Investigation of awake craniotomy cases for elderly patients using dexmedetomidine: Case series

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Background

1. A high quality of awakening is required for awake craniotomy (AC) in order for patients to properly perform neurological tasks during the awake phase.
2. In the guidelines for AC in Japan, there is no particular restriction on age of the patient.
3. In elderly patients (over 65 years of age), we sometimes experience poor quality of awakening and uncontrollable delirium due to anaesthetic agents.
4. Goettel et al. reported a high quality of intraoperative brain mapping and efficacy of sedation when dexmedetomidine (Dex) was used for AC¹⁾.
5. In this study, we investigated whether smooth awakening and comfortable anaesthetic management could be achieved by using Dex concurrently in three elderly patients undergoing AC.

Cases

Case 1: 82-year-old woman. BMI: 21.14
Case 2: 82-year-old woman. BMI: 21.43
Case 3: 77-year-old woman. BMI: 16.15
※Brain tumor resection was planned for all patients.

Anaesthetic management of AC

Premedication	Dexamethasone 3.3mg+Famotidine 20mg
Induction	Anaesthesia was induced with propofol, remifentanyl and rocuronium. LMA Supreme® was used for airway management.
Analgesia	Scalp nerve block was performed with 0.375% levobupivacaine. [Figure.1] ※Local anaesthesia with levobupivacaine was performed by a surgeon before head pinning.
Maintenance	After induction, we gradually decreased the continuous doses of propofol and remifentanyl and started Dex infusion.
BIS	targeting BIS index of around 60.
Awake phase	The surgeon cued to awake the patient, and we stopped infusing anaesthetic agents. After confirmation of spontaneous breathing and communication, we removed the LMA. ※Times to extubation were 1 min (case 1), 4 min (case 2), and 5 min (case 3). [Table 1]
Re-induction	Anaesthesia was induced with propofol, remifentanyl and rocuronium. LMA Supreme® was used for airway management.

Figure.1 Scalp nerve block in our institution

Results

Table1 patients clinical data

Case	Preinduction	Awake phase						
	HR(bpm), BP(mmHg)	Time to extubation (min)	Prop (µg/ml)	Remi (ng/ml)	Dex (ng/ml)	HR(bpm), BP(mmHg)	awaking time (min)	Modified Aldrete Score after extubation
Case1	80, 126/58	1	0.1	0.023	0.44	80-82, 100-102/60-64	26	12
Case2	78, 156/98	4	0.3	0.386	0.08	78-98, 104-116/62-64	61	11
Case3	60, 118/64	5	0.4	0.027	0.14	56-60, 120-140/60-72	33	10

※Effect-site concentrations of propofol/ remifentanyl and plasma concentration of dexmedetomidine after surgery were estimated by the models below. Propofol (Prop), Marsh model, Remifentanyl (Remi), Minto model, Dexmedetomidine (Dex), Dyck model.

The quality of awakening was high in all cases, and the patients could perform neurological tasks faultlessly during the awake phase.

Discussion

- ◆ Dexmedetomidine is a selective α_2 -receptor agonist and has sympatholytic, analgesic, and sedative properties²⁾. [Figure2]
- ◆ Stevanovic et al. reported that patients in whom dexmedetomidine was used for AC had a shorter arousal time after the first sleep phase³⁾. For elderly patients, intraoperative awake electrical mapping was also associated with better preservation of the patient's neurological status and quality of life compared to surgery under general anesthesia⁴⁾.

Figure.2 Pharmacological action of dexmedetomidine via α_2 receptor

- ◆ In the elderly patients in whom Dex was used, the time to extubation was short and the quality of awakening was good.
- ◆ Dex infusion enabled the intraoperative propofol and remifentanyl doses to be reduced and might have provided proper sedation.
- ◆ Intraoperative infusion of low-dose Dex stabilized haemodynamics.

Learning point

Anaesthetic management using dexmedetomidine concurrently is useful for awake craniotomy in elderly patients.

References

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