Postmastectomy Lymphedema

Long-term Results Following Microsurgical Lymph Node Transplantation

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Background and Objectives: Lymphedema complicating breast cancer treatment remains a challenging problem. The purpose of this study was to analyze the long-term results following microsurgical lymph node (LN) transplantation.

Methods: Twenty-four female patients with lymphedema for more than 5 years underwent LN transplantation. They were treated by physiotherapy and resistant to it. LNs were harvested in the femoral region, transferred to the axillary region, and transplanted by microsurgical procedures. Long-term results were evaluated according to skin elasticity, decrease, or disappearance of lymphedema assessed by measurements, isotopic lymphangiography, and ability to stop physiotherapy.

Results: The postoperative period was uneventful; skin infectious diseases disappeared in all patients. Upper limb perimeter returned to normal in 10 cases, decreased in 12 cases, and remained unchanged in 2 cases. Five of 16 (31%) isotopic lymphoscintigraphies demonstrated activity of the transplanted nodes. Physiotherapy was discontinued in 15 patients (62.5%). Ten patients were considered as cured, important improvement was noted in 12 patients, and only 2 patients were not improved.

Conclusion: LN transplantation is a safe procedure permitting good long-term results, disappearance, or a noteworthy improvement, in postmastectomy lymphedema, especially in the early stages of the disease.

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Lymphedema complicating breast cancer treatment remains a challenging problem. Combined physiotherapy is not performed equally in all centers, and many physicians remain skeptical on the overall efficacy of surgical treatments.[1] Furthermore, whatever the treatment proposed, the possibility of cure remains questionable. Over the last 12 years, our team has treated limb lymphedema by transplanting lymph nodes.[2] The purpose of this study was to analyze the results obtained with this procedure during a minimal 5-year follow-up.

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PATIENTS AND METHODS

We retrospectively reviewed data of 24 female patients suffering from lymphedema following breast cancer treatment who underwent lymph node transplantation by one of us (C.B.) in Cavell Institution in Brussels from 1991 to 1997. Mean age was 58.7 years (range, 37–80 years) with a mean follow-up of 8.3 years (range, 5–11 years). Upper limb lymphedema was right sided in 14 patients and left sided in 10 patients. All the patients were previously seen by their oncologist and considered in breast cancer remission. Breast carcinoma treatment performed was mastectomy (n = 3), mastectomy and radiation therapy (n = 11), and mastectomy, radiation therapy, and chemotherapy (n = 10). Axillary lymphadenectomy had been performed in all cases. In 18 patients, upper limb lymphedema was present for at least 1 year or greater (mean, 5.6 years; range, 1–15 years). In 6 patients, it was present for only a few months (mean, 5 months; range, 3–8 months). Patients complaining of pain and/or presenting with palsy and/or with elephantiasis were excluded from the study. All patients were undergoing physiotherapy and were considered resistant to it.

Lymphedema was assessed by measurements, infectious episodes, and isotopic lymphangiography.

Measurements were weekly during the preoperative month and were performed before and after physiotherapy. Sites measured were at the wrist, 10 cm above the wrist, at the elbow, and 10 cm above the elbow. Results were then compared with the contralateral limb measurements.

The number of previous infectious episodes (erysipela, lymphangitis . . .) and the aspect of the teguments at presentation (elasticity of the skin and infectious disease) were recorded. In case of infectious disease, antibiotic therapy and local treatment was performed.

Isotopic lymphangiography was performed in 20 patients. In 15 patients, lymphoscintigraphy demonstrated absence of both lymph nodes and drainage; and in 3 patients, drainage was impaired without clearly demonstrating the absence of nodes. In 2 patients, lymphoscintigraphy was normal.

Patients were divided into 2 stages: stage I, early edema with no or less than 2 infectious episodes, skin elasticity preserved, and perimeter not exceeding 30% more than the

contralateral arm (n = 6); stage II, older edema, most often of more than 1 year duration, more than 2 infectious episodes, impaired skin elasticity, and perimeter measured between 30 and 50% more than the contralateral arm (n = 18).

Surgical approach of the axillary region of the lymphedematous limb was performed in search of receiving vessels: fibrotic muscular and burned tissue were dissected and adhesions released. Axillary vessels were dissected and the periscapular pedicle was isolated. The circumflex posterior branches were individualized and prepared for microanastomoses.

An incision was then performed in the inguinal region. The dissection began by visualizing the superficialis circumflex iliac vein. At that level are located lymph nodes irrigated by the circumflex iliac vessels and without direct connection with the lymphatic drainage of the inferior limb. These nodes were dissected, freed, and elevated external to internal at the level of the muscular aponeurosis. The nodes were then harvested with an abundant amount of surrounding fat tissue.

Lymph nodes were then transplanted in the axillary receiving site. Artery and vein were anastomosed with the vessels previously prepared, using microsurgical techniques. Both axillary and inguinal approaches were closed on suction drainage.

In 7 cases, because of an incomplete result at the level of the forearm, a second procedure was performed. Lymph nodes were harvested in the same manner at the contralateral inguinal site and were transplanted at the level of the elbow.

Following surgery, manual drainage (physiotherapy) was performed on the first postoperative day and daily during the first 3 months. Manual drainage was then performed twice a week during the following 3 months and discontinued. No elastic compression dressing was applied following surgery to avoid compression on the transplanted lymph nodes and on the microsurgical anastomosis. Antisludge treatment mainly acetylsalicylates were administrated during the postoperative period.

