

## **Pectoral Nerves Block: Impact of Regional Anesthesia in Pacemaker Implantation in Patients ASA IV Status and with High Risk of Cardiac Arrest, A Case Report**

**Luis Alberto Rodriguez Linares<sup>1\*</sup>, Clara Elisa Frare de Avelar Teixeira<sup>2</sup>, Pedro Velloso Margarido<sup>3</sup> and Pedro Paulo Kimachi<sup>4</sup>**

<sup>1</sup>Assistant from Regional Anesthesia Department, Sírio-Libanês Hospital, São Paulo, Brazil

<sup>2</sup>Sírio-Libanês Hospital, São Paulo, Brazil

<sup>3</sup>Sírio-Libanês Hospital, São Paulo, Brazil

<sup>4</sup>Coordinator from Regional Anesthesia Department, Sírio-Libanês Hospital, São Paulo, Brazil

**\*Corresponding Author:** Luis Alberto Rodriguez Linares, Assistant from Regional Anesthesia Department, Sírio-Libanês Hospital, São Paulo, Brazil.

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### **Abstract**

The pectoral nerves block is an easy and reliable superficial block, first described in 2011, inspired by the infraclavicular block approach and the transversus abdominis plane blocks. It aims to anesthetize the lateral and medial pectoral nerves at an interfascial plane between the pectoralis major and minor muscles. The main indications are breast expanders and subpectoral prosthesis where the distension of these muscles is extremely painful. Although local anesthesia with sedation for implantable cardiac devices insertion has been reported previously, cooperation with such techniques may be limited due to pain associated with widespread infiltration of the local anesthetic agent. Some patients may not tolerate the use of surgeon delivered local anesthetic agents, instead requiring a more profound level of sensory blockade.

Although it is common knowledge that this technique can be used in implantable cardiac devices surgeries, its use hasn't been reported very often, suggesting it is underestimated in cardiovascular surgeries for high risk patients.

This case report exemplifies this regional anesthesia technique's success for a bicameral pacemaker exchange in a high cardiovascular risk patient, classified by the American Society of Anesthesiologists physical status IV.

**Keywords:** *Implantable Cardiac Devices (ICD); Lateral Pectoral Nerves (LPN); Medial Pectoral Nerves (MPN)*

### **Introduction**

In many implantable cardiac devices (ICD) implanting centers, whether a cardiovascular surgeon or an electrophysiologist performs the implant procedure in the operating room or in the electrophysiology laboratory, general anesthesia is routinely used. Furthermore, when a submuscular pocket was used, this was initially perceived as a demanding and potentially more painful procedure and general anesthesia was considered more suitable. With pectoral implants, avoidance of general anesthesia could be a more attainable objective. Some investigators have already successfully used combined conscious and deep sedation during subfascial prepectoral implantation [1-5].

In the present case report, we demonstrate an advantage of the use of regional anesthesia confirming that not only is it feasible and safe, but also leads to fewer complications and a faster procedure.

### **PECS I block**

The Pecs I block is a single injection of local anaesthetic between pectoralis major and pectoralis minor muscles at the level of the 3<sup>rd</sup> rib to anaesthetise the lateral pectoral nerves (LPN) and medial pectoral nerves (MPN) [6].

### **Indications**

Surgery limited to pectoralis major e.g. unilateral surgery such as insertion of breast expanders and submuscular prosthetics, portacaths and implantable cardiac defibrillators/pacemakers, anterior thoracotomies and shoulder surgery involving the deltopectoral groove.

### **PECS II block**

The Pecs II block is a modified Pecs I block and can be achieved with one needle insertion point. Local anaesthetic is placed between pectoralis major and minor just as with a Pecs I block and then between the pectoralis minor and serratus anterior muscles. This results in local anaesthetic spread under the ligament of Gerdy. The ligament of Gerdy is a thick fascia that gives the concave shape to the axilla. On its medial side it attaches to the lateral side of the pectoral muscle. This second injection will anaesthetise the anterio-cutaneous branches of the intercostal nerves, the intercostobrachialis and the long thoracic nerves [6].

### **Indications**

Similar to Pecs I with some additions: tumour resections, mastectomies, sentinel node biopsies and axillary clearances.

### **Case Report**

E.P.C (name of patient), male, 90 years, 80 kg, M.D (profession), Atrioventricular Mobitz II block since 2009, after a myocardial infarction. Benign prostate hyperplasia. No other comorbidities. Continuous use of tamsulosin. Scheduled for an elective pacemaker generator exchange. Presented with no altered preoperative laboratorial exams.

After placement of standard ASA monitors, intravenous access (18G) was obtained in right arm and nasal cannulae with 2 L/min oxygen was installed for support.

