

# Ganglion Stellatum Blockade is a Suitable Tool to Control the Postmastectomy Pain Syndrome

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## ABSTRACT

Postmastectomy syndrome (PMS) is a complex of symptoms that frequently follow breast carcinoma surgery. Typical symptoms include pain, lymphoedema and loss of sensation. All of them can hardly be managed by standard pharmacological methods. Ganglion stellatum blockade (GSB) is a non-invasive regional algesioly method in which repeated application of local anesthetic is delivered to reduce/eliminate the postmastectomy pain syndrome (PMPS).

The objective of the study was to investigate the effect of the ganglion stellatum blockade by fractionated administration of local anesthetic Ropivacain on the severe postmastectomy pain in 46 postmastectomy breast cancer patients. Our study clearly shows that ganglion stellatum blockade represents advantageous approach to minimize the PMPS and to improve the patients quality of life.

**Keywords:** *breast cancer, postmastectomy pain, sympathetic blockade*

## INTRODUCTION

Chronic pain of the upper extremities has many various causes, ranging from vasospasms to postamputation phantom pain. The most frequent cause of the algic syndrome observed in patients dispensed in Out-patient Clinic for Chronic Pain at our Institute is the tumorous impairment of the brachial plexus associated with the basic diagnosis of advanced breast carcinoma. Similar findings have been reported elsewhere.<sup>1,2</sup>

The breast cancer is accompanied by various symptoms including subsequent impairment of upper extremities that result in the distinctive negative impact on the quality of life.<sup>3</sup> Although many studies deal with the management of acute post-operative pain after breast surgery, less of them concern with the chronic pain of the same etiology, neuropatic and mixed pain after radical operations and with the treatment of consequent complications. Generally, the data dealing with the unpopular topic of chronic pain are ten times less frequent than those dealing with the pain that can be managed quickly and efficiently by standard means or by some new methods.<sup>4,5</sup> The postmastectomy syndrome (PMS) that belongs to the former category refers to a complex of symptoms, that follow breast cancer surgery

accompanied with a dissection of axillary ganglion. The causing factor is a nerve injury induced either by tumor itself or by surgery cut, swelling, or by ongoing nonsynaptic joining of peripheral nerves.<sup>6, 7</sup> PMS was until recently considered exceptional, or rare. Recent studies, however, revealed its increased incidence, which might probably be a consequence of expanded frequency of breast cancer surgery world-wide.<sup>8</sup>

## PMS SYMPTOMATOLOGY

PMS is manifested by persistent intense pain in upper extremity, armpit, chest or shoulder, by lymphoedema and loss of sensation, or, to the contrary by exaggerated sensitivity and not negligibly by substantial resistance to common analgesics, rehabilitation and other established procedures. Frequent symptoms also include paroxysms of lancinating pain in the arm, stinging, tingling, tension, phantom pain after breast removal – all of them apparently depending on exertion, activities, surrounding temperature and on psychic condition of the patient as well.<sup>9, 10</sup> Additional factors known to worsen PMS include obesity, diabetes, unsuitable work and exertion, inappropriate surgery technique and, naturally, the number of lymphatic ganglions removed during surgery. Interestingly, some of the PMS symptoms are three times more frequent in young woman than in woman over 70 years. It also follows from numerous reports that patients who have developed the lymphoedema of arm before an operation are logically exposed to much higher risk of postoperative complications, e.g. paresthesias, dysesthesias and permanent swellings.<sup>11, 12, 13</sup> Whether and to what extent the individual types of treatment, such as radiotherapy, chemotherapy or hormone therapy affect the occurrence and the intensity of PMS has not been satisfactory defined so far, mostly due to the amount of variable combinations and individual dosage schedules used in the individual patients.

