

# USG Guided triple peripheral nerve blocks in an arthrodesis patient who has implanted cardioverter defibrillators

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## Abstract

The use of combined peripheral nerve blocks significantly reduces morbidity and mortality in high-risk patients. The widespread use of ultrasound in peripheral nerve blocks provides success with less local anesthetic amounts in patients with multiple blocks. In this case report, we aimed to present the use of a combination of sciatic nerve block, femoral nerve block and fascia iliaca block in a patient with implanted cardioverter defibrillator (ICD) and vascular pathologies who underwent an arthrodesis operation for bimalleolar fracture.

**Keywords:** Femoral nerve block; sciatic nerve block; fascia iliaca nerve block.

## INTRODUCTION

Aging can cause irreversible changes in all circulation system (heart and blood vessels) and therefore the ages of 65 more predisposed to heart diseases. The developments in the area of health in the recent years have made it possible in particular for patients with heart diseases to live longer. Naturally long life brings more risk of surgery. Since patients with heart disease have an increased risk of anesthesia, anesthesia techniques have started to vary when compared to others.

The function of implanted cardioverter defibrillator in high risk cardiac patients is reducing mortality caused by sudden deaths by rates as high as 50% (1). On the other hand increasingly wide spread use of implanted cardioverter defibrillator (ICD) is one of the main serious cardiological problems in the management of anesthesia for patients who are to go under surgery with any other surgery than cardiac anesthesia. The optimal preoperative anesthesia plan for ICD patients with comorbid heart problems should be decided with cardiology and anesthesia departments.

Although the neuraxial blocks are widely used in lower extremity operations, it is known that peripheral nerve blocks cause more limited hemodynamic changes in particular in patients with heart diseases (2). Moreover the use of ultrasonography in peripheral nerve blocks are

more preferred in patients who need multiple peripheral nerve blocks because of decreasing the amounts of local anesthesia (3). We aimed to present our perioperative anesthesia approach in a patient who is to go under arthrodesis operation due to bimalleolar fractures and has ICD and different vascular problems.

## CASE REPORT

A 64 years old man weighing 75 kg was admitted to the orthopedics and traumatology department because of an ankle arthrodesis due to a bimalleolar fracture. In the preoperative anesthesia evaluation, it was observed that the patient had a history of cardiopulmonary bypass, aortic valve replacement and ascending aortic replantation. The patient has ICD in his chest and pacemaker rhythm in his electrocardiogram. The patient had rales in lung listening with bilateral closed costophrenic sinuses in anteroposterior lung graphy. The patient's complete blood count, blood biochemical and coagulation factor values were within normal values, except INR (international normalized ratio) was 4.17 (0.8-1.1).

Cardiology consultation was requested because the patient had cardiac problems and was an active ICD user. As a result of the echocardiography (ECO) indicated in the cardiology consultation note, the patient's ejection fraction (EF) was 20% with a global hypokinesia in the

**Received:** 30.06.2019 **Accepted:** 25.09.2019 **Available online:** 25.10.2019

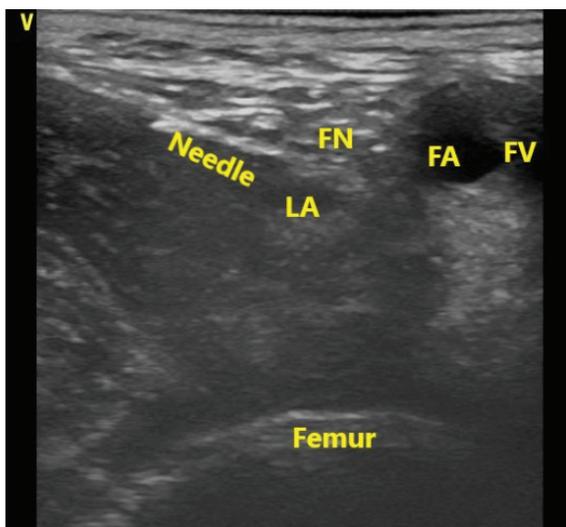
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heart. The Lee index score was developed to predict major cardiac complications for perioperative risk assessment in non-cardiac surgeries (4). The patient's Lee index score was determined as 11% with a decision of high risk patient for surgery. Because of the patient's high INR value, it was stated in the cardiology consultation note that he should be operated when the INR value is below 1.5. Warfarin and enoxaparin sodium can be restarted in the post-operative period. In addition, it was decided to closely do the follow-up of urination and liquid management during the operation and to avoid excessive hydration in the intraoperative period.

