

## 유방암 감염성 림프부종 환자에서 성상신경절 블록이 미치는 영향

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# The Effect of Stellate Ganglion Block on Breast Cancer-Related Infectious Lymphedema

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Breast cancer related lymphedema (BCRL) is one of the most intractable complications after surgery. Patients suffer from physical impairment, as well as psychological depression. Moreover, a recent study revealed that cellulitis significantly increased the risk of BCRL, and cellulitis has been suggested as a risk factor of BCRL development. We describe a patient treated with stellate ganglion blocks (SGBs) without steroid for relief of symptoms and reduction of the arm circumference of breast cancer-related infectious lymphedema in a month. We measured the arm circumference at four locations: 10 cm and 5 cm above and below the elbow crease, numeric rating scale (NRS) score, lymphedema and breast cancer questionnaire (LBCQ) score on every visit to the pain clinic. A serial decrease of the arm circumference and pain score were observed after second injection. In the middle of the process, cellulitis recurred, we performed successive SGBs to treat infectious lymphedema. The patient was satisfied with the relieved pain and swelling, especially with improved shoulder range of motion as it contributes to better quality of life. This case describes the effects of SGB for infectious BCRL patients. SGB could be an alternative or ancillary treatment for infectious BCRL patients.

**Key Words:** Lymphedema, Stellate ganglion, Breast neoplasms, Breast cancer lymphedema

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## INTRODUCTION

Despite there has been remarkable surgical techniques improvement in breast cancer patients, lymphedema is one of the most intractable complications after surgery. Furthermore it is known that the risk of lymphedema is higher after axillary lymph node dissection than sentinel node biopsy (1). Patients

with lymphedema may suffer chronic pain, heaviness, and physically impaired arm function with a limited range of motion (2). It could impede social activities, decrease quality of life in breast cancer patients leading to depression or social isolation.

In this report, we describe the patient treated with stellate ganglion blocks (SGBs) for relieving symptoms and reduc-

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ing the arm circumference of breast cancer related infectious lymphedema.

## CASE PRESENTATION

The patient was a 66-year-old woman with right arm edema, cellulitis who had a right breast modified radical mastectomy with axillary lymph node dissection three years earlier. Before she visited to our outpatient clinic, she had admission in rehabilitation medicine department for lymphedema treatment that IV antibiotics therapy with physical therapy such as com-



**Figure 1.** The arm circumference (right) before SGB treatment. SGB: stellate ganglion block.

pression bandages. Her first admission day, her arm circumference was 36.4 cm, 32.3 cm on 10 cm, 5 cm above the elbow crease and 32.1 cm, 30.2 cm below the elbow crease. After 6-days-IV antibiotics treatment in the hospital, the infection lab became normal and fever was subsided but her pain was not improved. Therefore she was referred to our outpatient clinic 4 days after discharge of rehabilitation medicine department.

On the day of her first visit, the arm circumferences were 36.0 cm, 32.3 cm on 10 cm, 5 cm above the elbow crease and 31.6 cm, 30.1 cm below the elbow crease (Figure 1). She was suffered from severe pain and discomfort, her pain score was numeric rating scale (NRS) 8. The lymphedema and breast cancer questionnaire (LBCQ) score was 10 (Table 1). The LBCQ consists 19 questions which is a self-administered survey, the higher score means the more severe symptoms (3,4). Also lymphedema classification was accessed according to the skin condition and severity of swelling (Table 2) (5). Her stage was 2, moderate lymphedema. A right SGB was done with 3 mL of 0.33% lidocaine by palpating the anterior transverse process from the C6 vertebra. We did not use steroid because she had cellulitis treatment few days ago. We measured the arm circumference at four points, NRS pain score and LBCQ score at every visits.

During the follow-up two days later, the arm measured 34.3 and 32.6 cm above the elbow crease, 30.8 and 28.3 cm below the elbow crease. She was still suffered from severe pain, but

**Table 1.** Lymphedema and Breast Cancer Questionnaire (LBCQ) Score.

Question	Score*
Do you have limited movement of your :	1) Shoulder
	2) Elbow
	3) Wrist
	4) Fingers
Do your arm or hand feel weak? Have you had	5) Aching
	6) Blistering
	7) Breast swelling
	8) Chest wall swelling
	9) Firmness
	10) Heaviness
	11) Increased temperature in your arms
	12) Numbness
	13) Rashes
	14) Redness
	15) Stiffness
	16) Swelling
	17) Swelling with pitting
	18) Tenderness

\*Patients replied to question, yes/no answers above symptom before and after thoracic sympathetic ganglion block. The number of items answered 'yes' is the score.

