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## CLINICAL INFORMATION

# Sedation with dexmedetomidine for conducting electroencephalogram in a patient with Angelman syndrome: a case report

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### KEYWORDS

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### PALAVRAS-CHAVE

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Sedação profunda;  
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### Abstract

**Introduction:** Angelman syndrome is characterized by severe mental retardation and speech and seizure disorders. This rare genetic condition is associated with changes in GABA<sub>A</sub> receptor. Patients with Angelman syndrome need to be sedated during an electroencephalogram ordered for diagnostic purposes or evolutionary control. Dexmedetomidine, whose action is independent of GABA receptor, promotes a sleep similar to physiological sleep and can facilitate the performing of this examination in patients with Angelman syndrome.

**Case report:** Female patient, 14 years old, with Angelman syndrome; electroencephalogram done under sedation with dexmedetomidine. The procedure was uneventful and bradycardia or respiratory depression was not recorded. The examination was successfully interpreted and epileptiform activity was not observed.

**Conclusion:** Dexmedetomidine promoted satisfactory sedation, was well tolerated and enabled the interpretation of the electroencephalogram in a patient with Angelman syndrome and seizure disorder.

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### Sedação com dexmedetomidina para realização de eletroencefalograma em paciente portadora de síndrome de Angelmann: relato de caso

### Resumo

**Introdução:** A síndrome de Angelman (SA) é caracterizada por retardo mental grave, distúrbio da fala e desordem convulsiva. Essa condição genética rara está associada a alterações do receptor GABA<sub>A</sub>. Pacientes portadores de SA necessitam ser sedados durante a feitura de eletroencefalograma (EEG), indicado para fins diagnósticos ou controle

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evolutivo. A dexmedetomidina, cuja ação independe do receptor GABA, promove sono semelhante ao fisiológico e pode viabilizar a feitura desse exame em pacientes com SA.

*Relato de caso:* Paciente feminina, 14 anos, portadora de SA, fez EEG sob sedação com dexmedetomidina. O procedimento transcorreu sem intercorrências e não foi registrada bradicardia ou depressão respiratória. O exame foi interpretado com sucesso e atividade epileptiforme não foi observada.

*Conclusão:* A dexmedetomidina promoveu sedação satisfatória, foi bem tolerada e possibilitou a interpretação do EEG em paciente com SA e desordem convulsiva.

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## Introduction

Patients with genetic disorders, common or not, with or without congenital abnormalities, present unique challenges for the professional responsible for administering sedation or anaesthesia during surgical or technical procedures. Angelman syndrome (AS) is a clear example of this situation, which requires special care because of the increased risk of complications.<sup>1</sup> Patients with AS exhibit convulsive disorder, make regular use of anticonvulsants and depend on electroencephalogram (EEG) studies for diagnosis or evolutionary control. However, because of the changing behaviour, common to many other neurological conditions, the sedation during EEG is often necessary. This is peculiar because the sedatives and hypnotics commonly used in anaesthesia interfere with EEG basal patterns,<sup>2</sup> wrecking its use during the examination. In addition, in AS patients some genetic characteristics related to acid gamma-aminobutyric acid type A (GABA<sub>A</sub>) are observed,<sup>3</sup> and GABA<sub>A</sub> is a target for some sedatives and hypnotics. The aim of this report is to discuss the use of dexmedetomidine for sedation during EEG, focusing on the unique aspects of AS.

## Case report

The case is of a female patient, 14 years old, 43 kg, diagnosed with AS, with seizures, in regular use of phenobarbital, reporting bronchial asthma and kyphoscoliosis and using thoracocervical vest. Laboratory tests and preoperative electrocardiogram were normal. In the examination room, the patient was monitored with ECG, pulse oximetry and non-invasive measurement of blood pressure. Peripheral intravenous access was obtained to allow dexmedetomidine infusion (bolus of 1 µg kg<sup>-1</sup> and maintained with 0.05–0.2 µg kg h<sup>-1</sup>). The patient remained relatively stable during the procedure. There was a moderate decrease in mean arterial pressure (MAP) during infusion of the initial dose, when this parameter ranged from 59 to 40 mmHg. The heart rate ranged from 80 to 85 bpm and no bradycardia was observed. This patient had an episode of upper airway obstruction, corrected with an oropharyngeal cannula; but the oxygen saturation remained above 92% without supplemental oxygen. The dexmedetomidine doses were adjusted according to the level of sedation and haemodynamic effects and there was no spontaneous movement during the 20-min recording of the EEG. The patient awoke spontaneously 20 min after the end of the test and was released from the

unit after 90 min. The analysis of EEG was performed by a neurologist who found stages I and II of NREM sleep and absence of epileptiform potentials.

