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Case Report

Anesthesia in paraplegic patients. A brief Case Report-Based Literature Review

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ABSTRACT

Anesthesia in paraplegic patients: A case report - based literature review

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Despite the vast progress in contemporary medicine, the burden of spinal cord injury has increased over the last decades. Thus, more and more often patients with paraplegia appear for an emergency or elective surgery below the level of the injury. Anesthetic management of those patients can be turn out to be a challenge. In this article we present a case report of monitored anesthesia care in a paraplegic patient for an orthropaedic procedure and perform a short literature review on the subject.

Keywords: Paraplegia, anesthesia

INTRODUCTION

Despite the vast progress in contemporary medicine, the burden of spinal cord injury has increased over the last decades. Thus, more and more often patients with paraplegia appear for an emergency or elective surgery below the level of the injury. Anesthetic management of those patients can be turn out to be a challenge. In this article we present a case report of monitored anesthesia care in a paraplegic patient for an orthopaedic procedure and perform a short literature review on the subject.

CASE REPORT

A 70-year-old man (body weight: 82kg, height – 176 cm) was referred to our hospital for distal

femur fracture (Müller classification type A1) open reduction and internal fixation (ORIF) surgery. Past medical history involved arterial hypertension, diabetes mellitus type II and paraplegia below T10 level (A-level on American Spinal Injury Association- Impairment scale) after a falling-from- height accident 15 years ago. For the latter, he had undergone a spinal fusion surgery just after the accident. Medical drug regiments included pregabalin 150mg bid, fesoterodin 8mg qd, trimetazine 20mg bid, duloxetine 30 mg bid, metformin/sitaglipin 50/850 mg bid and gliclazide 80mg qd. Allergies and family history were unremarkable.

Preoperatively the patient (classified as ASA III) was transfused with a unit of RBCs (red blood cells) due to low haemoglobin and ondasetron 4mg iv, omeprazole 40 mg, amikacin 500mg iv and cefuroxime 750mg was given. During the ORIF procedure, monitored anaesthesia care was provided with midazolam 1.5 mg iv given initially and dexmedetomidine infusion of 0.6-0.8 μg/kg/h c.i.v, to target a modified observer assessment of alertness/sedation (MOAA/S) score 4. Patient maintained intraoperative hemodynamic stability and another RBCs unit were transfused. After the surgery (duration 120 min), the patient was transferred to post anesthesia care unit for 30 minutes; and discharged to ward without any side effects.

LITERATURE REVIEW

The incidence and the burden of Spinal cord injury (SCI) has increased over the last 30 years.[2] Though the most affected group seems to be the males and the elderly, the incidence and the level of SCI varies a lot from region to region; yet the majority of available literature is related to high (cervical and thoracic) level of SCI[2-3]. The most common mechanisms of SCI are spinal cord compression, as well as penetrating injuries of neural and vascular structures caused by different traumatic mechanical phenome. Damage is further aggravated as a result of ischemia. Progressively, a series of pathophysiological changes involving excitotoxicity, oxidative damage and free radicals may lead to neuronal death.[2]

Many advances have been made for the treatment of patients with SCI, both pharmacological and non-pharmacological that mainly aim to stop the progression of secondary damage (Table 1 and 2)[2].

Acupunture (Improves neuronal and motor recovery)	**Massage therapy** (Reduce pain levels, anxiety, improves upper body strength and improves motor function)
Transcutaneous electrical nerve stimulation (Relieves pain levels)	**Exoskeleton** (Improves physical aspects, reduces spasticity, facilitates rehabilitation)

Table 1. Non-pharmacological therapies for the treatment of SCI[2].