The interventional cardiologist estimated at 40 minutes procedure with a high risk of cardiorespiratory arrest. Sedation and thoracic wall block were chosen as anesthetic technique. Patient received 1 mg midazolam, 60 mg lidocaine and 30 mg ketamine IV for a Ramsay 3 sedation. Antiseptics and sterile materials were used for a Pecs type 2 block in the left chest wall guided by ultrasound and Stimuplex® A50 mm needle. A total of 15 ml 0,375% ropivacaine was used in a 2:1 proportion in Pecs 2. During the procedure there was no further need for sedation boluses. There were also no surgical complications.

The procedure lasted one hour, during which the patient was hemodynamically stable, with no vasoactive drugs, with spontaneous breathing with the nasal cannulae. After the surgery, patient received 2g of metamizole and was transferred to the post anesthetic recovery unit awake and with no complaints. After one hour, he was admitted in the hospital ward and required no further analgesics. He was discharged 24 hours after the procedure without reported complications.

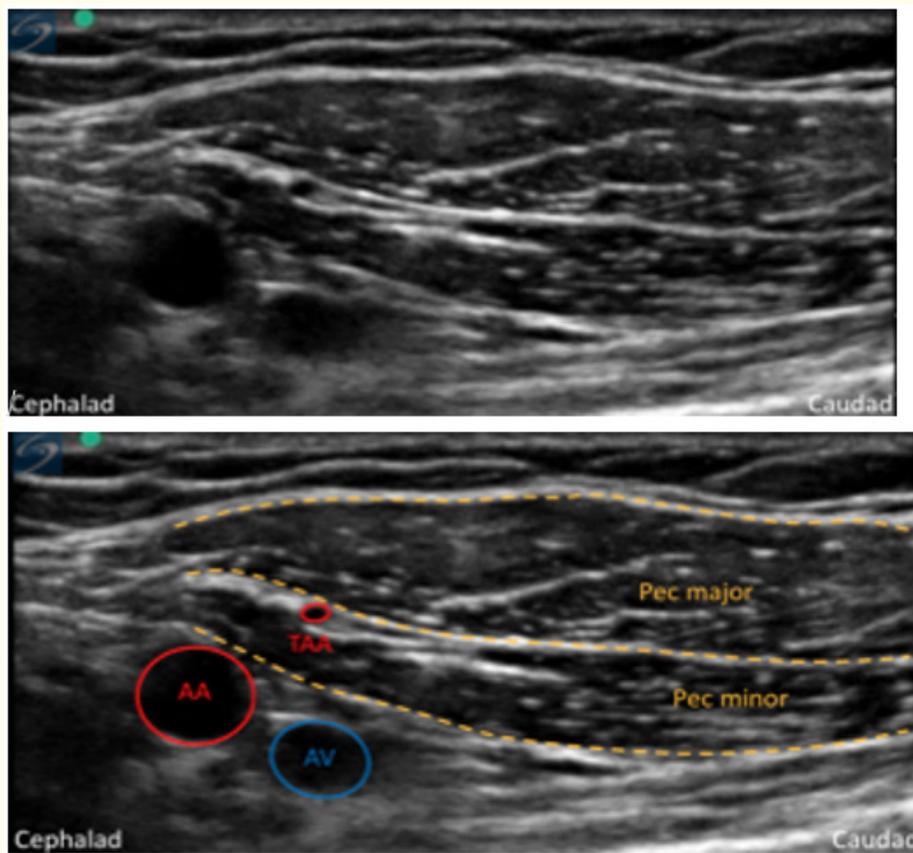
### **Discussion**

Peripheral blocks have gradually conquered space in anesthesia due to a very low complication rate, to their relative easy to perform techniques and their wide range of applicability. There are beneficial in high risk patients (ASA IV or higher) in which the hemodynamic

alterations provided by general or spinal anesthesia can be harmful, meaning a higher probability of cardiac arrest and even death. In this context, pacemaker implantations or its surgical manipulation can be a challenging scenario for the anesthesiologist, for the vast majority of these patients has some degree of cardiovascular limitation, and the anesthetic drugs must be carefully titrated to the desired effect [7]. On the other hand, too much local anesthetic administration may lead to insufficient wound healing and local anesthetic intoxication resulting in patient stress [8]. With PECS and intercostal nerve blocks, we can minimize the dose of local anesthetics under the guide of ultrasonography.

Pecs Block is a fascia local anesthetic infiltration technique with a very safe profile, and its main complication is puncture site hematoma, specially in anticoagulated patients [9]. Other possible complications include pneumothorax or injury of the long thoracic nerve or thoracodorsal nerve. The long thoracic nerve runs on the outer surface of the serratus anterior muscle and thoracodorsal nerve runs deep in the posterior axillary wall to supply the latissimus dorsi [10].

