

LETTER TO THE EDITOR

DEXMEDETOMIDINE SEDATION ASSOCIATED WITH SUPRAINGUINAL FASCIA ILIACA BLOCK FOR HIP FRACTURE SURGERY IN HIGH RISK ELDERLY PATIENTS

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To the Editor,

Hip fracture is one of the main causes of hospitalization and major surgery in elderly patients (1). It is estimated that the number of elderly people in Europe will double in the next three decades, thus leading to a dramatic increase in hip fracture surgery. Furthermore, elderly patients with hip fracture often present at least one major comorbidity such as cardiac and respiratory disease, for which they receive anticoagulant therapy and are at greater risk of death.

At A. Gemelli University Hospital Foundation, Rome, Italy, the treatment of intertrochanteric fracture in elderly patients consists of intramedullary femoral fixation and it is performed within 48 hours in order to avoid the increase of postoperative mortality and morbidity (2). Thus, selecting an appropriate anesthetic method for high risk patients requires considerable deliberation. In daily clinical practice, the patients scheduled for internal fixation of intertrochanteric fractures are treated with a spinal anesthesia; however, should this technique be contraindicated, a general anesthesia is performed.

In this case series the anesthetic management of three patients treated with dexmedetomidine sedation and suprainguinal fascia iliaca compartment block as

an alternative to general anesthesia is presented. The aim of this report is to highlight how this treatment could give benefits in terms of efficacy and faster functional recovery.

Written informed consent was provided by all patients for the use of images and for data publication.

Case series

According to the institutional orthopedic surgery protocol, each patient received preoperative antibiotic prophylaxis and gastric protection. In the preanesthesia room, the patients received dexmedetomidine (Orion Pharma, Espoo, Finland) i.v. at rates of 0.2–1.2 µg/kg/h with a target sedation level of -1 to -3 on the Richmond Agitation-Sedation Scale (RASS) (Table I). Then an ultrasound-guided Fascia Iliaca Block (FIB), with a suprainguinal approach, using ropivacaine 0.375% 40 ml was performed. As the standard procedure prescribes for non-intubated sedated patients, we applied a multiparametric monitoring including exhaled CO₂ and Bispectral Index. Thirty minutes after FIB the patients were positioned on the traction table.

Before the skin incision, a short acting local anesthetic (mepivacaine 1% 20 mL) was infiltrated by the surgeon on the operative site in order to

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block the sensitive subcostal nervous terminations not covered by the FIB. Intraoperatively the pain level was assessed with the Behavioral Pain Scale for non-intubated patients (BPS-NI, ranging from 3 -no pain- to 12 -most pain-) since this scale exhibited good psychometric properties (3). If BPS-NI was > 6 , sufentanil boluses of $0.05 \mu\text{g/kg}$ were administered intravenously. In the postoperative period all patients were given acetaminophen and ketoprofen by mouth in an around-the-clock dosing regimen. In case of nausea or vomiting ondansetron was prescribed. As a rescue drug for pain control oral tramadol was prescribed. The postoperative pain intensity was measured using Numeric Rating Scale for Pain (NRS Pain), ranging from 0 (no pain) to 10 (the worst imaginable pain).

Case 1

A 95-year-old female, weighing 55 Kg, was an ASA III patient with medical history as follows: atrial fibrillation in therapy with rivaroxaban, kidney failure (CKD Stage 3 KDIGO 2012) and a pharmacologically-treated hypertension. The patient had a normal myocardial contraction as shown by her echocardiogram. She refused spinal anesthesia and, after starting dexmedetomidine sedation, an FIB was performed. A transverse suprainguinal US image was obtained and the needle was introduced using a lateral-to-medial in-plane approach. Adequate local anesthetic spread, (ropivacaine 0.375% 40 ml) both medially and laterally, is essential to obtain a successful block. Target RASS score was obtained with rates of $0.6\text{--}0.7 \mu\text{g/kg/h}$ (BIS was always >75). The patient received sufentanil $7.5 \mu\text{g}$ in divided doses. A normal respiratory pattern was observed, and she remained hemodynamically stable, presenting a ventricular response around 85-95 beats/min. Postoperative pain evaluated by NRS was 1; the patient had a good functional recovery, and she started rehabilitation on the first post-operative day.

Case 2

A 94-year-old male, weighing 100 Kg, was an ASA III patient with medical history as follows: severe aortic stenosis (mean gradient 45mmHg), implanted pacemaker for sick sinus syndrome (the patient had a

spontaneous rhythm), chronic obstructive pulmonary disease, presence of abdominal aortic endoprosthesis due to a previous aortic rupture. After evaluating all these comorbidities, FIB and dexmedetomidine sedation was performed. Target RASS score was obtained with rates of $0.7\text{--}0.8 \mu\text{g/kg/h}$ (BIS was always >70). The patient received sufentanil $17.5 \mu\text{g}$ in divided doses. A normal respiratory pattern was observed; the patient presented a slight hypotension (Mean arterial pressure was 20% lower than the basal values for about 15 min), correlated to hypovolemia and anemia (starting hemoglobin 8.9 g/dL), which was promptly corrected with blood transfusion. Postoperative pain evaluated by NRS was 2; the patient had a good functional recovery, and he started rehabilitation on the first post-operative day.

