

Detection of Intravenous Infiltration Using Impedance Parameters in Patients in a Long-Term Care Hospital

Authors : Ihn Sook Jeong, Eun Joo Lee, Jae Hyung Kim, Gun Ho Kim, Young Jun Hwang

Abstract : This study investigated intravenous (IV) infiltration using bioelectrical impedance for 27 hospitalized patients in a long-term care hospital. Impedance parameters showed significant differences before and after infiltration as follows. First, the resistance (R) after infiltration significantly decreased compared to the initial resistance. This indicates that the IV solution flowing from the vein due to infiltration accumulates in the extracellular fluid (ECF). Second, the relative resistance at 50 kHz was 0.94 ± 0.07 in 9 subjects without infiltration and was 0.75 ± 0.12 in 18 subjects with infiltration. Third, the magnitude of the reactance (Xc) decreased after infiltration. This is because IV solution and blood components released from the vein tend to aggregate in the cell membrane (and acts analogously to the linear/parallel circuit), thereby increasing the capacitance (Cm) of the cell membrane and reducing the magnitude of reactance. Finally, the data points plotted in the R-Xc graph were distributed on the upper right before infiltration but on the lower left after infiltration. This indicates that the infiltration caused accumulation of fluid or blood components in the epidermal and subcutaneous tissues, resulting in reduced resistance and reactance, thereby lowering integrity of the cell membrane. Our findings suggest that bioelectrical impedance is an effective method for detection of infiltration in a noninvasive and quantitative manner.

Keywords : intravenous infiltration, impedance, parameters, resistance, reactance

Conference Title : ICN 2018 : International Conference on Nursing

Conference Location : London, United Kingdom

Conference Dates : September 27-28, 2018