

Case report

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The significance of axillary block in upper arm amputation in a patient with serious comorbidities – a case report

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Operative management of patients with peripheral arterial occlusive disease is sometimes the only therapeutic approach. Performing a surgical intervention under general endotracheal anesthesia in a hemodynamically and respiratoryly unstable patient can be a real challenge. Resorting to neuraxial blocks could be the right choice in such patients.

A 80-years old male patient was transported as an emergency case to the Department for Internal Diseases of the Military Hospital Niš because of difficulty breathing, livid left hand and forearm. Carpal pulsations were absent, and the hand had a lack of motility and sensibility in the last few days. After clinical examination and MSCT angiography of pulmonary and magistral arteries of the left arm, the diagnosis of pulmonary embolism and occlusion of *a. subclavia* and *a. brachialis* was made. After clinical examination, the anesthesiologist decided on a neuraxial type of anesthesia rather than general endotracheal anesthesia.

Avoidance of general endotracheal anesthesia and application of neuraxial blocks could minimize the possibility of adverse events in these patients.

Key words: neuraxial anesthesia; pulmonary embolism; peripheral arterial occlusive disease

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Značaj aksilarnog bloka kod pacijenata sa amputacijom nadlaktice i brojnim komorbiditetima – prikaz slučaja

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Operativni tretman pacijenata sa okluzivnom bolešću perifernih arterija je ponekad jedini terapijski pristup. Izvođenje hirurške intervencije u opštoj endotrahealnoj anesteziji kod hemodinamski i respiratorno nestabilnog pacijenta može biti pravi izazov. Pribegavanje neuraksijalnim blokovima može biti pravi izbor kod takvih pacijenata.

Pacijent star 80 godina prevezen je kao hitan slučaj na Odeljenje za kardiovaskularne bolesti Vojne bolnice Niš zbog otežanog disanja, blede leve šake i podlaktice. Karpalne pulzacije su izostajale, a šaka je u poslednjih nekoliko dana imala odsustvo motorike i senzibiliteta. Nakon kliničkog pregleda i laboratorijskih analiza, urađena je MSCT angiografija plućnih i magistralnih arterija leve ruke, kada je postavljena dijagnoza plućne embolije i okluzije *a. subclavia* i *a. brachialis*. Nakon uvida u medicinsku dokumentaciju i kliničkog pregleda, anesteziolog se opredelio za neuraksijalnu anesteziju.

Kod pacijenata sa hemodinamskom i respiratornom nestabilnošću, izbegavanje opšte endotrahealne anestezije i primena neuraksijalnih blokova mogli bi da minimiziraju mogućnost neželjenih događaja.

Ključne reči: neuraksijalna anestezija; plućna embolija; okluzivna bolest perifernih arterija

Introduction

Peripheral arterial occlusive disease refers to a disorder of normal functioning of the arterial system, leading to a reduced blood flow in the extremities. The risk factors for the disorder are hypertension, dyslipidemia, smoking, diabetes, physical inactivity and genetic burden (1). Peripheral arterial disease represents a factor of total cardiovascular risk. The most typical presentation of peripheral arterial disease is intermittent claudication, i.e. the pain in the calves the intensity of which increases during walking, while it usually diminishes in rest. In more advanced disease cases the pain persists even while resting and in a lying position (2, 3). Upper limb ischemia of the is not as frequent as that affecting the lower limbs. From a clinical point of view, the anatomical region of the shoulder and elbow is much more resistant to ischemia due to its well developed collateral circulation; ischemic symptoms are thus more frequently observed in the forearm region. Ischemia-related amputation is far less frequently performed in the upper than in the lower limbs. In 2005, out of 1.6 million people with limb amputation, it was estimated that 573,000 had upper limb amputation (4). Traumas accounted for the most part of major upper limb amputations, while vascular diseases accounted for only 12% of these operations (5).

Axillary block is a type of peripheral nerve block performed under ultrasound guidance and involves the use of a peripheral nerve stimulator. Application of a local anesthetic in the axillary region produces a *plexus brachialis* block. The block is relatively easy to perform, with a relatively low risk of complications. It is used in upper limb surgery (6-8).

We are reporting a case of irreversible ischemia of the left arm in a patient with pulmonary thromboembolism and numerous comorbidities, in whom upper arm amputation surgery is vitally indicated.

Case report

A 80-years old male patient was transported by an ambulance as an emergency case to the Department for Internal Diseases of the Military Hospital in Niš because of difficulty breathing. After admission, a clinical examination was performed and his blood samples were taken for laboratory analyses. The patient had dementia and was hardly able to communicate, so that the information required was obtained heteroanamnestically, from his wife. He was hypertensive, diabetic, and had a post-stroke status. He had difficulty breathing (Cheyne-Stokes type respiration). Hemodynamic parameters at admission were BP 80/50mmHg, HF 137/min, O₂ saturation 83%. Laboratory parameters at admission were as follows: RBC 5.0 10¹²/L, HGB 147 g/L, PLT 199 10⁹/L, WBC 13.4 10⁹/L, CRP 39 mg/L, glycemia 21.1 mmol/L, urea 14.8 mmol/L, creatinin 171 μmol/L, total proteins 66.8 g/L, albumin 35.3 g/L, AST 40 U/L, ALT 45 U/L,

