



SEDATION OF CHILDREN WITH ACUTE RENAL FAILURE DURING HEMODIALYSIS: COMPARISON OF THE EFFECTIVENESS OF DEXMEDETOMIDINE ADMINISTRATION VIA ARTERIAL AND VENOUS LINES

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Background

Hemodialysis in children with acute renal failure (ARF) is often accompanied by pronounced psycho-emotional stress, motor agitation, and decreased patient compliance. This may lead to complications during the procedure, displacement of vascular access, and reduced dialysis efficiency. Therefore, safe and controlled sedation is of great importance. In modern intensive care medicine, dexmedetomidine is one of the most widely used drugs with sedative and analgesic effects without significant respiratory depression. However, the features of its action when administered through different lines of the dialysis circuit remain insufficiently studied.

Keywords

Dexmedetomidine, hemodialysis, arterial dialysis circuit line, venous dialysis circuit line

Objective

To compare the effectiveness and safety of dexmedetomidine administered via the arterial and venous lines of the dialysis circuit in children with acute renal failure during hemodialysis.

Materials and Methods

The study included 20 children aged 1 to 14 years diagnosed with acute renal failure who were treated in the pediatric intensive care unit. Patients were divided into two groups: group 1 (n=10) — administration of dexmedetomidine through the arterial line of the dialysis circuit; group 2 (n=10) — administration through the venous line. Sedation was performed using dexmedetomidine infusion at a dose of 0.2–0.7 µg/kg/h. The depth of sedation was assessed using the Ramsay scale. Monitoring included heart rate (HR), mean arterial pressure (MAP), and oxygen saturation (SpO₂). Statistical analysis was performed using Student's t-test; differences were considered significant at p<0.05.

Results

Adequate sedation allowing safe hemodialysis was achieved in both groups. The mean Ramsay sedation score was 4.1±0.6 in the arterial administration group and 3.9±0.5 in the venous administration group (p>0.05). The average heart rate decreased from 118±12 to 102±10



beats/min in the arterial group and from 116 ± 11 to 108 ± 9 beats/min in the venous group. Moderate bradycardia was observed in 2 patients (20%) with arterial administration and in 1 patient (10%) with venous administration. Mean arterial pressure remained stable in both groups: 72 ± 8 mmHg versus 74 ± 7 mmHg ($p > 0.05$). SpO_2 values remained above 96% in all observations. The onset time of adequate sedation was slightly shorter with arterial administration (6.2 ± 1.4 min) compared with venous administration (8.1 ± 1.6 min, $p < 0.05$).

Conclusions

Dexmedetomidine is an effective and safe drug for sedation in children with acute renal failure during hemodialysis. Administration through either the arterial or venous line does not significantly affect pharmacodynamic properties or reduce the sedative effect of the drug. Administration via the arterial line provides a faster onset of sedation but may be associated with a more pronounced decrease in heart rate. Venous administration is characterized by more stable hemodynamic parameters.

References

1. Choong K. et al. Sedation during renal replacement therapy in critically ill children. Critical Care, 2012.
2. Tobias J.D. Dexmedetomidine: Applications in pediatric critical care and pediatric anesthesiology. Pediatric Critical Care Medicine, 2007.
3. Mason K.P., Lerman J. Dexmedetomidine in children: current knowledge and future applications. Anesthesia & Analgesia, 2011.
4. Chrysostomou C., Schmitt C.G. Dexmedetomidine: sedation, analgesia and beyond. Expert Opinion on Drug Metabolism & Toxicology, 2008.
5. Koroglu A. et al. Sedative, haemodynamic and respiratory effects of dexmedetomidine in children. Paediatric Anaesthesia, 2005.
6. Mahmoud M., Mason K.P. Dexmedetomidine: review, update, and future considerations of pediatric perioperative and periprocedural applications. Saudi Journal of Anaesthesia, 2015.