

Stress hormone response in neurosurgical patients given a single preoperative sedation dose of dexmedetomidine

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Background: The stress response is the name given to the hormonal and metabolic changes which follow injury or trauma. Stress response to surgery is modulated by several factors including magnitude of the injury, pain, type of procedure and choice of anaesthesia. Dexmedetomidine is a lipophilic imidazole derivative with a 100 times higher affinity for alpha-2 adrenoreceptor compared to the prototype drug clonidine. The goal of this study is to compare the effect of preoperative sedative dose of dexmedetomidine to a standard sedative dose of midazolam on the haemodynamic and stress hormone response to surgery and on the pattern of recovery of neurosurgical patients.

Subjects and Methods: Sixty patients scheduled for intracranial tumor surgery were included in this study. Patients were randomly allocated into one of three equal study groups each containing 20 patients; Control group (C) received normal saline, midazolam group (M) received 0.05-0.1 mg/kg midazolam and dexmedetomidine group (D) received 1 µg/kg 10 minutes before induction of anesthesia. Anesthesia was standardized for all patients. The haemodynamic changes (heart rate and blood pressure), arterial blood gas analysis, intracranial pressure, markers of stress response {serum cortisol, adrenocorticotrophic hormone and Growth hormone (by chemiluminescence immunoassay), insulin (by electrochemiluminescence) and blood glucose }, intraoperative opioid consumption and recovery criteria were all assessed and recorded.

Results: Preoperative sedative dose of dexmedetomidine resulted in a significant reduction of heart rate, blood pressure and markers of stress response compared with midazolam and control group ($P < 0.05$). No significant difference was observed between the groups regarding intracranial pressure, arterial blood gas, postoperative sedation or recovery criteria ($p > 0.05$). Opioid consumption in group D was significantly lower than the other two groups ($p < 0.05$).

Conclusion: A preoperative single dose of dexmedetomidine before induction of anaesthesia in neurosurgical patients attenuates the haemodynamic and stress hormonal response to surgery and reduces the opioid consumption with no adverse effect on intracranial pressure or recovery criteria.

Keyword: Stress response; Dexmedetomidine; Midazolam; Cortisol; Adrenocorticotrophic hormone; Insulin; Growth hormone; Neurosurgical patient.