

The effect of IPC compression on tissue elasticity in lower limbs lymphedema measured in USG elastography.

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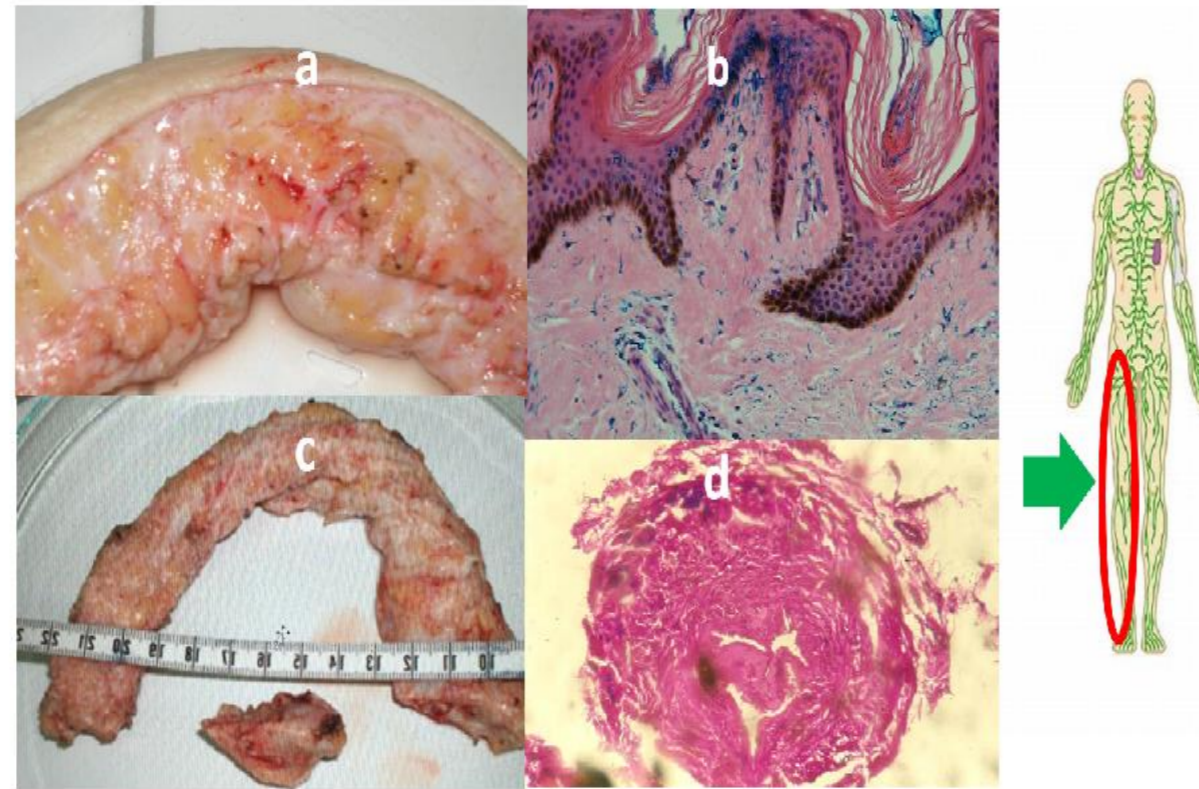
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Background. In lymphedema of the lower limb, fluid accumulation, overgrowth, and tissue remodeling occur regardless of etiology. Both factors influence tissue biophysical properties and stiffness. The main goal of conservative treatment is to reduce the volume and weight of edematous limbs and prevent and reduce tissue fibrosis and stiffness. Our previous studies using skin and deep tissue tonometers prove the effectiveness of IPC in increasing tissue elasticity in lymphedematous limbs.

