

# Neurolytic Erector Spinae Plane Block for Long-Term Oncologic Pain Control: A Report of Two Cases

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**Abstract:** Background: The erector spinae plane block (ESPB), a novel interfascial plane block initially intended for the management of severe thoracic neuropathic pain by Forero et al, is currently used for many other peri- and post-operative procedures due to its simplicity and safety. Recent numerous studies have demonstrated the effectiveness of ESP blocks in acute pain management, using local anesthetics for their realization, but the true mechanism of action of this block has not yet been determined due to a paucity of evidence of the technique, so the role of ESPB in chronic pain management is limited. Even more, there are no studies using neurolytic techniques in the ESPB. Method: We describe the successful application of the neurolytic substance phenol in 2 female patients with severe pain due to breast cancer where the previous management of the analgesic medications, did not achieved an adequate pain control. Result: The neurolytic-ESPB produced an extensive multidermatomal sensory block, allowing the reduce of the previous total oral opioid requirement for prolonged periods of time after the neurolytic procedure, and reducing, in consequent, the related side effects, improving the quality of life of our patients. Conclusion: The true mechanism of ESPB has not yet been determined, and there is a paucity of evidence of its role in the management of chronic pain with this technique. This balance between effectiveness and safety in all areas of chronic pain, mainly with patients with refractive cancer-pain, where multimodal techniques are chosen, must follow the criteria of evidence-based medicine.

**Keywords:** Erector Spinae Plane Block, Chronic Cancer Pain, Interventional Nerve Block Procedures, Neurolytic Block

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## 1. Introduction

Cancer pain is cited as the most feared complication in cancer patients [1] and can occur as a result of the disease, its treatment, or even a combination of both. In fact, pain in cancer patients, particularly in the advanced stage of disease, is considered the most important factor in deterioration of their quality of life, contributing to poor physical and emotional well-being, be more than 70% [2]. Therefore, the initial cancer pain management should be a comprehensive assessment, with an integral part of the cancer care. Despite guidelines and even the availability of opioids, there is a significant percentage of patients, ranging from 56% to 82%, who are not adequately treated. Also, the oncological pain

treatment cannot achieve an effective control (because there are dose-limiting or analgesic-related side effects) [2, 3], which is as much as 10% of cancer patients. Even more, a systematic review published in 2014 reported that approximately one-third of patients with cancer-pain do not receive appropriate analgesia proportional to their pain intensity [4, 5]. Thus, the cancer pain management requires an interdisciplinary approach, including the routine pharmacological and the non-pharmacologically therapies, and a mainly consideration of an interventional technique when there is a refractory cancer-related pain, the interdisciplinary fashion [6-8].

Interventional techniques include nerve blocks, neurolytic blocks, and intrathecal drug delivery (spinal or epidural) [9-11]. These techniques may achieve pain relief when are used

alone or, more frequently, the multimodal approach. Peripheral nerve blocks or plexus blocks should be considered a good strategy when pain occurs in a specific field, in one or more peripheral nerves. Nerve blocks, with local anesthetics, or even better, a neurolytic block technique is an optimal resource when is possible [10], since neurolytic blocks achieve a more prolonged effect than the use of LA, sometimes making it a "one off" intervention, or be easily repeated if the effect is a short-lasting.

The erector spinae plane block (ESPB) is a novel interfascial plane block, where numerous studies have demonstrated the effectiveness in acute pain management, using local anesthetics for their realization. Therefore, ESPB is currently considered a good alternative for multimodal analgesia in early postoperative pain [12-16]. The ESPB is, in fact, a technically simple procedure, with easily identified sonographic landmarks, for analgesia in patients undergoing thoracic, abdominal, lumbar, and urologic surgery. Considering breast surgery, the sensory blockade capability of the ESPB achieve and involve the nervous innervation of the breast (the anterior and lateral cutaneous branches of the T2-T6 intercostal nerves, with infrequent involvement of the T1 and T7 intercostal nerves) allowing us to consider this option for multimodal analgesia after total mastectomy. In fact, previous studies assessed the analgesic effects of the ESPB as part of the multimodal analgesic procedure after total mastectomy [15-17], supporting the use of this technique after total mastectomy. Even though, a catheter insertion is a successful technique in the management of analgesia for patients after breast surgery, with further injections of local anesthetics for 24 hours [16].