gamma-GT 24 U/L, alpha-amylase 91 U/L, LDH 552 U/L, CK 276 U/L, sodium 145 mmol/L, potassium 4.7 mmol/L, calcium 2.04 mmol/L, chlorids 114 mmol/L, phosphorus 2.17 mmol/L, D-DIMER 34533 ng/mL. The following conservative therapy was prescribed by a vascular surgeon: Sol. 0.9% NaCl 250 ml + amp. Meropenem 500mg/8h i.v, Sol. Metronidazole 500mg/8h i.v, sir. Enoxaparine 80mg/12h s.c, amp. Pantoprazole 40mg/12h, amp. Furosemide 40mg/12h, a vasoactive cocktail (amp. Pentoxifylline 300mg+amp. Lidocaine No 60mg+amp. Metamizole 2.5g+amp. Ascorbic acid 500mg+amp. Thiamine 100mg).

A neurologist was consulted, who prescribed endocranial MSCT, after which it was decided that there was no acutization of the existing neurological disease.

Clinical examination revealed livid left hand and forearm. Left-sided carpal pulsations were absent, and the hand had no motoric or sensory ability. Heteroanamnestically, the information was obtained that this left hand status had been already present for several days. MSCT angiography of pulmonary and magistral arteries of the left arm was done, when the diagnosis of pulmonary embolism and occlusion of *a. subclavia* and *a. brachialis* was made. Due to serious comorbidities and unavailability of vascular surgeons in the Military Hospital in Niš, the patient was referred to the Emergency Centre of the University Clinical Centre Niš.

After admission and detailed clinical examination, with an insight into the undertaken diagnostic procedures, emergency upper arm amputation was found to be indicated due to irreversible ischemia. The patient was received at the Vascular Surgery Clinic in a serious general condition. After a short preoperative preparation, the patient was transferred to the surgical block for the planned operative treatment. After an insight into the patient's medical records and medical examination, a decision was made by the anesthesiologist that the intervention would have to be made in an axillary block, since general anesthesia was associated with a very high risk due to patient's critical condition. After patient positioning in supination with his arm in 90° abduction, his skin was disinfected and a tube was placed transversally to the anteromedial part of the upper arm, in the direction of *m. pectoralis major* attachment to the humerus. At the 1-3 cm depth, ultrasound visualized axillary artery, two veins (usually), hyperechogenic structures: *n. medianus* (laterally and superficially to the artery), *n. ulnaris* (superficially and medially to the artery) and *n. radialis* (posteriorly and laterally or medially to the artery) and three muscles: *m. biceps brachii*, *m. coracobrachialis* and *m. triceps brachii*, as well as *n. musculocutaneus*, extending between the tendons of *m. biceps brachii* and *m. coracobrachialis* (9, 10). After nerve and vascular structure identification, a local anesthetic (0.5% Levobupivacain, 20 ml) was delivered perivascularly under the angle of 45° using a 22 G 50 mm needle (Figure 1).



Figure 1. Ultrasound-guided axillary block – University Clinical Centre Niš;

*AA – axillary artery, AV – axillary vein, RN – radial nerve, UN – ulnar nerve, MN – medial nerve

After the axillary block of the left arm, upper arm amputation was performed (Figure 2). The immediate postoperative course was stable in this patient.

