

# World Journal of *Clinical Cases*

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## Ultrasound-guided fascia iliaca compartment block combined with general anesthesia for amputation in an acute myocardial infarction patient after percutaneous coronary intervention: A case report

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**Author contributions:** Ling C, Liu XQ and Li YQ contributed equally to this work. Ling C collected the case data and administered the anesthesia; Li YQ formulated the surgery regimen and administered the surgery; Liu XQ collected the case data and administered the anesthesia; Wen XJ formulated the anesthesia regimen, guided the anesthesia, and wrote the manuscript; Hu XD and Yang K administered the anesthesia.

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The authors have read the CARE Checklist (2016) and the manuscript was prepared and revised according to the CARE Checklist (2016).

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### Abstract

#### BACKGROUND

Fascia iliaca compartment block is a technique that blocks three nerves, similar to a 3-in-1 nerve block. This block provides analgesia for patients undergoing lower limb surgery, and is a simple technique that is easy to implement. Here, we report a case of fascia iliaca compartment block in a patient with myocardial infarction who underwent emergency middle thigh amputation.

#### CASE SUMMARY

A 78-year-old female patient weighing 38 kg with gangrene and occlusive peripheral atherosclerosis of the right leg underwent an emergency middle thigh amputation. The patient had a history of hypertension, coronary heart disease, cerebral infarction, anterior wall myocardial infarction, and had recently undergone percutaneous coronary intervention consisting of coronary angiography and right coronary artery stent implantation. Considering the patient's condition, an ultrasound-guided fascia iliaca compartment block combined with general anesthesia was implemented for amputation. The fascia iliaca compartment block provided analgesia for the operation, and reduced the dosage of general anesthetics. It also alleviated adverse cardiovascular effects caused by pain stress, and ensured the safety of the patient during the perioperative period. This block also provided postoperative analgesia. The patient had a good prognosis, and was subsequently discharged from hospital.

#### CONCLUSION

Fascia iliaca compartment block provides surgical analgesia. It also alleviates adverse cardiovascular effects, and ensures patient safety during the perioperative period.

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**Core tip:** Ultrasound-guided fascia iliaca compartment block combined with general anesthesia can provide better intraoperative analgesia for thigh surgery, reduce the dosage of general anesthetics, and alleviate the adverse cardiovascular effects caused by pain stress. In this case report, we describe the effects of fascia iliaca compartment block in a patient with myocardial infarction who underwent an emergency middle thigh amputation. Use of this block ensured the safety of the patient during the perioperative period.

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## INTRODUCTION

Thigh surgery presents a challenging clinical problem commonly encountered by medical staff. Traditional analgesia for thigh surgery involves opioids and regional nerve blockade, which have been demonstrated to be effective. Emergency surgery is often encountered in the elderly, and presents special demands for the anesthesiologist. Fascia iliaca compartment block is a technique that blocks three nerves similar to a 3-in-1 nerve block. The fascia iliaca space has the iliopsoas muscle behind, the fascia iliaca in front, and the fascia lata covering the superficial fascia of the fascia iliaca. The femoral nerve, the lateral femoral cutaneous nerve, and the obturator nerve are located below the fascia iliaca at the pelvic segment. The fascia iliaca compartment block is used to block these three nerves to meet the needs of lower limb analgesia and anesthesia. From references<sup>[1,2]</sup>, we know that fascia iliaca compartment block can provide superior analgesia and decreased opioid consumption with minimal side effects. It can be deployed in a relatively quick fashion after a small amount of training, and can be executed with high success rates under ultrasound guidance. Compared with general anesthesia, fascia iliaca compartment block combined with general anesthesia reduces the dosage of general anesthetics required, stabilizes the hemodynamics, and improves postoperative analgesia. Here, we report a case of fascia iliaca compartment block in a patient with myocardial infarction who underwent emergency middle thigh amputation.

## CASE PRESENTATION

### Chief complaints

Shortness of breath and dyspnea for 10 d.

### History of present illness

A 78-year-old female patient weighing 38 kg was diagnosed with acute non-ST segment elevation myocardial infarction 10 d previously in another hospital, which manifested as chest pain, shortness of breath and dyspnea, and was treated with tracheal intubation, ventilator-assisted ventilation and vasodilation. Serum troponin concentration was 0.7 ng/mL. The patient was transferred to the intensive care unit (ICU) at our hospital.

### History of past illness

Hypertension and coronary heart disease for 15 years, cerebral infarction for 8 years, and anterior wall myocardial infarction for 5 years.

