

Microvascular surgery for upper limb lymphedema treatment

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ABSTRACT

Although the necessity of performing radical mastectomy has significantly decreased over the last decades there are still cases in which this procedure is required, predisposing the patient to the development of long-term complications such as upper limb lymphedema. Meanwhile, due to the increased implementation of indocyanine green usage, the rates of this complication have decreased, preservation of the lymphatic vessels of the arm being more and more possible. Even though, upper limb lymphedema can be still encountered, in such cases vascular surgical procedures such as lymphovenous anastomoses might be performed in order to treat this complication. This is a literature review regarding the usage and effectiveness of indocyanine green administration in the upper limb lymphedema treatment.

Keywords: upper limb lymphedema, breast cancer, lymphovenous anastomosis

INTRODUCTION

In the last decades the rates of early detection of breast malignant lesions significantly improved and therefore long-term survival has been achieved; moreover, advances in the field of adjuvant therapies led to the achievement of similar expected

survivals between patients with breast cancer and those with similar ages but with no oncological background. Therefore, attention has been focused in improving the quality of life of these cases, the development of late postoperative complications such as upper limb or breast lymphedema being widely known (1).

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PATHOGENESIS AND RISK FACTORS

This complication is related to both radical surgery (consisting of axillary lymph node dissection) or radiation therapy and is caused by the interruption of the axillary lymphatic system; in these conditions the fluids which are usually drained through the lymphatic system will accumulate at the level of the subcutaneous tissues leading to the development of an increased volume of the affected arm and secondarily to a decreased mobility of the upper limb (2,3). Regarding the microscopic level, the fluid accumulation at this level will lead to the apparition of lymphovascular fibrosis (3) which will further determine the appearance of pain, decreased healing capacity and increased infection risks; all these modifications seem to significantly alter the quality of life, leading to the psychological disorders' association such as depression and anxiety (4-7).

Concerning the incidence of upper limb lymphedema after breast surgery, it ranges between 0 in cases submitted to sentinel node excision to 56% after axillary lymph node dissection and is estimated to be maximal in cases submitted to both radical surgery and radiotherapy at a two-year interval after these oncological treatments (7,8). Besides the number of excised lymph nodes and association of radiation therapy, other incriminated risk factors are represented by the number of positive lymph nodes and patients' age (9-11).

DIAGNOSIS AND STAGING

As expected, the most commonly and easily method of diagnosis of this complication consists of the simple measurement of the diameter of the two arms, a difference higher than 2 cm establishing the diagnosis of lymphedema (12,13). The staging system of lymphedema comprises four stages: stage 0 – normal extremity at clinical evaluation but with abnormal lymphatic mapping – demonstrated at lymphoscintigraphy, stage 1 – early oedema of the limb, disappears after limb elevation, stage 2 – persistent oedema – does not disappear after elevation

and stage 3 which includes the presence of local changes at the level of the fibro-adipose tissue (14).

THE ROLE OF NON-PHARMACOLOGICAL THERAPIES IN UPPER LIMB LYMPHEDEMA

The non-pharmacological therapies in upper limb lymphedema refer to kinetic therapies such as upper limb elevation, massage, placement of external pressure disposals and, in more severe cases electrically stimulated lymphatic drainage or even surgical procedures (15). Initially, surgical procedures have been scarcely used, the most commonly performed ones being represented by liposuction, superficial lymphangiectomy and, more recently, lymphovenous anastomoses (16,17,18). These latter methods of microsurgery have gained significant field once the indocyanine green lymphography has been widely used. The method consists of a bypass between the dilated lymphatic channel and the nearby venules and was initially described in the 1960s (19,20). An interesting review conducted on the issue of indocyanine green guided lympho-vascular anastomoses demonstrated that more than 90% of the included patients reported a significant improvement after this surgical approach (21).

CONCLUSIONS

Upper limb lymphedema still represents a significant morbidity which occurs after axillary lymph node dissection and/or radiotherapy, the most important risk factors for the development of this complication being related with the number of excised nodes, the number of positive nodes and the association with radiotherapy. Depending on the severity of lymphedema, several therapeutic strategies have been imagined, surgical procedures being reserved for the most advanced stages. The wide implementation of indocyanine green usage has increased the efficacy of these procedures allowing the practice of lymphovascular anastomoses under the direct control and visualization of indocyanine green in the infrared light.

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