**Table 2.** Lymphedema Stage.

Stage	Signs and symptoms
0: Latent (subclinical) lymphedema	No visible edema No pitting Sensations of local heaviness or tightness may be present for months or years before overt swelling occurs
1: Early lymphedema	Visible edema, with or without pitting
2: Moderate lymphedema	Visible edema, usually with pitting Hardened, thickened skin and tissue Pitting may disappear as fibrosis worsens
3: Severe lymphedema	Visible edema No pitting Enlargement of the affected area Hardened, thickened skin and tissue Lymph leaking through damaged skin

she felt firmness and swelling was improved. Her NRS score was 6, and LBCQ score was 8. The right SGB was done in succession.

Five-days-later on her third visit, the warmth and stiffness were markedly improved, her arm measured 34.0 and 32.0 cm above the elbow crease, 30.5 and 26.8 cm below the elbow crease (Figure 2). She felt much better, her NRS score was 5, Her LBCQ score was 8. The third right SGB was done in the same way.

The next day of her third visit, she had right supraclavicle lymph node dissection under general anesthesia, because there a 3 cm malignant metastatic carcinoma on supraclavicle lymph node was detected by sono-guided biopsy. She discharged on POD #3, her arm measured 34.0 and 32.1 cm above the elbow crease, 30.0 and 27.0 cm below the elbow crease. Even though the warmth and stiffness of arm were still existing, her pain score was decreased, NRS 2.

Seven days after discharged, she was admitted again for complain of recurring pain and edema with pitting. Infection lab was increased CRP 5.74, WBC  $17 \times 10^3$ . General surgery department started cellulitis treatment with IV antibiotics and gave a consultation to pain clinic for relieving symptoms. Her arm measured 35.5 and 33.4 cm above the elbow crease, 31.5 and 29.7 cm below the elbow crease. She was suffered from relapsed aching pain and stiffness with impaired shoulder range of motion. Her NRS was 7, LBCQ score was 8. A right SGB was done without steroid. Two days after, her pain was reduced NRS 2 and firmness and heaviness was markedly reduced. At the first time recurring infectious lymphedema surgeons considered lymphatico-venous anastomosis surgery, however her outcome was getting better after successive SGBs, the surgery was hold. Her arm measured 32.9 and 30.7 cm above the elbow crease, 30.2 and 28.0 cm below the elbow



**Figure 2.** The arm circumference (right) after third sequential SGBs treatment. SGBs: stellate ganglion blocks.

crease. She was satisfied with the outcome, she could able to do daily activities, her pain score was NRS 1, LBCQ score was 4. Especially her range of motion, stiffness, edema were extremely improved.

## DISCUSSION

This report is about the effect of SGB with infectious breast cancer related lymphedema (BCRL) in a month follow up. Even though she had repeated cellulitis on the arm with lymphedema, we decided to treat her lymphedema with SGB injections. Recent study revealed that cellulitis significantly increased the risk of BCRL (6). In this prospective study, they suggested that the axillary lymph node dissection, regional lymph node irradiation, body mass index ( $BMI \geq 25$ ), cellulitis may increase risk of developing BCRL using multivariate analysis. Thus, cellulitis may increase the risk for developing BCRL, and vice versa (6,7).

At the first time she visit our clinic we considered thoracic sympathetic ganglion block (TSGB), but she was not able to positioning in prone because of severe pain on right chest wall. Previously Choi et al (4) reported that TSGB is an effective method for treating BCRL patients, especially to high stage of lymphedema patients. During her treatment we take account of permanent neurolysis with alcohol or radiofrequency ablation, but she had exceeding improvement on upper arm circumference throughout 5 successive SGBs in a month. Early studies described that the breast cancer related lymphedema is caused by harm to axillary lymphatic system during surgery or radiotherapy (7). Our patient had right breast modified radical mastectomy with axillary lymph node dissection three years ago, it could be the possible reason for the lymphedema with cellulitis. Axillary lymph node dissection (ALND) has considered as an independent risk factor for the development of BCRL (8). When the lymphatic system is disturbed, excess interstitial fluid accumulation starts with increasing interstitial proteins. This leads chronic tissue changes, such as fibrosis, hypertrophy of adipose tissue, and inflammation, contributing to make symptom worse (7).

Several treatments were suggested to treat BCRL including complex decongestive therapy (CDT), manual lymph drainage (MLD), compression bandages, intermittent pneumatic

compression, pharmacotherapy, and surgical treatments (9,10). Moreover surgical treatments could be available management for BCLR patients such as vascularized lymph node transfer, lymphaticovenous anastomosis and suction-assisted protein lumphectomy (11). However, our patient had infectious BCRL, there was a limitation to adjust available treatments mentioned above.

