Clinical experience in the use of dexmedetomidine for deep brain stimulation

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Background

✓ **Dexmedetomidine** (DEX) is an **alpha$_2$-adrenergic agonist** that produces sedation through the promotion of endogenous sleep pathway activities without respiratory depression.[1]

✓ It seems **not to interfere with electrophysiological records** (EPRs) **and neurocognitive tests** (NTs) during deep brain stimulation procedures (DBS).[2,3] It *was* approved as for *"out of label"* indication in our hospital in 2014.

The goal of this study was to confirm the usefulness of DEX for DBS in patients with movement disorders in our setting.

Methods

A **prospective observational study** was conducted. Patients scheduled for deep brain stimulation (DBS) during 2015-2016 were included. (*Fig.1*)

PROCEDURE:

- The stereotaxic frame was placed under local anaesthesia.
- Monitoring included electrocardiogram, pulse oximeter, BIS®, capnography and invasive blood pressure (arterial line). O_2 was provided through nasal prongs.
- **A total of 1 µg.kg^{-1} of DEX was administered within 10 minutes at the beginning of the procedure, followed by perfusion (0.1-1 µg.kg^{-1}.h^{-1}) adjusted as needed**.
- **All patients received 1 µg.kg^{-1} of fentanyl.** If necessary, propofol and remifentanil were added in bolus or "target controlled infusion" system.
- Sedation was assessed by means of Richmond Scale (RASS).
- **Ropivacaine 0.75% + Lidocaine 2% was used for bilateral 'scalp block' prior to cranial incision**.
- Analyzed variables were sedation level, patient comfort by Visual Analogue Scale (VAS), hemodynamic and respiratory parameters, intraoperative and postoperative adverse effects.
- **The correct placement of the electrodes, guided by EPRs and possible incidences during NTs were recorded**. *(Fig.2 and 3).*

Results

Seventeen consecutive patients who underwent DBS during the study period were included (14 Parkinson, 2 essentials tremors and 1 dystonia).

Summary description of the analyzed parameters	
RASS	**-1 a -3 (-4 in 1 patient)**
DEX perfusion	**0.5 ± 0.2 µg.kg^{-1}.h^{-1}**
Adjuvants drugs	**Propofol (5)** **Remifentanil (3)** **Propofol + Remifentanil (3)**
VAS	**All patients VAS < 3 ,** **except 1 patient with VAS 5 (high previous consumption of opioids)**
Hemodynamic incidences	**Bradycardia (atropine) (1)** **Hypotension (phenylephrine) (1)** **Hypertension (urapidil) (7)** **Hypertension (clevidipino) (1)**
Respiratory depression	**None**
Adverse effects	**Postoperative agitation (1)** **Pneumocephalus (1)**
Neurophysiological records	**Optimal in all cases**
Neurocognitives tests	**Correct without drug interference**

Table 1. Procedures evolution. (Numbers of patients between brackets)

Conclusion

In our experience, DEX provided conscious sedation and comfort without respiratory depression and with an appropriate hemodynamic profile.

We did not detect interferences with NTs or EPRs and surgeons were comfortable during DBS location in our patient population.

Figure 1. Procedure and position

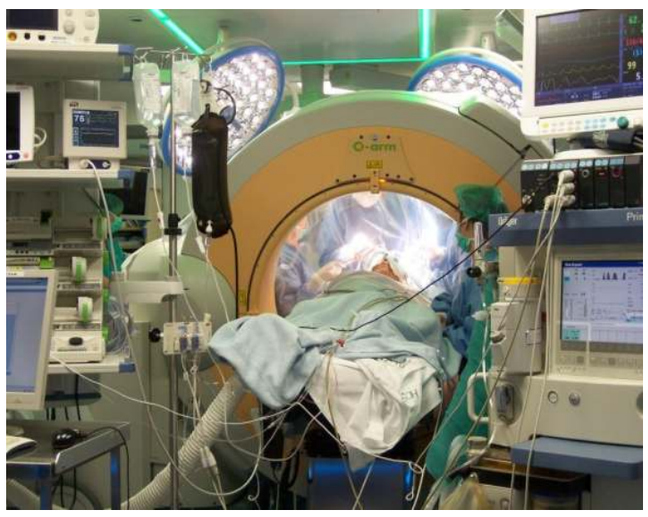

Figure 2. Monitoring and intraoperative O-Arm CT scan

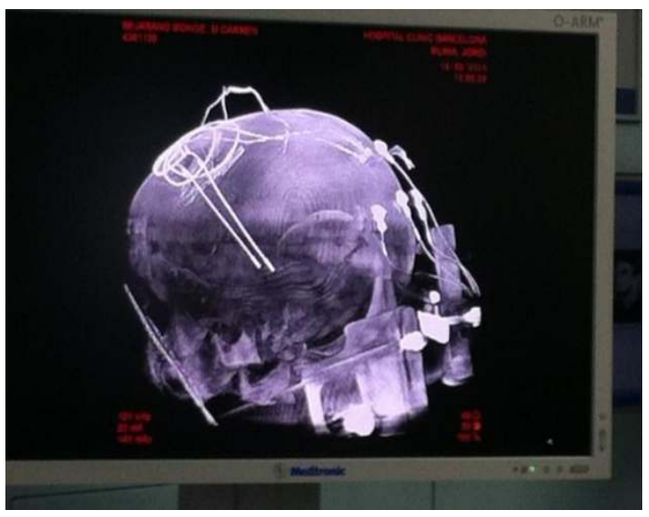

Figure 3. CT 3D reconstruction to check electrodes placement

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3. Martinez-Simon A, Alegre M,et al. Effect of Dexmedetomidine and Propofol on Basal Ganglia Activity in Parkinson Disease: A Controlled Clinical Trial. Anesthesiology. 2017;126(6):1033-1042.