Nevertheless, the role of ESP block in chronic pain management is still limited. The notorious difficult of this alternative interventional procedure targeting for the chronic pain management is limited due to the short duration of local anesthetics. Therefore, neurolytic blocks could be considered as alternative to obtain a lasting effect. Also, neurolytic blocks are very helpful as they are inexpensive, "one off shot" or easily repeated if the effect is short-lasting. To our knowledge however, there are no documents reporting the use of neurolytic techniques in the ESPB, looking for a long-lasting effect. Thus, considering the sensory blocking capacity of the ESP technique that implies the nerve innervation of the breast, could allowed to applying this neurolytic technique, used alone or, more frequently, in combination with systemic therapy, such as multimodal analgesia, mainly dealing this difficult and refractory management of cancer breast pain when other physical therapies or medications have failed. This study proposes, then, this "ancient but novel strategy", rescuing neurolytic solutions, using this time the neurolytic substance phenol in 2 female patients with severe pain due to breast cancer, using the ESP block. The purpose of this study has been, also, the assessing of the analgesic effects with this multimodal technique with female patients with breast cancer-pain, and the results achieved to improve of quality of life of these patients, reducing systemic opioids doses and reducing as

well, its adverse effects.

This balance between effectiveness and safety in all areas of chronic pain, mainly with patients with refractive cancer-pain, where multimodal techniques are chosen, must follow the criteria of evidence-based medicine [18].

Case 1:

A 47-year-old woman referred to the chronic pain clinic with a 4-month history of severe left-sided chest pain. She reported constant burning and stabbing mixture nociceptive and neuropathic pain of 10/10 severity on the numerical rating score (NRS), mainly extending into the anterior chest wall, and radiating ipsilateral to the shoulder and arm, and the movements of the shoulder joint had a great limitation, and the Lattinen scale applied at the time was 17/20, providing a correlation with measurements of the impairment of her quality of life. There was also a significant sleep disturbance.

Outstanding history, the patient was diagnosed with stage IV breast cancer 8 months ago and underwent an extended radical mastectomy, with chemotherapy treatment and adjuvant radiotherapy completed 4 months ago. Exploration revealed a painful mastectomy scar on palpation, with great retraction of tissues, accompanied by lymphedema, and with allodynia and hyperesthesia over the affected dermatomes, very disabling, with notably altering the quality of life. Also, evidence of metastatic process in the upper and middle third of the humerus, and left 5, 6, 7 costal arches.

At the time of consultation, pain management up to that point had included Pregabalin (600 mg daily), Tramadol, nonsteroidal anti-inflammatory drugs, and several different opioids (codeine + morphine) that had to be stopped due to adverse severe side effects such as nausea and vomiting, with no improvement. The patient was admitted to hospital for pain management with intravenous potent opioid (morphine). In view of the severity of symptoms and the side effects of high doses of morphine, we elected to attempt a regional anesthetic technique in the pain unit to provide some immediate relief. The patient was explained about procedure, in two phases, the first one with local anesthetics (LA) and the second one using a neurolytic substance, phenol. The consent was taken.

After overnight fasting of the patient was premedicated with Midazolam 2 mg IV and Fentanyl 50 µg before the neuromuscular blockade. This novel interfascial plane block, the ESPB, was performed with the patient placed in a prone position and identifying the landmarks with a high-frequency linear ultrasound transducer (TERASON SMART 3200), placed in a longitudinal orientation 3 cm lateral to the left T3 spinous process. Three muscles were identified superficial to the hyperechoic transverse process shadow as follows: trapezius, rhomboid major, and erector spinae. An 8-cm 22-gauge block needle (Stimuplex Braun) was inserted in a caudad-to-cephalad direction until the tip lay in the interfascial plane between rhomboid major and erector spinae muscles, as evidenced by visible linear spread of fluid between the muscles upon injection. A total of 20 mL of Levobupivacaine 0,375% + Epinephrine 1:200.000 + Dexamethasone 16 mg was injected

here. The procedure was uneventful, and vitals were stable during and at the end of the procedure. Within 10 minutes, the patient reported that her pain had diminished significantly, and a full assessment of the extent of the sensory block was performed 2 hours later. By that time, the patient had obtained complete relief of pain, with an NRS of 2/10. She was discharged from hospital, and the medication prescribed was oral Acetaminophen/ Hydrocodone (mix 325/5 mg tab) on a regular basis every 8 hours and rescue with Morphine drops (3%) 4 drops on demand.