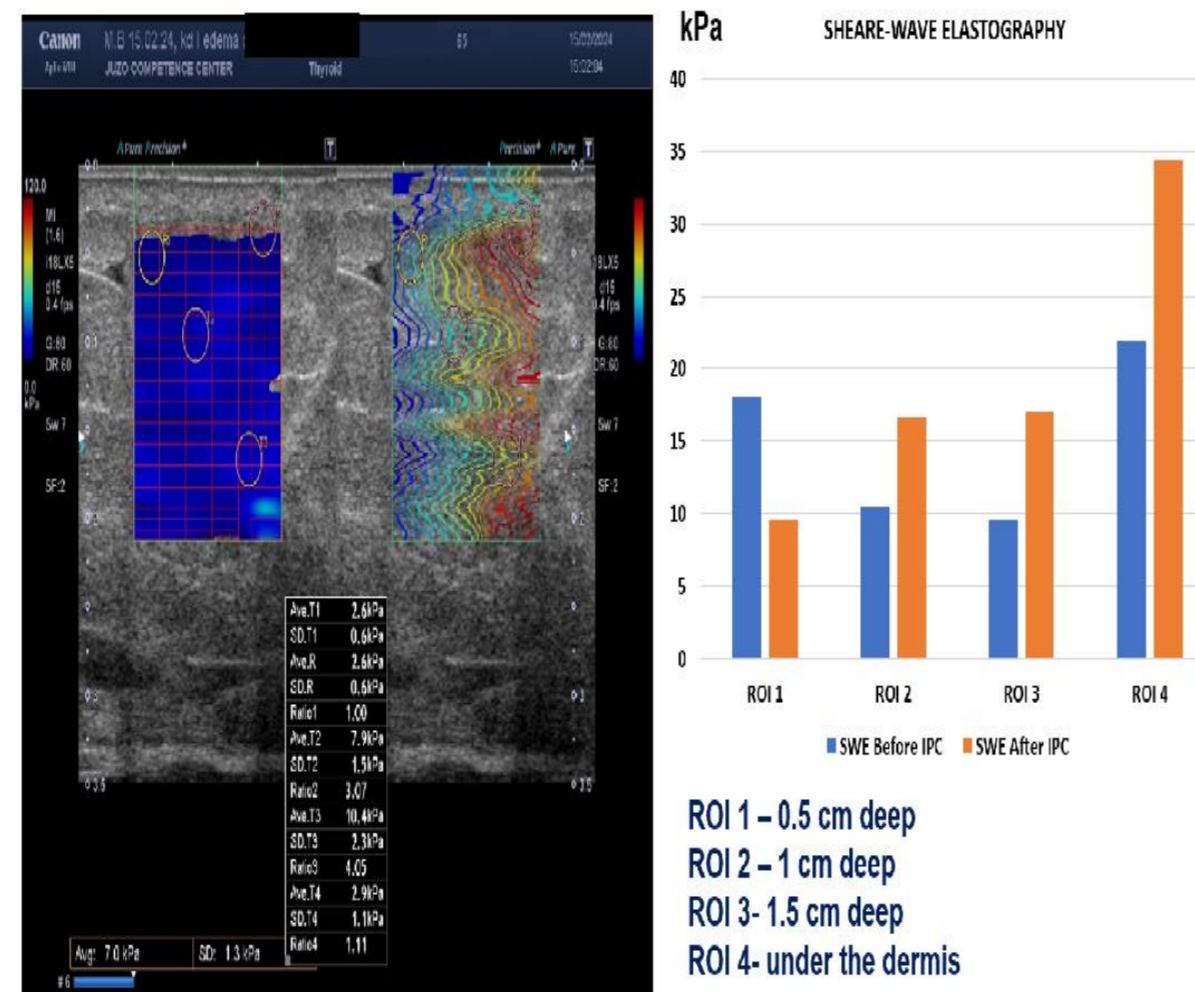
Aim. We aimed to investigate the usefulness of USG elastography in estimating changes in skin and subcutaneous tissue elasticity after IPC compression and correlate them with durometry, tonometry, and skin water concentration.

Materials and Methods. Twenty patients with lower limb lymphedema stage I-III of different etiology were investigated. The lymphatic origin of limb swelling was proven in ICG lymphography. In the selected limb region (10x 5 cm), on the inner part of the middle calf, we did USG examination (SE, SWE) (Canon APLIO i800) and, durometry (SkinFibrometer; Delfin Technologies Ltd.), tonometry (Wagner, Seattle, WA), skin water concentration (LympScanner; Delfin Technologies Ltd.). Then, IPC (Bio Compression system) was applied for 45 min with a pressure of 80-100 mmHg depending on tissue stiffness. After the session with IPC, all measurements were repeated.