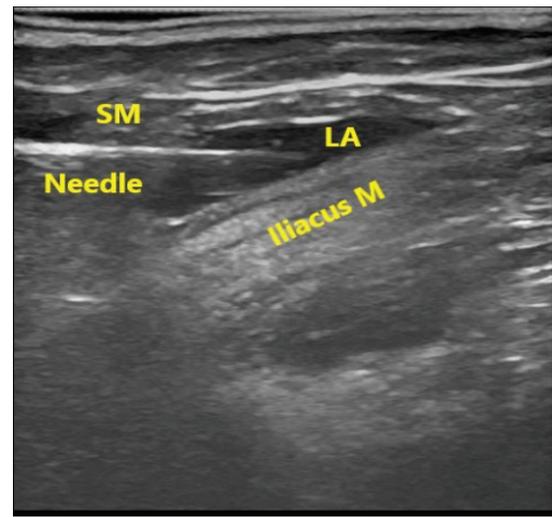
In the INR follow-up (1.57) done on the morning of the operation and after all the results were evaluated, it was decided to perform combined femoral-sciatic and fascia iliaca nerve block for the arthrodesis operation in this ASA IV patient. Prior to the surgery, the pacemaker's battery, impedance and threshold values were checked and the patient was operated on without stopping the pacemaker. Routine monitoring involving electrocardiogram, non-invasive blood pressure and peripheral oxygen saturation was carried out. The premedication was done with intravenous 25 mcg/kg fentanyl and 1 mg midazolam. The patient was positioned supine, inguinal crease was cleared with povidone-iodine and covered up sterilely. GE Healthcare ultrasound machine with 6-13 Hz linear probe covered by sterile cover. First of all femoral artery was found in the inguinal crease with the transversely located sterile probe. Local anesthesia was done with 2% prilocaine 2 ml to prevent the pain of the block needle.

The probe was moved laterally with the identification of the sartorius and iliopsoas muscles. Under the ultrasound image, the needle was inserted in an in-plane technique. Passing through the fascia lata and sartorius muscle of the needle was seen clearly. 15 ml 0,5% bupivacaine was injected to the surrounding area of the femoral nerve with care with episodic aspirations. The distribution of local anesthetic around femoral nerve was observed (Figure 1).

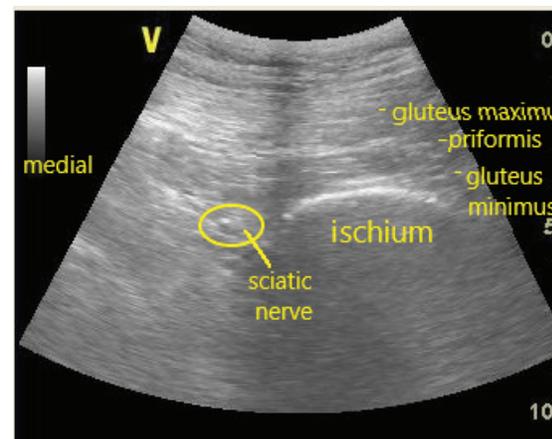


**Figure 1.** Distribution of local anesthetics during femoral nerve block. FN; femoral nerve FA; femoral artery FV; femoral vein LA; local anesthetic

Using the same technique, the needle was pulled underneath the skin without being taken out and placed in vertical position again and 20 ml 0.5% bupivacaine was injected in fascia iliaca (Figure 2).



**Figure 2.** Distribution of local anesthetics during fascia iliaca nerve block. SM; sartorius muscle LA; local anesthetic



**Figure 3.** Ultrasonographic view of sciatic nerve block.

The spread of the injected local anesthetic in the interfascial plan in the lateral direction was observed clearly. After all these processes, the patient was turned in lateral decubitus position with the leg to be operated on top and the leg on top was preserved in 135° flexion and the leg below was placed in a straight position. The convex probe was prepared and put in sterile cover with the same technique. After identifying of the spina iliaca posterior superior and the large trochanter of the femur, the probe was placed 4-5cm underneath of the middle point of the line between these two structures. For preventing the block needle pain, the local anesthesia was repeated with 2ml of 2% prilocaine. After the sciatic nerve was observed, 20ml of 0,5% bupivacaine was injected through the in-plane technique (Figure 3).