One week after the “therapeutic/ test” block, performed with local anesthesia, the patient reports substantial improvement in pain with a median NRS of 2-3/10, but still with episodes of breakthrough pain (median 5-6 times a day), with moderate to severe intensity, rapid in onset (minutes) but of relatively short duration, which responds to analgesic and rescue, reaching an optimal balance between the pain relief and a minimum side effects. Also, functional movements of the shoulder joint was recovered greater than 70%.

With this good response, the ultrasound neurolytic procedure was scheduled 10 days later. This second procedure was repeated in the similar position and following the similar sonographic landmarks, but the medications as follow: an initial dose of 15 ml Levobupivacaine 0,375% with Epinephrine 1:200.000 + Metilprednisolona 40 mg, and a second dose of 10 ml of phenol 8%. Then the total injected volume was 25 ml. Within 1 hour, the patient reported that her pain had diminished significantly, with a full assessment of the performed procedure 2 hours later achieving an NRS of 0/10, and with shoulder movements still greater than 70%. Oral Acetaminophen/ Hydrocodone (regular basis) and morphine drops 3% (as rescue) was kept, the similar regimen of analgesic. The follow-up after one month after the neurolytic procedure, the patient had still slight somatic pain but satisfactory pain control, despite still maintaining edema of the left upper limb, but with positive improvement of the mood, the insomnia, constipation, and appetite, allowing then the reduction of analgesic medications, and requiring the minimal doses of rescue.

#### Case 2:

A 62-year-old woman referred to the Pain Unit with a 2-month history of breast cancer with severe drug-refractory pain of right-sided hemithorax, having a regimen with Acetaminophen /Hydrocodone 325/5 mg and Pregabalin 75 mg every night, prescribed by the oncologic unit.

Her outstanding history reported she was diagnosed a breast cancer 5 years ago and underwent a partial mastectomy and an axillary lymph node dissection, with adjuvant chemotherapy after surgery. having a remission for three years. After the recurrence of the tumor, it was decided an extended radical mastectomy, followed by adjuvant chemotherapy and radiation. The evidence of side effects of radiotherapy, with red skin and a swelling in the arm and lymphoedema, associated to severe pain, NRS 8/10, with hyperesthesia and allodynia, very disabling, including the right side of the chest and the right arm, a mixture of somatic

and neuropathic component pain. The movement of her arm and shoulder was limiting, affecting her activities and work, with notably altering her quality of life. Also, a CT scan showed of multiple liver metastasis, although the PET scan did not show any spread of breast cancer to bones.

Explained to her about the proposed ESPB procedure, scheduled in two phases, a first “therapeutic/ test” ultrasound block with local anesthesia and then the second neurolytic procedure, scheduling 10 days after, she signed the consent.

In induction room, Midazolam 2 mg and fentanyl 100 µg were given IV and oxygen at 2 L/min using nasal prongs before the neuromuscular blockade, and standard monitoring, she was placed in a prone position and identifying the similar sonographic landmarks with a high-frequency linear ultrasound transducer (TERASON), at the level of the right T4 spinous process vertebra. Twenty ml of Levobupivacaine 0,375% + Dexamethasone 16 mg. was injected. Ten minutes on arrival to recovery room, her pain scores according to numerical rating scale (NRS) were 1/10 at rest and 2/10 on movement. Ten days later, the second procedure with neurolytic solution was repeated, similar position and similar sonographic landmarks, but the medications as follow: 15 ml of Levobupivacaine 0,375% + Depomedrol 40 mg and then 10 ml of phenol al 8% (total volume of 25 ml).

Five months after the neurolytic procedure, the patient had a satisfactory pain control with Acetaminofen/ Hidrocodona 325/5 mg every 8 hours + Pregabalina 150 mg/ night. A positive improvement in mood and insomnia was evident, and functional movements were recovered. The patient did not require any rescue analgesic.

## 2. Discussion

Ultrasound-guided interfascial plane blocks are a recent development in modern regional anesthesia research and practice and represent a new route [19]. The knowledge of the pharmacokinetics and pharmacodynamics of the local anesthetics usually associated with corticosteroids as adjuvants when performing these locoregional techniques is paramount for safe and optimal practice. The emergence of interfascial plane blocks facilitated by ultrasound and with arguably less complications associated with them, have been a well-established technique for perioperative pain management after breast and thoracic. These blocks can provide effective analgesia for a variety of abdominal surgical procedures. Several studies of interfascial blocks have documented the efficacy in reducing pain intensity and opioid consumption, as the abdominal wall is a major contributor to acute postoperative pain after abdominal surgery.