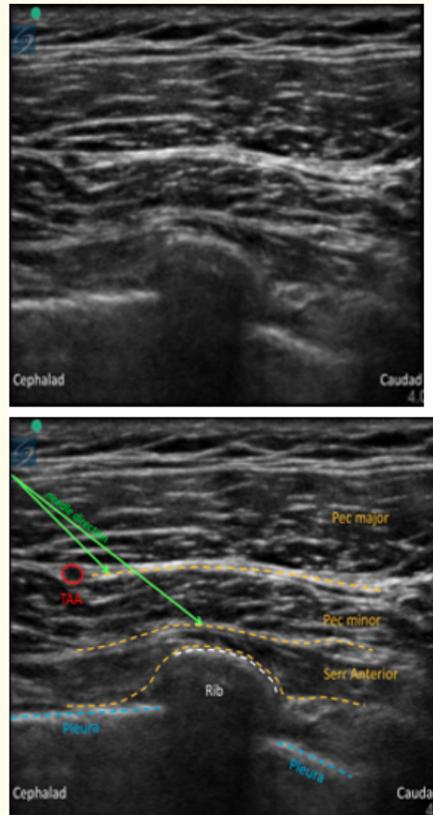
The technique initially described by Blanco, called Pecs I, provides analgesia to the thoracic wall during breast surgeries (Figure 1).



**Figure 1:** Sonoanatomy Pecs I. Needle will be seen to approach from cephalad end. Local anaesthesia will be injected in the space between the Pec major and Pec minor.

AA: Axillary Artery; AV: Axillary Vein; TAA: Thoraco-Acromial Artery.

In 2012 a modification of this block was described and called the modified Pecs block or Pecs block type II, which includes axillary analgesia, essential for lymph nodes exeresis, and intercostal nerves block, for large tumors and mastectomies (Figure 2).



**Figure 2:** Sonoanatomy Pecs II. Needle will be seen to approach from the cephalad end. Local anaesthesia will be injected at two points. One in the space between pectoralis major and minor and the other in the compartment between pectoralis minor and serratus anterior  
AA: Axillary Artery; AV: Axillary Vein; TAA: Thoraco-Acromial Artery.

In the reported case, the choice of Pecs block was due to scientific evidence of effective analgesia for pacemaker substitution or for cardiac defibrillator implantation [11] and due to the inherent risks of this patient.

We emphasize that, depending on the area of implantation, a cervical superficial approach might be necessary, due to the anterior and inferior clavicle innervation.

In those cases, it is essential to evaluate the experience of the surgeon, since excessive manipulation of adjacent structures may increase the area necessary to be anesthetized in order to provide a painless and safe procedure for the patient [10].

It was evident how the use of regional anesthesia in this exemplary patient, the advantages of using it as an anesthetic technique. Why submit a type of patient like this to a more invasive anesthesia? This time regional anesthesia, I avoid a cardiac arrest in a patient with obvious myocardial dysfunction and other complications. Avoid prolonged stay in intensive care unit or cardiac and respiratory

complications. This work is serving as the basis for the realization of a randomized study, where patients with the same clinical characteristics are being evaluated. In our country, the realization of the blockade in all centers is not a reality. Showing the advantages of blockages, we have made progress in the implementation of regional anesthesia in cardiac center

### **Conclusion**

We report the application of this block for a unique patient population as a means of avoiding general anesthesia: patients with many comorbidities and high potential of cardiac attack that require ICD insertion due to their coexisting cardiomyopathy and the development of ventricular arrhythmias.

When the search is made in high-impact journals, there is not enough evidence on related articles patients with high risk of cardiovascular arrest, the article more only studies patients with Duchene dystrophy [10].

For this reason, it is important to know that in patients where general anesthesia can increase the risk of cardiac arrest and increase morbidity, we must think of other possibilities, being able to support regional anesthesia as option.

It is well known that PECS type II has a clear use in the implementation of brand-pass, but we have few cases in the literature that support the use of it.

The procedure ended without complications, the risks and deleterious effects of general anesthesia were avoided, postoperative analgesia was optimized and with no use of opioids, allowing a faster discharge for the patient. We know that pain can increase oxygen consumption and cause infarction or worsen the situation of a compromised cardiac tissue. Patients with high cardiovascular risk, who benefit from hypoxia or an event such as bronchospasm or laryngospasm, which can occur through general anesthesia, can be avoided.

More studies, with a larger number of patients, and training of anesthesiologists are necessary for the widespread use of this block as a first option in anesthesia for pacemaker or defibrillator implantation or substitution.

### **Conflict of Interest**

The authors declare no competing interests.

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