### Physical examination

The patient had decreased blood pressure, increased heart rate and fever, characterized by septic shock, cardiogenic shock, and blood oxygen saturation (SpO<sub>2</sub>) fluctuations above 97% when tracheal intubation was connected to the ventilator. The lungs demonstrated thick breath sounds, and the lower lungs showed slight moist rale. Her heart rate was 100 bpm, the heart sound was low and blunt, and there was no noise in each valve area. Dry necrosis of the right lower foot and visible scattered ecchymoses were observed.

### **Laboratory examinations**

The serum creatine kinase-MB concentration was 25.8 ng/mL, and the white blood cell count was  $24.25 \times 10^9/L$ .

### **Imaging examinations**

The bedside digital radiography chest X-ray showed double lung infection. Color Doppler ultrasound showed moderate mitral regurgitation and mild aortic regurgitation.

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## **FINAL DIAGNOSIS**

Non-ST segment elevation acute myocardial infarction, right leg gangrene, and right leg peripheral arterial occlusive disease.

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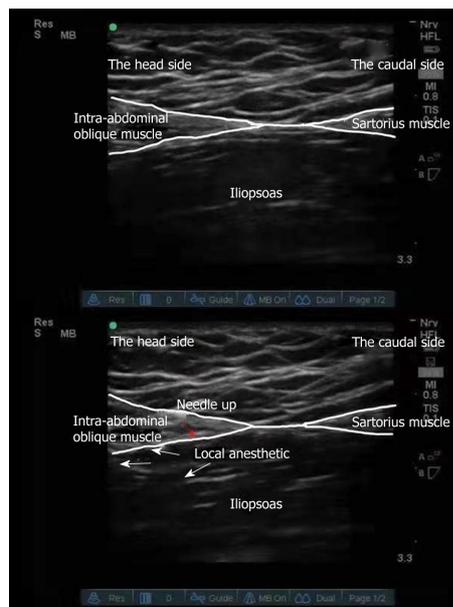
## **TREATMENT**

In the ICU, the patient had been given imipenem and cilastatin sodium for anti-infection, as well as dopamine and norepinephrine as anti-shock treatment. Three days previous, the patient had undergone percutaneous coronary intervention (PCI) consisting of coronary angiography and right coronary artery stent implantation by a cardiologist. The coronary angiography showed that there was no obvious stenosis in the left main coronary artery, 70%-80% stenosis in the middle part of the anterior descending artery, 80% stenosis in the opening of the circumflex artery, and 90% stenosis in the proximal part of the right coronary artery. The patient was diagnosed with right coronary artery dominant type and three-vessel coronary lesions. Considering the patient's condition, a stent was implanted in the right coronary artery, and the effect of vascular opening was good. Following PCI, the patient's body temperature further increased (38.5-39 °C), and the white blood cell count was  $33.74 \times 10^9/L$ . The right lower extremity showed dry skin necrosis and scattered ecchymoses. The right middle iliac artery showed occlusion. The patient had an endotracheal tube in place and presented with fever, and the SpO<sub>2</sub> was over 97% with medium flow oxygen inhalation. Following multi-disciplinary team consultation, the patient was scheduled for mid-thigh amputation.

The patient was conscious and entered the operating room with a tracheal catheter in place. Dopamine was pumped continuously at 5 µg/kg per min, and norepinephrine was pumped at 0.06 µg/kg per min into the right internal jugular vein. The patient's non-invasive blood pressure was 95/45 mmHg, heart rate was 98 bpm, and SpO<sub>2</sub> was 99%. A left radial artery puncture catheter was used to monitor arterial blood pressure. The anesthesia system was connected to the tracheal catheter to assist ventilation.

Ultrasound-guided right-side improved fascia iliaca compartment block was used for surgical analgesia. The procedures were as follows: The ultrasound probe was vertically placed on the outer third of the inguinal ligament to identify the hourglass sign in the obliquus internus abdominis, sartorius muscle and iliopsoas muscle<sup>[3]</sup> (Figure 1). The in-plane technique was used to implant the needle from the tail end to the head of the patient to reach the deep surface of the fascia iliaca. Local anesthetics (0.33% ropivacaine hydrochloride 30 mL) was injected into the space between the obliquus internus abdominis and iliopsoas muscle. The anesthetic plane was tested by acupuncture after 5 min and 10 min to ensure the block effect. After blocking, midazolam 2 mg, sufentanil 10 µg, cisatracurium 6 mg and etomidate 6 mg were intravenously injected to induce anesthesia, and 1% sevoflurane inhalation anesthesia-maintained anesthesia.