Category	Examples
Fibrobalst Growth Factors (FGF)	FGF1, FGF2, FGF7, aFGF, bFGF
Cyclooxygenase inhibitors	Ibuprofen, Meclofenamate
Ion channels antagonists	Rilluzole, Nimodipine, Methylprednisolone, 4-aminopyridine, Glibenclamide
Vasoactive agents	Dopamine, Epinephrine, Norepinephrine, Dobutamine, Phenylephrine
Glutamate receptor antagonists	Gacyclidine (GK-11), Dizocilpine (MK-801), Magnesium ions
Corticosteroids	Tirilazad mesylate, Methylprednisolone
2nd gen Tetracycline antibiotic	Minocycline
Caspase inhibitors	Z-VAD-FMK, Bcl2 gene therapy, Cephallon
Chondroitinase ABC enzyme	Anti-Nogo-A- Antibody (ATI-355)
Neuroimmophilin ligands	Cyclosporine- A, FK-506, GP-1046, NIL-A
VX-210 (Gethrin)	Hepatocyte Growth Factor (HGF)
Neutrophillic factors	Monosialotetrahexosylganglioside (GM-1)

With bold – category or single agents.

Table 2. Pharmacological therapies for the treatment of SCI[2].

However, >50% of patients may not regain their normal function and daily life[2]. Thus, more and more often such patients appear for a non-spinal emergency or elective surgery.

The most feared complication during the perioperative management of these patients is autonomic hyperreflexia or dysreflexia. This condition occurs in approximately 85% of cases with an injury above the level of T6-T7.[4-5] It is observed in parturient women or patients undergoing surgical procedures below the level of the injury, especially in response to afferent noxious stimulation of hollow viscera of the pelvis (especially in urological procedures), lower extremities and skin.[5-6] It manifests clinically mainly with marked hypertension which is a result of sympathetic discharge that leads to severe vasoconstrion.[7] Other important clinical manifestations are bradyarrhythmias, headache, flushing, sweating and piloerection.[5-6,8] For the management of such a complication, different agents such as nifedipine, nitrates and captopril can be used, although only nifedipine has been supported by controlled trials.[6] Leão et al. described a case that responded favourable to the administration of iv lidocaine.[8]

The first line treatment of autonomic hyperreflexia remains avoidance of triggers such as bladder distension or uterine contractions during labour[6,8]. For this reason, currently the trend

regarding pregnant paraplegic patients is to deliver through caesarean section under spinal and epidural anesthesia.

Nevertheless, a consensus has not been reached on the ideal perioperative approach in SCI patients.[6] General and regional anesthesia is equally used as well as local techniques and MAC. In a review that studied perioperative complications and the choice of anesthesia in quadriplegic patients, results showed that anesthetic techinques that bolck the afferent pathway of autonomic hyperreflexia are safer for such patients but also pointed out the difficulty in assessing the level of the block in regional anesthesia.[6]

A clinical trial by Takatsuki et al. investigated the potential of the use of the patellar reflex, Babinski sign and Ashworth scale as means to confirm motor and therefore sensory block in patients with paraplegia, who received spinal anesthesia. With the absence of the patellar reflex an indirect estimation of an L2-4 block can be made, as well as S1-L5 for the Babinski sign and L1 for hip joint relaxation on the Asworth scale. Idependendly from the level of the block, results showed that in all cases that the above clinical criteria were met, autonomic dysreflexia did not appear.[9]

Wadhwa et al. reported recently a case series regarding the perioperative management of paraplegic patients undergoing lower limb surgery, which highlighted the possibility of adapting MAC as the technique of choice for patients with complete SCI, who did not have any episodes of autonomic hyperrflexeia preoperatively. They underlined the technical difficulties in performing regional anesthesia, especially when a recent or unstable neurological injury was present, as well as the possible complications of muscle relaxant administration in general anesthesia; hyperkalemia, cardiac arrest, prolongation of the block, need for postoperative ventilation.[10] In their study, one patient received 50 mcg of fentanyl iv after complaining of a stretching sensation and two patients received 0,5mg of midazolam iv due to infrequent muscle spasms.[10] Autonomic dysreflexia was not observed in any of the seven cases of the study.[10]

Regardless the perioperative plan, a trained qualified anesthetist should always be present in such procedures and patients should always be informed about the potential risks arising according to both surgical procedure and anesthetic plan.[6]

CONCLUSION

Anesthesia in patients with paraplegia for a non-spinal surgical procedure below the level of the injury hides various difficulties, due to the complex pathophysiological changes occurring after a spinal injury. No matter the choice of the anesthesia - spinal, epidural anesthesia or monitored anesthesia care - and a case-by-case approach is needed for successful management of those patients.

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