

Evaluation of vascular lesions on cutaneous and mucosa tissue in head and neck regions by Doppler Optical Coherence Tomography

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Vascular lesions are one of the most common congenital and neonatal abnormalities, 60% of the cases affect the head and neck region. In most cases these lesions involute spontaneously with no consequences for the patient health, although complications caused by tissue deformities occur in 10%. The proper diagnosis of the different lesions type has impact on the proper choice of patient treatment. The Optical Coherence Tomography (OCT) technique obtains non-invasive real-time cross-section images of tissue structures with high resolution ($\sim 5\mu\text{m}$), about 20 times greater than ultrasound. One of the characteristics of vascular lesions are the presence of blood vessels on the superficial layer of the skin, not present on normal tissue. Using the so-called Doppler OCT it is possible to identify the presence of blood flow and vessels on OCT images. The aim of this work was to evaluate the differences in the architecture of blood vessels in different types of lesions on cutaneous and mucosa tissue in head and neck regions by Optical Coherence Tomography and Doppler Optical Coherence Tomography. After approved by the Ethics Committee of IMIP (protocol no. 728.993), 27 patient lesions were imaged using a Doppler-OCT system (OCS1300SS; Thorlabs GmBH), at 1325 nm of central wavelength and 100 nm of bandwidth. Using the ImageJ software, the average diameter and mean depth of the blood vessels were measured. The average diameter and mean depth of the blood vessels were respectively equal to $114\mu\text{m} \pm 92\mu\text{m}$ and $304.3\mu\text{m} \pm 99\mu\text{m}$ on vascular malformation, $38.6\mu\text{m} \pm 19\mu\text{m}$ and $297.8\mu\text{m} \pm 132\mu\text{m}$ on skin hemangiomas, $45\mu\text{m} \pm 16\mu\text{m}$ and $520.5\mu\text{m} \pm 189.5\mu\text{m}$ on oral mucosa hemangioma (lips), $157.5\mu\text{m} \pm 90\mu\text{m}$ and $695\mu\text{m} \pm 136\mu\text{m}$ on lip lymphatic malformation, and $128\mu\text{m} \pm 63\mu\text{m}$ and $689\mu\text{m} \pm 217\mu\text{m}$ on lip vascular malformation. Using the flow information provided by Doppler OCT, it was possible to evaluate the differences on each lesion type. It was possible to obtain a diagnosis method to differentiate each vascular lesion on skin and oral mucosa, providing information for the early stage treatment of the lesions which will evolve. This work was supported by Capes/PROCAD proc. 88881.068505/2014-01; CNPq INCT proc. 465763/2014-6 and PQ 312397/2013-5.