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SINCONAPP: A Computerized learning tool for CBCT normal anatomy and variants of the nose and paranasal sinuses.

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1. Purpose

To supply an useful learning tool aimed to interactively display on mobile devices normal anatomy and variants of the nose and paranasal sinuses as seen on CBCT images.

2. Methods and Materials

Images

Images of the nose and paranasal sinuses were derived by a study series acquired by a CBCT device. CBCT studies of the paranasal sinuses were acquired in patients referred for nasal obstruction or sinusitis with the following parameters: 90 kVp, 12.5 mA, 20 s rotation time, FOV 13 x 14.5 cm, 0.25 x 0.25 x 0.25 mm voxel size.

Software

The application has been developed for iOS based mobile devices through the platform XCode provided by Apple®, and it is developed using the Objective-C programming language. The application has been configured as Master-Detail. This configuration splits the mobile device display in two panels. The left panel displays a list of the interesting items, while the right panel shows the relative details. Touching an item from the menu on the left panel, the textual description is shown on the same side, while the panel on the right will show the relative image.

The application allows interactively navigation through normal anatomy and variants of the nose and paranasal sinuses, as represented on CBCT images in axial, sagittal and coronal planes. Cross-reference images to localize the same anatomic structures on different section planes are available. The navigation is intuitive, with multiple shortcuts. Different labels have been proposed in accordance with the specific anatomic lessic of the district and current literature references. High image quality with a zooming tool are available.

3. Results

Imaging findings

Fig. 1. Interactive coloured map on axial CBCT image. 1b) All the anatomical items are listed on the right, with different colours corresponding to coloured areas on the axial CBCT image. 1b) A right Onodi cell is evidenced in green on the axial CBCT image corresponding to the selected item on the left.

Fig. 2. Interactive coloured map on coronal CBCT images. All the anatomical items are listed on the right, with different colours corresponding to coloured areas on the coronal CBCT images displaying sinonasal cavities at an anterior (2a) and posterior (2b) level. 2c) Bilateral infraoptic recesses are evidenced in orange on the coronal CBCT image corresponding to the selected item on the left. 2d) Bilateral concha bullosa are evidenced in green on the coronal CBCT image corresponding to the selected item on the left.

Fig. 3. Interactive coloured map on sagittal CBCT images. 3a) All the anatomical items are listed on the right, with different colours corresponding to coloured areas on the sagittal CBCT. 3b) Agger nasi cell is evidenced in pink on the sagittal CBCT image corresponding to the selected item on the left. 3c) Frontal cell is evidenced in green on the sagittal CBCT image corresponding to the selected item on the left.

4. Conclusion

An App for IOs devices was developed, that can represent an useful educational tool for medical students, residents and continuous medical education in radiology and other medical specialties dealing with nose and paranasal sinuses. This interactive atlas based on CBCT images could be also an useful option to be implemented on CBCT softwares.

5. References

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