Erector spinae plane block (ESPB) is a novel regional block that has the ability to sufficiently block unilateral multidermatomal sensation from T1 to L3. The pooled reviews of the ESP block show this technique as a safe and effective option for multiple types for thoracic, abdominal, and limb surgeries. In recent years, there has been a lot of literature supporting the use of ESPB for patients undergoing

modified radical mastectomy where multiple nerves supplying the area, given excellent early analgesia. Thus, ESPB is a promising form of regional anesthesia that can decrease postoperative pain and opioid consumption when used as part of multimodal pain analgesia for patients undergoing breast surgery. However, the effective analgesic effect of this block with these drugs (LA) usually does not exceed 12 hours, therefore its use is usually restricted to post-operative analgesia [12, 15-17]. Hence, following these considerations, the prospective and randomized controlled trials of the ESPB technique are well documented, such as the analgesic effects or even the anesthetic procedures with this technique, however, other specific aspects, such as the diffusion of local anesthetics or other substances in this interfacial space, are scarce.

Cancer patients, particularly in advanced stages of the disease, have chronic severe pain that interferes significantly with functioning and contributing to poor physical and emotional well-being. The prevalence is estimated to be more than 70%. On the other hand, the neuropathic pain (NP) associated to cancer is a notoriously difficult manage, being a poor response to analgesic medications. NP cancer pain arises as a direct consequence of a cancer-induced injury to the somatosensory system. This type of NP cancer must be due to cancer treatment nerve fibrosis after RT, chemotherapy-induced or postsurgical NPs. [21, 22]. Patients refractory to all conventional strategies and/or with dose-limiting, or analgesic-related side effects could be considered an interventional technique, including nerve blocks, neurolytic blocks (including spinal neurolytic blocks and cordotomy) and intrathecal drug delivery (spinal or epidural) that may improve the quality of analgesia [2, 23]. Peripheral nerve blocks or plexus blocks, as we propose here, then, may be an alternative. Thus, interventional procedures targeting the peripheral nervous system, used alone, or in combination with systemic analgesics (the multimodal approach applied to all cancer pain) is probably the best alternative, allowing the pain control.

Neurolytic substances such as phenol or alcohol, have been widely used since ancient times in patients with chronic intractable pain. However, the narrow risk-benefit ratio associated with neurolysis techniques requires knowledge of the complications associated with the different neurolytic blocks in order to minimize undesirable effects. With this regard, there are very little studies using myofascial block compartments associated with neurolytic substances, most trials focused the TAP block (transverse muscles of the abdomen) with neurolytic substances via interfascial infiltrations [6, 24-27]. To our knowledge there are no documents reporting the use of neurolytic techniques in the ESPB, searching a long-lasting effect. Thus, the ESP block should be considered a good alternative regional block technique for providing analgesia for cancer-pain, but the "neurolytic ESPB technique" requires an additional evaluation as a randomized study to evaluate its true potential with respect to benefits and complications [27, 28]. Also, the management of cancer-pain, should include a multimodal analgesic technique, to reduce opioids doses and its adverse

effects, improving the quality of life of our patients.

In our opinion, there would be a clearly potential for the application of this neurolytic technique in a wide range of conditions, including chronic cases of NP or mixture pain after cancer, where more conventional therapies usually have a limited success [27-29].

### 3. Conclusion

In these 2 patients included in this study, with severe chest cancer pain, with mixed characteristics (somatic and neuropathic), allowed us to manage the pain but also the function of the shoulder. We consider this technique, a neurolytic block, has been a beneficial and reasonable alternative in the lack of response to other therapies (topical and oral). Therefore, searching this balance between effectiveness and safety in all areas of chronic pain, mainly with patients with refractive cancer-pain like we include in this study, the multimodal techniques options must follow a rigorous criterion of evidence-based medicine, that is, the explicit and judicious decisions in the care in each individual patient [18]. Currently, ESPB-associated neurolytic agents have not been published, so further investigation should confirm the reproducibility of this block when using neurolytics.

### Disclosure

The authors have declared no conflicts of interest.

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