While the peripheral nerve block was being applied, the neurostimulation technique was never used. A total of 125

mg ketamine and 2 mg midazolam was given intravenously (iv) to the patient with the purpose of sedoanalgesia intraoperatively and the operation was completed without pain. The hemodynamic changes, electrocardiogram and non-invasive arterial pressure monitoring was observed carefully during operation.

## DISCUSSION

Nowadays the span of life is increasing and accordingly elderly patients with more comorbidities and complication risks need anesthesia for operations. In particular opioids given during or after general anesthesia cause serious complications such as longer periods of hospitalization, increased delirium, uncontrolled post-operative pain and decreasing gastrointestinal motility. In addition, patients who have a serious low ejection fraction and global hypokinetic hearts just like our patient have hypotension and perfusion defect resulting from hypotension after the induction of anesthesia.

Since neuroaxial and peripheral nerve blocks which are regional anesthesia methods reduce risks due to induction of anesthesia and the consumption of opioids. So nowadays these techniques are more preferable than general anesthesia especially in orthopedic surgeries. Neuroaxial anesthesia led to more complications like hypotension which is caused due to vasodilatation and bradycardia due to sympathetic blockage in old patients with comorbidities when compared to peripheral nerve blocks (5). In a study comparing combined sciatic-femoral block with spinal anesthesia, while a 15-20% decrease has been observed in cardiac index in the spinal anesthesia group, a change was not observed in the group in which peripheral blockage was applied (6).

In patients with lung diseases, it is known that general anesthesia worsens the functions of the lungs and in particular elderly patients can be overly sensitive to narcotic and sedatives. We have avoided general anesthesia due to the existing lung pathologies and cardiac pathologies in our patient and decided that the peripheral nerve block application will be the better approach.

ICD is mostly used in patients who are under sudden death risk caused by ventricular function inefficiency. However, there are some limitations related to its interaction with electromagnetic area in its usage. When a patient is subject to electromagnetic waves, the magnetic resonance device and security bands at airports for more than 30 seconds, ICD loses its activation (7). Besides we know that electroconvulsive treatment may cause arrhythmia, so ICD patients should be monitored very closely (8).

Our patient had some other risks which were related to his pacemaker among other cardiac problems. As we know, while peripheral nerve blockages are applied, still the neurostimulation technique is still being used. In fact, the studies show that the use of ultrasonography is not superior to the neurostimulation technique. However, some researchers suggest that the combined used of these two techniques give better results.

In the literature, unsuitable defibrillation activity which develops due to electromagnetic interference which occurs as a result of using the transcutaneous electrical nerve stimulant (TENS) in patients with ICD has been defined (9). In another study, the negative effects of the TENS device have been shown although these did not reach shock levels (10). Although the neurostimulation technique is used in addition to ultrasonography in some cases in our classic routine, we only used ultrasonography in this case. The main reason for this is that the change which takes place in the magnetic focus in relation to the use of neurostimulation technique can change the rhythm which should be provided by the pacemaker and cause thermal myocardial injury. In the preoperative evaluation done with cardiology consultant, we have decided for the pacemaker to continue working in the 'VOO' mode since the area to be operated on would remain below the belly. During the case, the bipolar electrocautery was used in minimal power. The advantage in this case was that, the area on which the electrocautery was used was far from the heart. Because in electrosurgical processes below the belly area, electromagnetic interaction possibility is lower.

As a result, patients who have ICD and are in the high cardiac risk should be closely evaluated preoperatively in concordance with the cardiology department. During and after the operation, peripheral nerve blocks as an anesthesia technique should definitely be considered in patient groups whose ASA (American Society of Anesthesiologists) scores are high and have serious comorbidities in order to avoid cardiovascular and respiratory complications. In patients with ICD, it is suggested to apply peripheral nerve blocks under the guidance of ultrasonography and to avoid using neurostimulation devices.

*Competing interests: The authors declare that they have no competing interest.*

*Financial Disclosure: The financial support was provided by Hatay Mustafa Kemal University*

*Ethical approval: The ethics committee of Hatay Mustafa Kemal University approved the study.*

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