Dexmedetomidine Vs Clonidine to prevent hemodynamic instability during emergence after craniotomy

Arefiev A.¹, Kulikov A.¹, Lubnin A.¹

**Burdenko National Medical Research Center of Neurosurgery
Moscow, Russia**

Background and Goal:

Stability of hemodynamics, absence of hypertension or increased ICP level, secure respiratory function and early neurological assessment are extremely important for neurosurgical patients in the early postoperative period [1]. According several studies alpha-2-adrenergic agonist can be used for hemodynamic stabilization during awakening and extubation [2,3,4,5]. A2-adrenominetics can also induce central symphatolysis, anxiolysis and sedation, prolong effect of other anesthetics, prevent hypertensive response on laryngoscopy and tracheal intubation, surgical injury, emergency and extubation [4].

Clonidine was introduced to the clinical practice in the middle of XX century as a hypotensive drug. Dexmedetomidine was presented as modern analog of clonidine with more significant sedative effect and more favorable hemodynamic profile.

Goal of this study was to compare effectiveness of short infusion of dexmedetomidine and clonidine for optimization of emergence after craniotomy.

Materials and Methods:

In this prospective study after local EC approval we include 40 adult patients scheduled for elective craniotomy and awakening in PACU. Physical status based on ASA scale was I-II. Exclusion criteria were initially low level of consciousness, speech disorders and severe complications during the surgery. All patients were divided in two equal groups (D and C), 20 patients in each. Intravenous anesthesia with propofol and fentanyl, local anesthesia the cut line with ropivacaine were used in all patients. During the dura mater closure in group D infusion of dexmedetomidine was started at a dose of 0.5 µg/kg/h, in the C group we used clonidine in a dose of 1 µg/kg/h. By the end of surgery, infusion was stopped and the patients with continuous hemodynamic monitoring were transferred to the PACU, where they were extubated. Hemodynamic parameters were noted before induction of anesthesia, after laryngoscopy, after surgical incision, in the middle of intervention, during suturing of a wound, on awakening and extubation, and 10 minutes after. Time of extubation, evaluation of the quality of awakening on the RASS and Aldrete scales, the presence of agitation during awakening were also noted. Data are presented in mean±SD. Difference between group were assessed based on Fisher exact test, level of significance was p<0,05.

Results and Discussion:

At the end of surgery before awakening we noted lower levels of mean arterial pressure (MAP) and heart rate (HR) in D group (63±10,2mmHg MAP; 70bpm HR in D group and 80±9,2mmHg MAP; 70bpm HR in C group) (Fig.1, Fig.2). Immediately after extubation episodes of hypertension (AP higher than 140/90 mmHg) were noted in 1 patient in D group and in 2 patients in C group (p>0,05). In general after extubation: in D group MAP was 82±14 mmHg, HR - 75±15 bpm; in C group MAP - 90±11 mmHg, HR 77±12 bpm. MAP and HR after 10 minutes after extubation were 80±10 mmHg and 75±16 bpm in D group and 90±10 mmHg and 77±13 bpm in C group. There were no significant differences between the two groups in the extubation time (30±35 min in D group and 27±23 min in C group). Thus hemodynamic profile was favorable for neurosurgical patients in both groups. We successfully provided absence of hypertensive reactions and decreased the risk of postoperative hemorrhage.

Fig.1 MAP level in both groups.

Fig. 2 Heart rate level in both groups.

Recovery profile was also positive in both groups (9,4±1 points in Aldrete scale in both groups), all patients were calm on emergence based on RASS scale (-0,1±1,3 points in D group and -0,3±1,5 points in C group) (Fig.3). RASS score >2 was noted in 2 patient in D group and in 3 patients in C group. (p>0,05).

Thus anxiolysis allowed the patients to avoid discomfort associated with tracheal tube during awakening, which does not provoke cough and hypertension. Patients were available to early neurological control, could be safe extubated being sedated, that is we believe psychologically more comfortable.

Fig. 3 RASS scale in both groups

Conclusion:

Both dexmedetomidine and clonidine were equally effective for prevention of hemodynamic instability at the emergence after anesthesia and extubation, even in form of short infusion. We didn't note rather high variability in time of extubation in both group, but positive profile of awakening without agitation and cough. Such similar results in both groups might be explained by homogeneity and healthy physical status of enrolled patients. We suppose more profound differences can be revealed in patients with co-morbidities e.g. arterial hypertension etc.

References

1. Basali A., Mascha E., Kalfas I. Relation between perioperative hypertension and intracranial hemorrhage after craniotomy. *Anesthesiology*. 2000; 93: 48-54.
2. Kadarapura N., Gopalakrishna, Prasanta K., Nilay C.e.a. Dexmedetomidine as an anesthetic adjuvant in patients undergoing transsphenoidal resection of pituitary tumor. *Journal Neurosurgical Anaesthesiology*. 2015; 27: 209-215.
3. Kim H., Choi S.H., Min K.T., Byon H.J. Randomized trial to compare the effect of a single dose of dexmedetomidine and continuous infusion of remifentanyl on airway reflex and hemodynamic response during emergence in patients undergoing cerebral aneurysm clipping. *European journal of Anaesthesiology*. 2012; 29: 112-113
4. Samantaray, A.; Sunkesula, S.; Mangu, H. R. Effects of Intravenous Clonidine Or Dexmedetomidine on Hemodynamic Responses to Laryngoscopy and Tracheal Intubation and Sedation A Randomized Double Blind Clinical Efficacy Study. *J Res Med Sci*. 2012 Jan; 17: 22-31
5. Turan G., Ozqultekin A., Turan C., Dincer E., Yuksel G. Advantageous effects of dexmedetomidine on haemodynamic and recovery responses during extubation for intracranial surgery. *Eur. J. Anaesthesiol*. 2008; 25: 816-820.