Effects of dexmedetomidine for retrobulbar anesthesia in vitreoretinal surgery

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BACKGROUND

Vitreoretinal and episcleral surgery is a complex and promising direction in surgery and it specifies requirements for anesthesia taking into account its traumatism, duration, and postoperative pain requiring analgesia. A modern approach in anesthesia is the creation of an extended nociceptive block both in the intra and postoperative period by the method of one injection. This will create an analgesic plateau, since the breakthrough of pain, in addition to affecting the cardiovascular system and the endocrine system, increases the risk of secondary hyperalgesia, which is important in surgical interventions that have two stages.

OBJECTIVES

To assess the effectiveness of dexmedetomidine in addition to local anesthetic for retrobulbar anesthesia in vitreoretinal surgery.

MATERIALS & METHODS

Group 1 (n=30), retrobulbar blockade with bupivacaine 0.5% plus dexmedetomidine at a dose of 0.25 µg/kg was performed, group 2 (n=30) retrobulbar block was performed with a mixture (bupivacaine 0.5% + hyaluronidase 16 IU/mL). Heart rate variability was evaluated in real-time mode with the estimation of the vegetative stress (variational cardiointervalometry). The oxidative status was evaluated by oxidation-reduction profile before and after the surgery. The pain was measured by verbal rating scales (VRS) in points.

Postoperative pain assessment of patients by Verbal Rating Scale (VRS).

The performance of retrobulbar blockade under the ultrasonographic assessment with the control of the needle position. It increased the safety of the anesthesia performed.

CONCLUSIONS

The addition of dexmedetomidine to a local anesthetic for retrobulbar anesthesia in vitreoretinal surgery has antioxidant effect and effect of prolonged analgesia.

RESULTS

Stress index in patients of the 2nd group at the time of maximum surgical aggression was 1380 (a.u.), and exceeded these values in the 1st group by 198%. It demonstrates the high level of tension of autonomic nervous system activity. Eight hours after the surgery, absence of pain in the 1st group was noted in 92% of patients, and in the 2nd group - in 70% of patients ($p < 0.05$). In the patients of the 1st group, oxidation-reduction profile FORD/FORT increased from 0.45 ± 0.5 to 0.62 ± 0.2 ($p < 0.005$) by 37% of the baseline value, in patients of the 2nd group it decreased by 5% ($p > 0.05$).

Course of anesthesia and early postoperative period was characterized by hemodynamic stability without significant fluctuations in blood pressure, heart rate. Pain sensations was 0.12 ± 0.12 points by VRS, which didn't exceed 4 points, i.e. the limit recommended by ESRA. According to the chart above 15 patients of the 1st group assessed the pain in 0 points. No patients assessed the pain in 3 points. In the second group 11 patients assessed the pain in 0 points and 1 patient assessed the pain in 3 points. Pathological ocular-gastric and ocular-cardiac reflexes were not observed.

DISCUSSION

It is known that drugs from the group of α_2 -adrenomimetics, in particular Dex, are preferred by anesthesiologists-resuscitators. Dex inhibits the activity of adenylate cyclase in cells, which leads to a decrease in the intake of calcium ions into nerve endings. It is with the influence on these receptors, localized in the field of locus coeruleus in the brain, that most of the effects (antinociceptive, anxiolytic, sedative, sympatholytic) of α_2 -adrenomimetics are associated with [1]. DEX modulates gene expression, channel activation, transmitter release, inflammatory processes and apoptotic and necrotic cell death. It is proved by our research when oxidation-reduction profile FORD/FORT increased in the patients of the 1st group (Dex) [2].

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