## PMS PATHOPHYSIOLOGY

Pathophysiological mechanism conditioning the formation of postmastectomy syndrome is not quite specified as it is undoubtedly complex multifactorial rather than unique phenomenon. Partly, it is certainly the lesion of peripheral nerve with subsequent morphological, neurochemical and pathophysiological changes within peripheral nerve fibres.<sup>14, 15, 16</sup> Ischemia, muscle spasms and, first of all, sympathetic dysfunction represent another factors involved in the breast pain that usually may be noniceptive – resulting from tissue damage and inflammation, or neuropathic – resulting from nerve damage; however, the most frequent is the combination of both. The upper extremity pain is usually attributed to the injury of the intercostobrachialis

nerves, and it is neither bound to the extent of surgical trauma nor to the number of ganglions removed.<sup>17</sup> The development of sentinel ganglion procedure noticeably decreased the number of radical surgeries in axilla and reduced the extent of both operational and post-operative devastation of neurovascular bundles.<sup>18, 19, 20, 21, 22</sup> However, despite of the radicality of operation we, similarly to the others, could observe further development of complications.<sup>23, 24, 25, 26, 27, 28, 29</sup>

## THERAPY OPTIONS

The postmastectomy syndrome treatment is not exactly determined yet. Generally and similarly to other chronic pain syndromes therapeutic methods depend on the type of pain and the degree of invalidity.

Treatment utilizes either noninvasive, i.e. pharmacological and non-pharmacological approaches including psychological interence or invasive anesthesiological procedures. The most common drugs that are used to control chronic pain comprise anticonvulsives (carbamazepin, valproates, pregabalin, gabapentin), antidepressants (amitriptylin, imipramin, fluoxetin), local anesthetics, ketamin, gama amino butter acid (GABA) agonists (baclofen), locally applied agents (capsaicin, nonsteroidal antiinflammatory drugs (NSAIDs), lidocain), corticosteroids and opiates. Non-pharmacological methods can be exemplified by transcutaneous electrical neural stimulation, massages, lymph drainage therapy, ultrasound, relaxation maneuvers and biofeedback.

Recently the Ganglion stellatum blockade has been reported as a new and advantageous method to control postmastectomy pain syndrome.<sup>30</sup> Ganglion stellatum is a

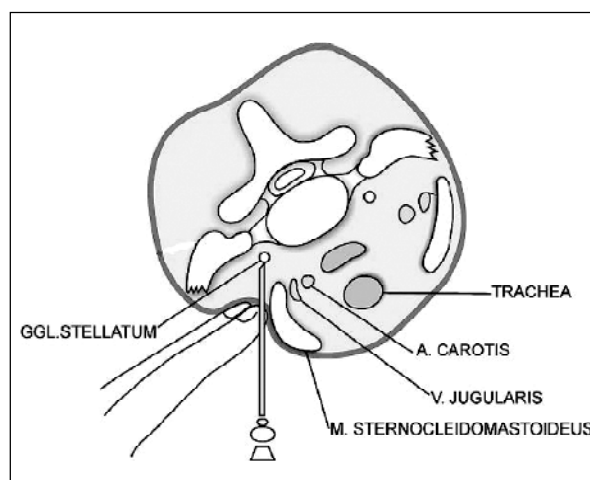


Fig. 1: Ganglion Stellatum Blockade

part of the neck sympathetic trunk situated paratracheally in the deep neck vertebrae at the level of C6-C7 (see Fig.1). It participates, among others, in the conduction and modulation of pain impulses arising from the area of the same side upper extremity and partially from the chest. GSB is a regional anesthesia and analgesia based on repeated application of local anesthetic into the area of stellar ganglion to achieve the suppression of sympathetic factor of a chronic pain and consecutively long-term significant subjective pain relief.

In this paper we report on our experiences with GSB used in 46 breast cancer patients to control postmastectomy pain syndromes.

## PATIENTS AND METHOD

We have routinely performed the GBS regional anesthesia since 2002. The cohort of patients consists of 46 breast cancer individuals regardless to the age and associated diseases. All of them manifested clear evidence of the PMS associated with the impairment of upper limb. The procedure is performed by experienced physician and his assistant. A patient lies on a bed. After being desinfected, the application area is covered by a sterile mask. The needle is connected by a tube with a syringe filled with a local anesthetic, holded and applied by an assistant. After negative aspiration aiming to avoid unwanted puncture of v. jugularis or a. carotis, 15ml of local anesthetic (usually ropivacain 0,75%) is fractionally administered. The patient is then positioned into half-sitting position (the upper half of a body is elevated at the angle of 45 degrees) to ensure uniform distribution of anesthetic in the paratracheal space. The blockade is performed in the series of 5 to 10 applications, either during hospitalization or ambulatory care, at intervals of 1 – 2 days. Hospitalization is not necessary. However, at any case the patient should be observed for at least one hour after the execution to discover and control accidental intravascular application and the potential manifestations of local anesthetic toxicity.

