxillary roots and their proximity to the sinuses.

Contact

Dr Barry A. Kaplan, Prosthodontist, Bloomfield, NJ, USA. Past President of the NJ Section of the American College of Prosthodontists. Fellow of the International Congress of Oral Implantologists (ICOI).

www.kaplandentistrynj.com