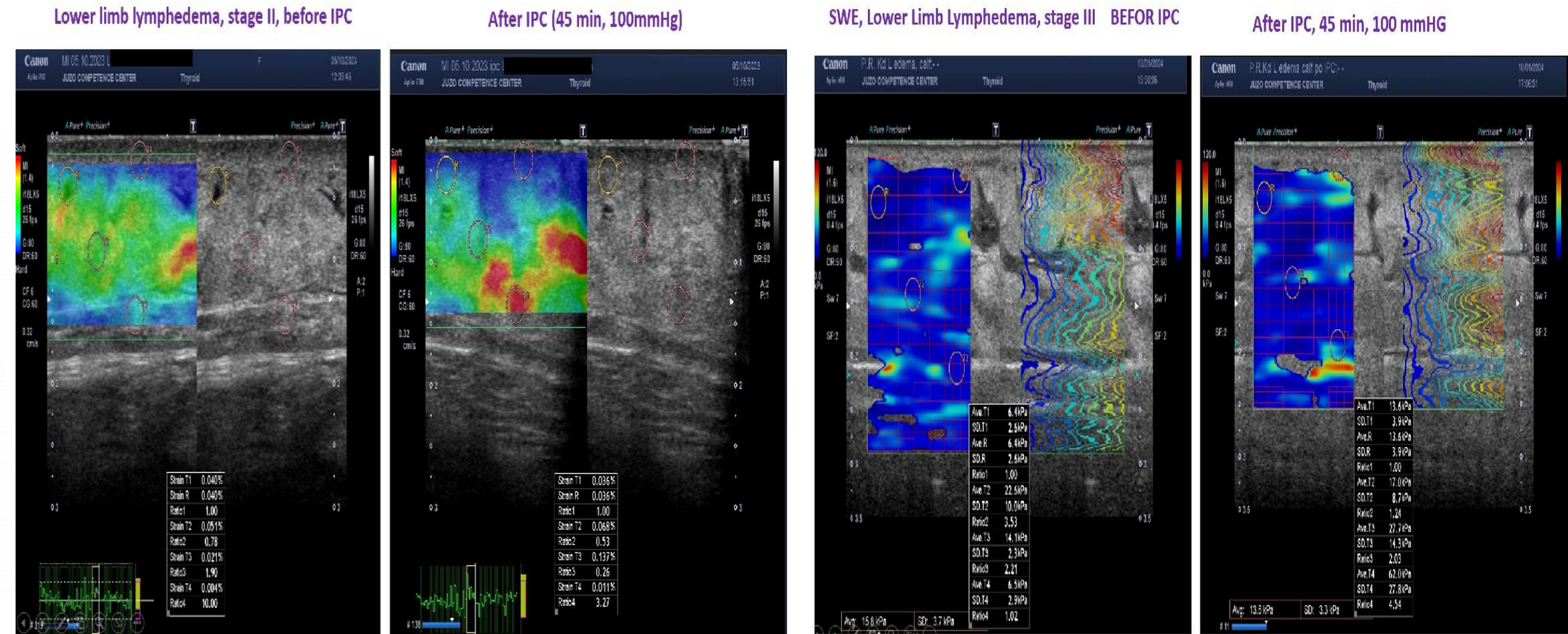
Morphological changes in lymphedema leg skin, subcutaneous tissue, fascia and lymphatic collectors



