

Three-Dimensional Computer Graphical Demonstration of Calcified Tissue and Its Clinical Significance

Authors : Itsuo Yokoyama, Rikako Kikuti, Miti Sekikawa, Tosinori Asai, Sarai Tsuyoshi

Abstract : Introduction: Vascular access for hemodialysis therapy is often difficult, even for experienced medical personnel. Ultrasound guided needle placement have been performed occasionally but is not always helpful in certain cases with complicated vascular anatomy. Obtaining precise anatomical knowledge of the vascular structure is important to prevent access-related complications. With augmented reality (AR) device such as AR glasses, the virtual vascular structure is shown superimposed on the actual patient vessels, thus enabling the operator to maneuver catheter placement easily with free both hands. We herein report our method of AR guided vascular access method in dialysis treatment Methods: Three dimensional (3D) object of the arm with arteriovenous fistula is computer graphically created with 3D software from the data obtained by computer tomography, ultrasound echogram, and image scanner. The 3D vascular object thus created is viewed on the screen of the AR digital display device (such as AR glass or iPad). The picture of the vascular anatomical structure becomes visible, which is superimposed over the real patient's arm, thereby the needle insertion be performed under the guidance of AR visualization with ease. By this method, technical difficulty in catheter placement for dialysis can be lessened and performed safely. Considerations: Virtual reality technology has been applied in various fields and medical use is not an exception. Yet AR devices have not been widely used among medical professions. Visualization of the virtual vascular object can be achieved by creation of accurate three dimensional object with the help of computer graphical technique. Although our experience is limited, this method is applicable with relative easiness and our accumulating evidence has suggested that our method of vascular access with the use of AR can be promising.

Keywords : abdominal-aorta, calcification, extraskelatal, dialysis, computer graphics, 3DCG, CT, calcium, phosphorus

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