Stellate ganglion block (SGB) is a method that injecting an anesthetic drug around the cervical sympathetic trunk. SGB is used treat complex regional pain syndrome (CRPS), post herpetic neuralgia, and hot flush (12,13). The therapeutic use of an SGB for the breast cancer related lymphedema was introduced by Swedborg et al. (14). Previous studies reported that the effects of SGB in lymphedema. Kim et al. (15) reported that the reduction of circumferences of the upper arm and forearm in BCRL patients by using ultrasonography and subjective assessment after 3 consecutive SGBs using 1% lidocaine 4 mL and 40 mg triamcinolone. Also there was a study about additive effect of corticosteroid in SGB. Park et al. (16) reported that the upper arm circumference was more reduced in 0.5% bupivacaine 4 mL+40 mg of triamcinolone group than only bupivacaine group and 0.5% bupivacaine 4 mL+20 mg of triamcinolone group. Moreover Choi et al. (4) reported that TSGB is more appropriate outcome for blocking the dermatomal thoracic sympathetic nerve. They used 5 mL of 4% lidocaine without steroid, the arm circumference and LBCQ score were  $\geq 50\%$  decreased in 2 months follow up. Our patient's arm circumference was markedly decreased, pain (NRS) and LBCQ score was decreased more than 50%, especially her range of motion, stiffness, edema were extremely improved in a serial follow-up in a month.

The mechanism of SGB in BCRL is still unclear. One possible mechanism is that SGB could autoregulate peripheral lymphatic vessels. Collecting lymphatic vessels are innervated by sympathetic and parasympathetic nerve fibers (17). The sympathetic nerve fibers in collecting lymphatic vessels release neurotransmitters to contract lymphatic vessels using smooth muscle cells (18). This autoregulation of lymphatic vessel by SGB could reduce a symptom in infectious BCRL patients.

Another possible mechanism is that SGB may increase venous flow. The SGB leads to reduce vessel resistance, increase systemic volume and interstitial perfusion. Previous reports

showed that the clinical improvement with SGB treatment to patients who are suffering from gynecologic cancer-related lymphedema (19).

Moreover, SGB is known to affect the immune system of the arm (20), such as reduction of chronic inflammatory response and raising skin temperature (21). SGB can modulate the distribution of lymphocytes and NK cells, it leads to manipulation of the immune system (20).

In conclusion SGBs can be an alternative option for infectious BCRL patients. Especially cellulitis is suggested as a risk factor of BCRL development (6), close monitoring in cellulitis patients after breast cancer surgery can leads subclinical detection and screening. Furthermore early treatment of SGBs could provide better outcomes for infectious BCRL patients. However, it is insufficient to prove the relation between cellulitis and BCRL until now, further evaluations would be necessary in the future.

## 요약

유방암에 의한 림프부종은 유방암 수술 이후 생기는 치료하기 힘든 부작용 중 하나로 여겨져 왔다. 환자들은 림프부종에 의한 신체적인 기능저하뿐만 아니라 삶의 질 저하로 인한 정신적인 우울감을 호소한다. 최근의 연구에서는 봉와직염이 유방암에 의한 림프부종의 위험성을 현저히 높인다는 결과가 있었고, 봉와직염 자체가 유방암에 의한 림프부종을 일으키는 위험 인자로 제시되어 왔다. 본 증례에서는 1달간의 정상신경절 블록으로 유방암에 의한 염증성 림프부종 환자의 증상 완화 및 팔 둘레의 현저한 감소에 대해 기술 하고자 한다. 우리는 환자의 팔 둘레를 4군데에서 측정하였는데 각각 팔꿈치를 기준으로 위 아래 5 cm, 10 cm에서 측정이 이루어졌다. 또한 통증 점수(NRS) 와 breast cancer questionnaire (LBCQ) 점수를 외래 방문마다 측정하였다. 두 번의 연속적인 정상신경절 블록 이후 환자의 통증 점수 및 팔 둘레는 감소하였고, 치료 중간에 봉와직염이 재발하여 다시 입원하여 항생제 치료와 병행하여 연속적인 정상신경절 블록을 시행하였고 환자는 시술의 결과에 대해 매우 만족하였다. 특히 환자는 통증 및 붓기의 완화와 어깨 관절의 움직임 개선에 큰 만족을 보였고, 결과적으로 환자의 삶의 질을 높이는데 기여하였다. 본 증례는 유방암에 의한 염증성 림프부종에 대한 정상신경절 블록의 효과에 대한 연구로, 스테로이드를 사용하지 않는 정상신경절 블록이 치료하기 힘든 염증성 림프부종 환자의 대체적이면서 보조적인 치료 방법으로 제시 될 수 있다는 것을 보여준다.

**중심단어:** 림프부종, 정상신경절, 유방암, 유방암 림프부종

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