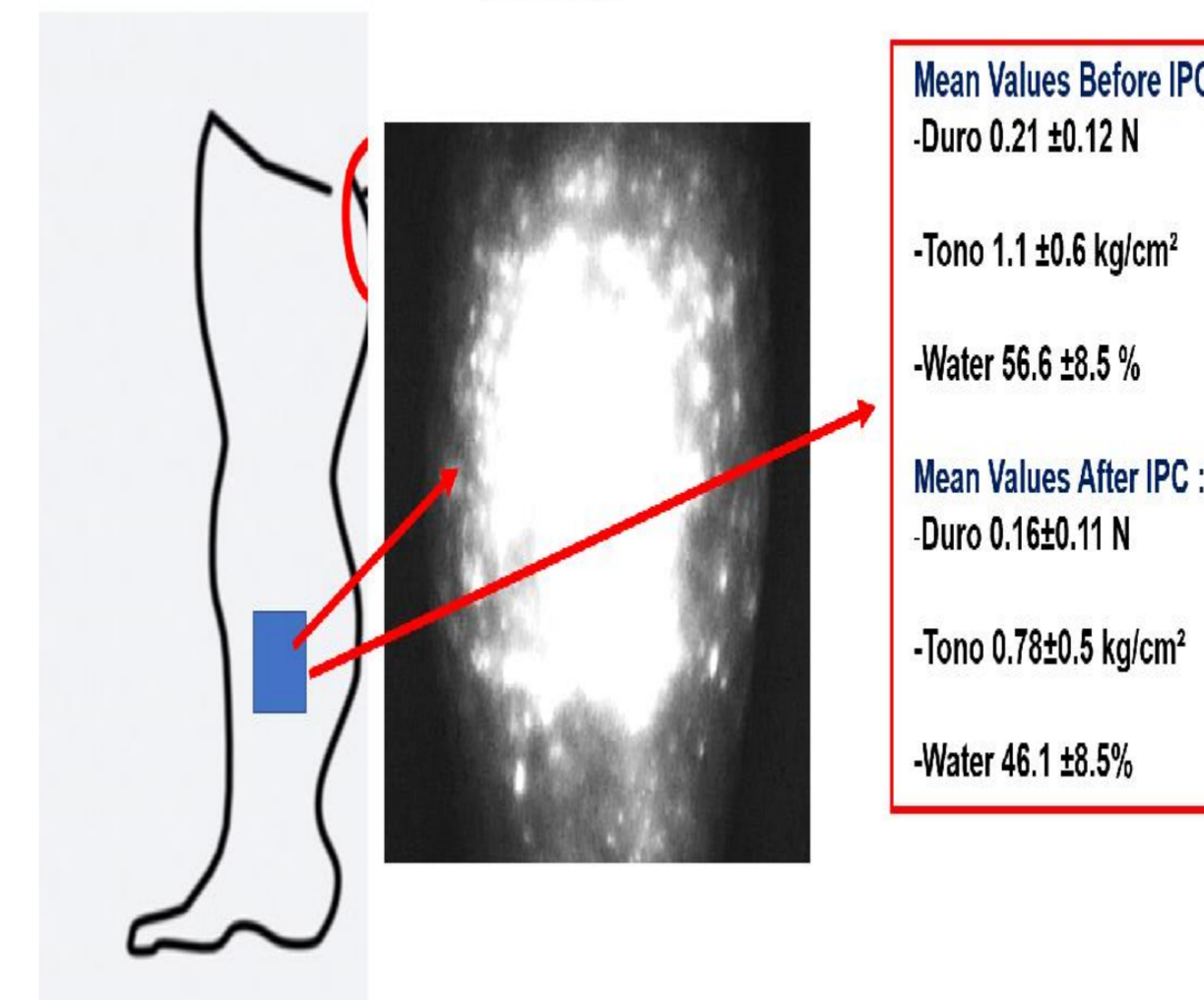
CHANGES IN SWE IN DIFFERENT SUBCUTANEOUS TISSUE LEVELS AFTER IPC



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CHANGES IN SKIN WATER CONCENTRATION, SKIN AND SUBCUTANEOUS TISSUE STIFFNESS



Results. After 45-minute sessions with IPC, we observed a reduction in skin water concentration by 18.0 %, skin stiffness by 23.2 %, and subcutaneous tissue stiffness by 30.4 %. We also observed the changes in strain ratio and elasticity (kPa). Before IPC, the strain ratio and elasticity values were different at different tissue levels: dermis, upper, middle, and lower levels of subcutis, and they change differently at different tissue levels.

Conclusions. IPC changes the biophysical properties of tissue and reduces tissue stiffness. Both types of USG elastography can be used to investigate changes in tissue elasticity after IPC. However, correlation with other methods measuring skin and subcutaneous tissue can help to understand the changes that develop in tissue under the influence of IPC.