

Imaging Modalities in Lymphedema: Indications, Methods, Significance

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Abstract:

Imaging modalities play an integral role in the early diagnosis and treatment of lymphedema by providing quantitative and qualitative interpretations. However, imaging modalities in lymphedema still face various issues. Most methods are lacking a universally standardized protocol for diagnosing and staging, which would be beneficial to improve reproducibility and objectivity.

Imaging modalities facilitate proper patient-, lymph vessel-, and donor-site selection, which are prerequisites for a successful lymphatic surgery. Each technique has different characteristics and yields specific information. Thus, they have to be indicated accordingly.

This presentation will provide the audience an understanding and interpretation of these imaging modalities, and our experience will support physicians in outlining a treatment plan.

Lymphoscintigraphy (LS) is generally considered the gold standard in confirming the diagnosis of lymphedema, offering quantifiable assessments of lymphatic fluid transport.

Near-infrared fluorescent imaging, also termed indocyanine green (ICG) lymphography, visualizes superficial lymphatic vasculature effectively. Its main application is to diagnose lymphedema and plan locations for lymphaticovenular anastomosis (LVA) operations.

Ultrasonography is widely performed to exclude venous diseases. High- and ultra-high frequency ultrasound is an effective means for lymphatic and vein mapping before LVA operations.

Magnetic resonance lymphangiography (MRL) diagnoses lymphedema by providing information on lymphatic morphology and function regardless of depth. It depicts fat and fluid excess. MRL reveals possible venous pathology, as well as diagnoses other than lymphedema (recurrent tumor, occult metastasis, lymphangiosarcoma).

Emerging technologies, e.g., bioimpedance spectroscopy, laser tomography, and photoacoustic imaging, can contribute to an earlier diagnosis, a superior treatment plan, and improved outcomes after reconstructive lymphatic surgery.