THE USE OF DEXMEDETOMIDINE FOR THE TREATMENT OF ARRHYTHMIAS AFTER PEDIATRIC CARDIAC SURGERY

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Introduction

•**Arrhythmias after cardiac surgery** can be a **therapeutic challenge**, since antiarrhythmics may be ineffective and associated with adverse effects.

•**Dexmedetomidine** is a highly selective α_2 -adrenergic agonist used for sedation and monitored anesthesia. Dexmedetomidine can have an adverse impact on the cardiovascular system secondary to its negative chronotropic and dromotropic effects. However, the cardiac effects may represent a therapeutic option for the treatment of perioperative tachyarrhythmias.

•This study evaluates **dexmedetomidine as a first line therapy** for management of **postoperative arrhythmias** in children with congenital or acquired cardiac diseases.

Methods

Retrospective study within the period of May 2014 – December 2017 evaluated **65 patients** who received **dexmedetomidine as a primary drug for postoperative arrhythmias**.

The **restoration of sinus rhythm** or **slowing of tachycardia** to rate that **allowed atrial or atrioventricular sequential pacing** was considered as **efficacy of therapy**.

Continuous data are presented as median (range).

Patients

Sixty-five patients with median **age of 2.0 months (1 day – 16 years)** received dexmedetomidine for several types of **arrhythmias** (Table 1). Main cardiac diagnoses of the patients are shown in Table 2.

Table 1. Types of arrhythmias treated with dexmedetomidine

Types of arrhythmias	No. of Patients
Junctional ectopic tachycardia (JET)	45
Supraventricular premature beats	8
Supraventricular tachycardia other than JET	6
Atrial flutter	1
Ventricular tachycardia	1
Ventricular premature beats	4

Table 2. Cardiac diagnoses of the patients

Primary cardiac diagnosis	No. of Patients
Ventricular septal defect ± atrial septal defect	11
Tetralogy of Fallot	11
Atrio-ventricular septal defect	10
D-Transposition of great arteries	7
Others	26

Results

Administration of dexmedetomidine

Fifteen (23%) patients received **initial loading dose of 1 mcg/kg (0.8 – 1.2 mcg/kg)**.

A **continuous infusion** with a **maximum dose of 1 mcg/kg/h (0.3 – 2 mcg/kg/h)** was administered in **all patients**.

In **4 patients** **transient blood pressure decrease** occurred in association with **dexmedetomidine**. Hypotension responded to volume and/or calcium administration.

Effectiveness of dexmedetomidine as a first line therapy

Dexmedetomidine administration was associated with **arrhythmia cessation in 37 (57%) patients**.

Risk factors for dexmedetomidine failure as a single antiarrhythmic agent

Risk factor	P	AUC
Lower patient weight	0.02	0.62
Lower patient age	0.031	0.62
Higher maximum heart rate	0.004	0.69

The escalation of antiarrhythmic therapy

The **escalation of treatment** was required in **28 (43%) patients**.

The second line therapy is shown in Table 3.

Table 3. Second line therapy

Treatment modality	No. of Patients
Amiodarone	25
Sotalol	1
Adenosine	1
Amiodarone with subsequent ECMO	1

ECMO = extracorporeal membrane oxygenation

Amiodarone as a second line treatment

Amiodarone was administered in **25 patients** as:

- **boluses of 4.5 mg (1 – 10 mg)**
- **continuous infusion** with maximum dose of **15 mcg/kg/min (10 – 20 mcg/kg/min)**.
- In 1 patient, bradycardia and hypotension occurred following administration of amiodarone boluses (5 mg/kg).
- **Amiodarone** infusion was used **concomitantly with dexmedetomidine** infusion in **10 patients** during **29.5 hours (9 – 98 hours)** without side effects.

Patient outcome

- In **64 patients**, arrhythmia **did not recur** in late postoperative period.
- One patient with ventricular arrhythmia and cardiomyopathy died due to septic shock.
- **Long-term** therapy with **amiodaron** and **sotalol** was required in the patient with **IART** and **AVRT**, respectively. (IART = intraatrial reentrant tachycardia , AVRT = atrioventricular atrioventricular reentrant tachycardia

Conclusion

The study suggests that dexmedetomidine as a first line antiarrhythmic drug has a therapeutic role in the treatment of postoperative arrhythmias after pediatric cardiac surgery.

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