## RESULTS AND DISCUSSION

The summarized results as to the proportion of responders, partial responders and non-responders illustrates Tab.1. In 33 patients (72%) classified as full responders significant pain relief was achieved and the requirement for conventional analgesic agents was markedly reduced. In the second group of 8 patients (17%) the pain has been partially controlled, subjectively patients reported tolerable mild pain although the standard administration of analgesics could not be avoided. No beneficial effects of the GSB was observed in the remaining 5 patients (11%). The effects of

**Table 1: Effectivity of Ganglion Stellatum blockade**

Evaluated data: needs of additional use of pain killers

Kind of answer	Number of patients	Analgesic requirement
Full response	33 patients	+
Partial response	8 patients	+ +
No response	5 patients	+ + +

Legend:

Full response: decreasing of opioid pain killers half dosis - +

Partial response: maintenance of equal pain killer level - + +

No response: increasing of pain killer dosis - + + +

the treatment appeared after 3<sup>rd</sup> or 4<sup>th</sup> application and have been maintained for at least 2 months, depending on the stage of the primary disease and seriousness of the pain. Before the onset of analgesia, as a rule the oedema starts diminishing. The oedema was at least partially managed in all cases. We have also experienced that high quality analgesia contributed to the rehabilitation of the limb which improved the blood circulation and swelling drainage.

The complications we have encountered have been those of slight swallowing difficulties and dysphonia, both of them transitory and disappearing within 12 hours after the application. We assume that such a complications are rather caused by the negative impact on patients psychic arising from the fear and unexpected change. Most of the patients therefore managed these complications significantly better and were taken them as the minute problems after being thoroughly instructed and warned of this eventuality. As to the other complications we had rather expected hemorrhage and post-puncture hematoma associated with the incidental puncture of v. jugularis interior or arteria carotis, infection in the site of puncture and toxic effect of local anesthetic after intravascular or intraarterial application. However, none of those serious complications occurred, but can not be neglected. Everyone who is employing this procedure should know how to avoid or overcome such a complications. Thus, the post-puncture hematoma can be prevented by the immediate extraction of the needle after aspiration of the blood and by subsequent compression of the puncture wound by pushing swab. It is recommended to use the needle with smallest possible diameter – in our case 22G (black). The entire procedure should be performed under strictly aseptic conditions, keeping all necessary hygienic rules, i.e. disinfection of the field, use of the sterile coverings and gloves.

To prevent the toxic effects of local anesthetic, it is

important to perform a negative aspiration and not to exceed the maximal dose of the local anesthetic used. Modern anesthetics e.g. ropivacain chloride or L-bupivacain should be therefore preferred as they are less toxic while preserving reasonable effectiveness.

That the management of postmastectomy pain syndrome represents a hot topic of current therapy of mastectomized cancer patients got support from the results of randomized survey on the quality of life after breast cancer treatment, organized by British Columbia Cancer Agency. Monitoring 744 patients from 1993 to 1997 they revealed that 50% of patients suffer from one of the symptoms generally referred to as postmastectomy syndrome, 12,5% of them with serious and permanent consequences lasting at least 2 years after the treatment.

In conclusion, we report on our good experience with the regional anesthetic/analgesic procedure employing ganglion stellatum blockade in satisfactory controlling postmastectomy pain complications in breast cancer patients. Besides, such an approach allows to decrease dosages of systemic analgesics, improves blood circulation, facilitates rehabilitation and subsequently improves the quality of patients life. Owing to relatively undemanding technical conditions of performing ganglion stellatum blockade and its long-lasting effect, we assume that this method may become one of the most widespread alternative approach used to suppress the pain of upper limb not only in the oncological treatment.

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