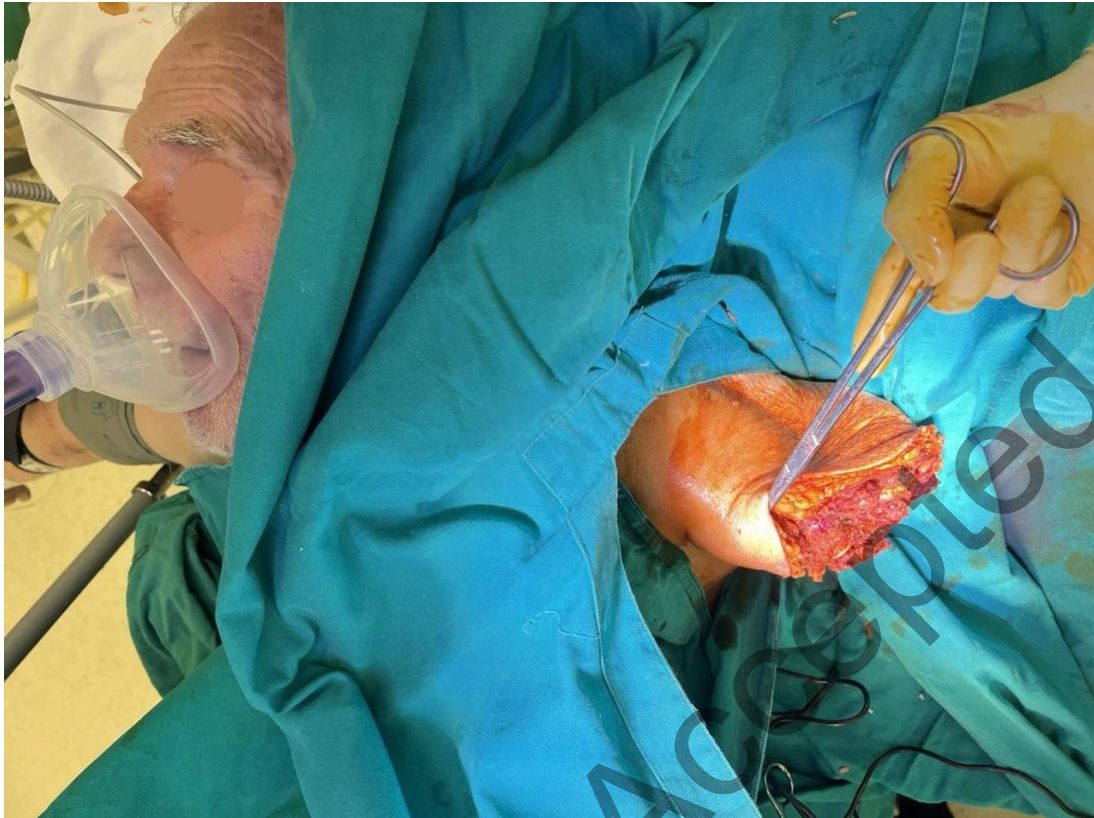


Figure 2. Upper arm amputation performed in an axillary block

After the surgery, the patient was transferred to the intensive care unit at the Anesthesia and Intensive Therapy Clinic. At admission, the patient's consciousness was preserved, but the contact with him could not be made. He breathed spontaneously with oxygen support through an O₂ mask with 8l/min flow rate; he maintained blood O₂ saturation 97-98% with the above O₂ flow rate. His hemodynamic parameters at admission were as follows: BP 148/80 mmHg, HF – 80/min. In the intensive care unit the patient came with a placed urinary catheter. His initial diuresis after admission in the ICU was 1400 ml. The immediate postanesthesia and postoperative course was in order. Further on, the patient's hemodynamic and respiratory parameters were stable. There was not any fever and his diuresis was 3600 ml until the following morning.

On his second postoperative day, the patient's consciousness was preserved, without any established verbal communication. He breathed spontaneously with oxygen supplementation through the mask (7 l/min flow rate), and maintained O₂ saturation of 99%.

The patient's hemodynamic parameters were as follows: BP 130/70 mmHg, HF 73/min; laboratory parameters: RBC 4.58 10¹²/L, HGB 133 g/L, HCT 0.397 L/L, PLT 213 10⁹/L, WBC 13.8 10⁹/L, CRP 175.6 mg/L, glycemia 15.8 mmol/L, urea 30.5 mmol/L, creatinin 308.0 μmol/L, total bilirubin 8.7 μmol/L, direct bilirubin 2.0 μmol/L, total proteins 55 g/L, albumin 26 g/L, AST 54 U/L, ALT 56 U/L, alkaline phosphatase 58 U/L, gamma-GT 23 U/L, alpha-amilase 47 U/L, LDH 646 U/L, sodium 153 mmol/L, potassium 4.3 mmol/L, chlorids 116 mmol/L, calcium 2.11 mmol/L, magnesium 1.06 mmol/L.

After the assessment of the vascular surgeon and anesthesiologist the patient was referred to the ICU of the Department of Surgery, Military Hospital in Niš for further follow-up and treatment.

Discussion

Regional anesthesia and peripheral nerve block have numerous advantages, such as: minimal patient preparation; since the use of intravenous anesthetics and opioids is avoided, a better cardiorespiratory stability can be achieved compared to general anesthesia; reduced postoperative nausea and emesis (11-13). All these factors contribute to early rehabilitation of the patient, reduction of the number of hospital days, resulting in greater patient satisfaction and reduction of overall treatment costs (14-16). The impact of regional and general anesthesia on postoperative morbidity and mortality of older patients is a controversial issue in the relevant medical literature. However, there are numerous studies, one of which is the Neuman et al. demonstrated that regional anesthesia is connected with a lower inpatient mortality and pulmonary complications when compared with general anesthesia (17). *Rashid et al.* described in their study that anesthesia should be adjusted to individual patient requests (18). The choice of the method of anesthesia should be based on the overall medical status of the patient and type of surgery, and carefully selected after the communication between the surgeon, anesthesiologist and patient (19). The question of the advantages gained with the use of peripheral nerve blocks in comparison to general anesthesia in surgical interventions involving upper limbs is still a debated matter. In cases such as this, when the patient's hemodynamic and respiratory parameters are critical, and in the presence of numerous comorbid conditions, the choice of anesthesia should be narrowed to the approaches with minimal impact on the patient's hemodynamic and respiratory stability and which would not additionally compromise the patient's condition with the use of mechanical ventilation, intravenous anesthetics, opioids and neuromuscular relaxants.

Conclusion

Upper arm amputation can be performed using peripheral nerve axillary block, without general anesthesia and machine-assisted ventilation, intravenous anesthetics, opioids and neuromuscular relaxants, which would not additionally compromise the patient's respiratory and hemodynamic status.

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