Case 3

A 90-year-old male weighing 50 Kg was an ASA III patient with medical history as follow: diabetes, pancreatic cancer, hypertension, moderate mitral insufficiency, taking clopidogrel (last dose: 24 h before surgery). His antiplatelet therapy precluded spinal anesthesia. FIB after starting dexmedetomidine sedation was performed. Target RASS score was obtained with rates of $0.5\text{--}0.6 \mu\text{g/kg/h}$ (BIS was always >65). The patient received sufentanil $7.5 \mu\text{g}$ in divided doses. A normal respiratory and hemodynamic pattern was observed throughout the surgery. Postoperative pain evaluated by NRS was 1; the patient had a good functional recovery, and he started rehabilitation on the first post-operative day.

DISCUSSION

The majority of people with hip fracture are elderly and they should be surgically treated within 48 hours (2) because an intervention delay longer than 48 hours is associated with increased mortality and morbidity in 1 year. These patients are often affected by many other diseases associated with ageing, which place them at high risk of mortality after the anesthesia. For hip fracture surgery, the choice of anesthesia (general or neuroaxial) is made by the anesthesiologist and is based on the patient's preference, comorbidities, potential general postoperative complications and the

anesthesiologist's clinical experience. Subarachnoid anesthesia is commonly used for hip fracture surgery at A. Gemelli University Hospital Foundation. However, subarachnoid anesthesia is contraindicated in patients already taking oral anticoagulant drugs (dicumarolic, dabigatran, rivaroxaban) or antiplatelet agents (ticlopidine, clopidogrel). Other contraindications to spinal anesthesia include patient refusal, infection at the injection site, severe and uncorrected hypovolemia, true allergy to any of the drugs, and increased intracranial pressure. Spinal anesthesia is relatively contraindicated in cardiac diseases with fixed cardiac output (CO) states and in aortic stenosis. In all the above mentioned cases, general anesthesia is performed. Adverse reactions to the drugs, possible difficult airway management, perioperative hemodynamic instability, inhalation of gastric content, postoperative nausea and vomiting, and respiratory depression are potential complications during general anesthesia. Unfortunately, in elderly patients undergoing general anesthesia, age is not an independent risk factor for morbidity and mortality, and this affects functional recovery and length of hospital stay.

Ultrasound FIB was chosen as the peripheral nerve block for its role in preoperative and

postoperative analgesia (4, 5). FIB is considered an anterior lumbar plexus approach since it targets the femoral nerve, the lateral cutaneous of the femur nerve and (less frequently) the obturator nerve. FIB has three main advantages: first of all, it produces fewer hemodynamic changes than spinal anesthesia; second, FIB may be performed while the patient is supine, unlike the paravertebral lumbar plexus block which requires the lateral position (6); finally, the risk of nerve injury or intravascular injection is very small and nerve stimulation is not needed. A suprainguinal approach to the fascia iliaca allows a better local anesthetic to spread to the lumbar plexus and a better obturator nerve block compared to an infrainguinal approach, as recently demonstrated in healthy volunteers (7).

Dexmedetomidine is an α_2 -adrenoceptor agonist that provides sedation and anxiolysis via receptors in the locus coeruleus, as well as analgesia via receptors at the spinal cord level. It is able to attenuate stress responses without significant respiratory depression (8). Dexmedetomidine is an effective sedative agent compared with propofol and midazolam and its use is associated with easier communication with patients, better assessment of pain and reduced delirium. This drug is useful in not depressing the

Table I. *The Richmond Agitation–Sedation Scale*

Score	Term	Description
+4	Combative	Overtly combative or violent; immediate danger to staff
+3	Very agitated	Pulls on or removes tube(s) or catheter(s) or has aggressive behavior toward staff
+2	Agitated	Frequent non-purposeful movement or patient–ventilator dyssynchrony
+1	Restless	Anxious or apprehensive but movements not aggressive or vigorous
0	Alert and calm	Spontaneously pays attention to caregiver
-1	Drowsy	Not fully alert, but has sustained (more than 10 seconds) awakening, with eye contact, to voice
-2	Light sedation	Briefly (less than 10 seconds) awakens with eye contact to voice
-3	Moderate sedation	Any movement (but no eye contact) to voice
-4	Deep sedation	No response to voice, but any movement to physical stimulation
-5	Unarousable	No response to voice or physical stimulation

patient's respiratory drive. Several studies showed a beneficial effect on the shivering related to the anesthesia and hypothermia. Side effects described in the literature include hypotension and bradycardia (9). In order to limit the undesired hemodynamic side effects related to dexmedetomidine, the initial bolus prior to the start of the continuous infusion should be avoided since the sympatholytic action occurs more frequently after the initial bolus, especially in patients who take drugs with negative chronotropic action or in a hypovolemic status. The early findings associated with this anesthetic management are encouraging and may contribute to improve pain control, obtaining a more efficient and complete anesthetic plan. We expect to continue to gather data in an effort to further define the scenarios in which this procedure can be mostly beneficial.

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