## Discussion

Of rare incidence, estimated at 1/10,000–1/40,000,<sup>4</sup> AS was first described by Harry Angelman in 1965.<sup>5</sup> This clinical syndrome includes a neurodevelopmental disorder characterized by severe learning difficulties, ataxia, seizures, and dysmorphic facial features. The sociable and happy facial expression motivated the initial designation of “puppet child”. Most children have developmental delay and growth retardation of the head during the first year of life. Speech does not develop in most patients. AS is caused by a variety of genetic abnormalities that include chromosomal region 15q11-13, a segment responsible for encoding the gamma subunit of GABA<sub>A</sub> receptor.<sup>6</sup>

Some relevant points are worth mentioning in relation to the particularities of sedation for EEG in patients with AS. The first one includes common anaesthetic problems such as those arising from anatomical changes or haemodynamic responses. Craniofacial abnormalities, including microcephaly, deep-set eyes, high arched palate and tongue protrusion,<sup>3</sup> may pose problems in the management of airway and in tracheal intubation. In this patient, upper airway obstruction associated with macroglossia was corrected with an oropharyngeal airway, but respiratory depression was not found and not even ventilation under mask was required. Regardless, all support for difficult airways approach was available, because asthma, kyphoscoliosis and the use of a thoracocervical vest represent aggravating factors for complications, if a more invasive approach to the airway was needed. Bradycardia related to vagal predominance, emphasized in other previous reports,<sup>7</sup> was not reported during the infusion of dexmedetomidine. In contrast, moderate hypotension was observed, but without need of specific intervention.

The second point refers to changes in GABA<sub>A</sub> receptor, given its importance as a target of action of drugs commonly used for sedation and anaesthesia,<sup>3</sup> such as propofol. Despite the relevance of this aspect, clinical information on the effects of such drugs in this special group of patients is scarce and not fully understood. It is estimated that a variation in clinical response or even a resistance to such drugs occurs, which is why some authors suggest that their association with other drugs acting on different pathways would

be a good strategy for sedation and/or general anaesthesia.<sup>7</sup> Therefore, dexmedetomidine, whose target of action is the  $\alpha_2$  receptor, would represent an option, not only as a single agent, but also as an adjunct to general anaesthesia or sedation.

The last relevant aspect is the interpretation of EEG, considering the possible interferences in its basal pattern, resulting from the administration of various anaesthetics and sedatives, including propofol, benzodiazepines and inhaled anaesthetics. Even chloral hydrate, which is traditionally used for this purpose,<sup>2</sup> can interfere with the EEG pattern,<sup>8</sup> besides showing sedation failure in 27% of patients with behaviour change.<sup>9</sup> In the present report, although the electroencephalographic changes commonly seen in AS<sup>4</sup> have not been observed, the analysis of this examination was successfully done and favoured the clinical control.

For all the reasons cited, dexmedetomidine emerges as a promising resource for patients with AS, especially those candidates who undergo EEG under sedation. Being a highly selective  $\alpha_2$  adrenergic agonist, this drug has a mechanism of action independent of GABA receptor, promoting sedation very similar to the physiological sleep, with minimal respiratory depression. It also has antipruritic, antiemetic, analgesic and sympatholytic properties. Dexmedetomidine operates in several locations in the central nervous system, but its sedative and anxiolytic effects result mainly from its activity in the *locus coeruleus* of the brainstem. In the dorsal horn of the spinal cord, it modulates the release of substance P and produces its analgesic effects. The sedation is accompanied by minimal effects on respiratory function.<sup>10</sup> In adult volunteers, no interference at EEG basal pattern was observed, and the sleep induced by dexmedetomidine compared with the natural sleep.<sup>11</sup> Considering that these results also apply to patients with epilepsy and behaviour changes, this drug tends to set itself up as a good choice for sedation during EEG. Some retrospective studies point to the efficacy and safety of this drug for sedation for further examinations, including EEG,<sup>12,13</sup> although no prospective studies have been published evaluating the possible interference of dexmedetomidine on EEG in special patients.

Therefore, despite all limitations, this report highlights the good tolerance and adequate sedation promoted by dexmedetomidine, which enabled the recording and interpretation of EEG in our patient. Despite the little evidence, this drug may represent an option for sedation

during this diagnostic procedure in patients with chronic neurological disorders and behaviour modification, including those patients with AS. However, prospective controlled trials that specifically emphasize the effects of the drug on EEG are needed to confirm these benefits.

## Conflicts of interest

The authors declare no conflicts of interest.

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