Long-term results were evaluated according to skin elasticity and existence of infectious disease, decrease or disappearance of the lymphedema assessed by measurements, effects observed on isotopic lymphangiography, and ability to stop or to discontinue physiotherapy after 6 months. Long-term results were also evaluated according to the duration of the lymphedema before surgery and occurrence of downstaging after surgery.

RESULTS

The postoperative period was uneventful except for the appearance of lymphorrhea in 8 patients, which resolved over a few days. Infectious disease disappeared totally in 17 patients; and in the remaining 7 patients, only one episode of skin infectious disease was recorded.

Upper limb perimeter returned to normal in 10 cases, remained unchanged in 2 cases, and decreased more than 50% of its value in 6 patients and less than 50% of its value in 6 other patients.

Control isotopic lymphangiography was performed in 16 patients. In 11 patients, lymph nodes and lymph drainage were initially absent: in 4 patients, the transplanted lymph nodes were visualized and new lymph drainage pathways appeared. In 3 patients, lymph drainage was impaired without clearly demonstrating lymph nodes: in 1 of these patients, lymph node was visualized. In 2 patients with normal isotopic lymphangiography, results were unchanged. So, 5 of 16 (31%) lymphoscintigraphies demonstrated the effectiveness of lymph node transplantation.

Physiotherapy was discontinued after 6 months in 14 patients and after 12 months in 1 patient. In the 9 other patients, physiotherapy remained necessary and was performed once weekly in 7 patients. Physiotherapy was thus discontinued in 15 patients (62.5%).

Ten patients were considered cured (good results) (stage I, n = 4; stage II, n = 6). Two patients were not at all improved, lymphedema remaining unchanged (stage I, n = 1; stage II, n = 1). Downstaging (from stage II to stage I) was observed in 12 patients.

Duration of the lymphedema before surgery was: a few months (n = 5) and 1 to 4 years, mean 2.4 years (n = 5) in case of good results, 3 and 4 years in case of bad results (n = 2), 8 months and 1 to 15 years, mean 7.4 years (n = 11) in case of downstaging. In 1 patient with downstaging, the result was considered as good (normalized) following elective liposuction.

During long-term follow-up, no breast cancer recurrence was observed.

DISCUSSION

Autologous lymph node transplantation permits lymphedema improvement with long-term downstaging commonly obtained (except 2 patients), and physiotherapy discontinued in 62.3% of patients. Lymphedema was considered cured in 42% of patients and fixating lymph nodes were detected in 31% of patients controlled by lymphoscintigraphy. Good results were obtained more regularly when the duration of lymphedema was the shortest before lymph nodes transplantation. Effectiveness of the procedure was always durably demonstrated with respect to skin infectious diseases.

Autologous lymph node transplantation for lymphedema treatment is a recent microsurgical technique,[3] the results of which have yet to be fully evaluated.[4] Results of the transplantation of lymph nodes in the rat[5,6] and in the dog[7] prove very attractive. In humans, the major concern is to find a fatty flap containing lymph nodes with their own vascularization, the procurement of which should be performed without injury. Our technique uses inguinal lymph node free flap[2] made of the more superior external superficial lymph nodes: an anatomic study based on the dissection of 50 inguinal regions of fresh cadavers demonstrated that they mainly received lymph from the abdominal wall and that their procurement did not impair lymph drainage of the lower limb.[6] This procurement site is the only one used in this report; however, lymph node transplantation may be used to treat limb lymphedema with other procurement sites such as cervical[2] or axillary[8] being possible.

No current gold standard for evaluation of lymphedema exists;[9] hence, evaluating results of treatments remains difficult

and appears controversial. Fluid displacement data, which would have been a more objective methodology, was not available because it was not routinely performed. Despite this, and although circumferential data appear subjective and difficult to interpret, results on lymphedema measurements were satisfactory in this series, and many patients were able to discontinue physiotherapy treatments.

Trevidic and Pecking[9] have underlined the role lymphoscintigraphy may have to objectively assess results obtained and to select patients for surgery. However, in our series, results obtained on reappearance of lymph drainage are difficult to interpret meaningfully, and colloidal uptake by transplanted lymph nodes was detected in only 31% of patients. Appearance of lymphatic pathways toward the graft site, which was sometimes also present, could suggest a "lymphangiogenetic" effect of these grafts. These results, also observed in experimental studies,[5–7] would be of paramount interest if confirmed by other series.

Transplanted lymph node colloidal uptake was all the more frequent than the duration of lymphedema was shorter. Shesol et al[5] also observed, in a study in the rat, that radioactivity appeared in 4 of 5 transplanted lymph nodes when transplantation was immediately following lymphedema onset, whereas it appeared in only 1 of 5 cases when transplantation was delayed. This could suggest that it would be perhaps better not to delay the indication for lymph node transplantation.

Effect on skin infectious diseases was the most obvious. A role by the transplanted lymph nodes immune effect may be possible. Experimental studies have demonstrated that autotransplanted lymph nodes rapidly recovered a normal architecture.[10] No study is available to validate our observations, but Egawa et al[11] reported reduction of lymphedema after intraarterial injection of autologous lymphocytes probably due to changes in blood protein components. Lymphoid tissue present in transplanted lymph nodes may prevent infection but may also reduce arm swelling by similar mechanism of changes in protein components: this also may explain partial benefits obtained when lymphatic pathways are not restored.

CONCLUSION

Autologous lymph node transplantation appears to have a favorable and persistent effect on postmastectomy lymphedema. It is a safe procedure that may be advocated when discussing surgical treatments, especially in early stages of the disease.

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