The operation duration was 65 min. The bispectral index was maintained between 45 and 60. Vasoactive drugs were used to regulate blood pressure and heart rate. Vital signs were stable during the perioperative period. The Critical Care Pain Observation Tool (CPOT) score can be used to assess pain in critically ill patients with no hypnotic, opioid-based analgo-sedation<sup>[4,5]</sup>, the CPOT score was 2 at 6 h after surgery, and the



**Figure 1 Procedure for ultrasound-guided fascia iliaca compartment block.** The ultrasound probe was vertically placed on the outer third of the inguinal ligament to identify the hourglass sign of the obliquus internus abdominis, sartorius muscle and iliopectus muscle.

Ramsay sedation score was 3. The effect of postoperative analgesia was satisfactory. Two days after the operation, inflammatory indicators improved, and tracheal intubation was removed.

## OUTCOME AND FOLLOW-UP

No serious adverse cardiovascular events occurred during the perioperative period, and the patient was subsequently discharged.

## DISCUSSION

The incremental risk of noncardiac surgery on adverse cardiac events among post-stent patients is highest in the initial 6 mo following stent implantation, and stabilizes at 1.0% after 6 mo<sup>[6,7]</sup>. From references<sup>[8]</sup>, in the case of emergency surgery, it is particularly important for anesthesiologists to prevent, monitor and treat myocardial ischemia during surgery.

Our patient suffered from an acute myocardial infarction approximately 2 wk previous, and had undergone PCI. Due to vascular occlusion and necrosis of the right lower extremity, the patient presented with septic shock, and underwent both tracheal intubation and artificial ventilation. She also had multiple organ dysfunction. It was necessary to perform an urgent right lower extremity amputation to eliminate the source of infection. For amputation patients, intraspinal anesthesia is the preferred method of anesthesia. However, this patient was administered anticoagulation therapy after PCI, and coagulation function was abnormal; thus, intraspinal anesthesia was unsuitable.

As this patient had suffered from a recent acute myocardial infarction and her cardiac function was poor, it was crucial to maintain stable circulation, as well as a balance between oxygen supply and demand during surgery. If only general anesthesia was selected, deep anesthesia would be required. Anesthetic agents can depress myocardial contraction<sup>[9]</sup>. A large dosage of general anesthetics would aggravate myocardial depression and induce adverse cardiac events. Krych *et al*<sup>[10]</sup> reported that the quality of perioperative analgesia provided by the fascia iliaca blockade was excellent, and resulted in both low opioid consumption and a high quality of pain relief. Ultrasound-guided fascia iliaca compartment block provided the perfect analgesia, and decreased the consumption of general anesthetics, which avoided cardiac and circulatory function depression. This was caused by deep general anesthesia and the stress reaction caused by light anesthesia. Considering the patient's condition, ultrasound-guided fascia iliaca compartment block combined with general

anesthesia was employed for amputation.

The fascia iliaca space has the iliopsoas muscle behind, the fascia iliaca in front, and the fascia lata covering the superficial fascia of the fascia iliaca<sup>[11-13]</sup>. The femoral nerve, the lateral femoral cutaneous nerve, and the obturator nerve are located below the fascia iliaca at the pelvic segment<sup>[14]</sup>. Fascia iliaca compartment block is used to block these nerves to meet the needs of lower limb analgesia and anesthesia. It is used for anesthesia and analgesia of the hip, knee and thigh<sup>[15,16]</sup>. Ultrasound-guided fascia iliaca compartment block can be divided into parallel puncture of the inguinal ligament, and improved vertical puncture of the inguinal ligament. In a parallel puncture of the inguinal ligament, drugs spread to the lower part of the inguinal ligament, while the modified fascia iliaca compartment block technique under real-time ultrasound guidance and local anesthetics spread to the head<sup>[17,18]</sup>. As the distribution of the femoral nerve, lateral femoral cutaneous nerve and obturator nerve is concentrated above the inguinal ligaments, the number of local anesthetics needed in the improved vertical method is reduced. Due to infection, the patient required emergency amputation, and the improved vertical method of fascia iliaca compartment block combined with general anesthesia was adopted.

## CONCLUSION

Ultrasound-guided fascia iliaca compartment block provided analgesia for surgery, and reduced the dosage of general anesthetics. It also alleviated adverse cardiovascular effects caused by pain stress, and ensured the safety of the patient during the perioperative period. The fascia iliaca compartment block also provided postoperative analgesia. The patient had a good prognosis and was subsequently discharged from the hospital.

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