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Use of Dexmedetomidine in Intensive Care: Retrospective on 1 Year of Practice at the Essos Hospital Center Cameroon

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Abstract

Background and Aims: Dexmedetomidine is a selective alpha-2 agonist with an alpha-2/alpha-1 selectivity ratio seven times higher than that of clonidine [1]. Its main effects are the analgesic effect, the sedative effect without causing respiratory depression and the anxiolytic effect [1,2,3]. Its use in intensive care and perioperative medicine is not documented in Cameroon. It is in this perspective that we proposed to study the first use of dexmedetomidine in the intensive care unit in Cameroon.

Patients and Methods: This was a quantitative, descriptive study with retrospective data collection. It took place at the Essos hospital center (Cameroon) over a period of 12 months. All records of patients admitted to intensive care during the above-mentioned period, and having benefited from the administration of dexmedetomidine were included. The variables studied were: socio-demographic data, clinical characteristics and history of the study population, indication, duration and mean dose of dexmedetomidine. The results obtained were analyzed with IBM SPSS Statistics Base 29.0 software.

Results: Fifteen cases were analyzed. The average age of patients was 53 years with extremes ranging from 35 to 63 years, the sex ratio of 2/1. The most found history was arterial hypertension (33.3%). Postoperative mechanical ventilation (40%) was the main reason for admission to intensive care, while awake and calm sedation (60%) was the first indication for the use of dexmedetomidine. The average infused dose was 0.5 µg/kg/h using an electric syringe pump. In 66.7% of cases, the duration of the infusion was less than 24 hours for an average length of stay in intensive care of 11 days ±7.

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Conclusion: Dexmedetomidine is a highly selective α2-adrenergic receptor agonist. Its clinical use has been authorized since 1999 in the United States. The first experience of its use in intensive care at the Essos hospital center is done in compliance with the recommendations formulated by the French Society of Anesthesia and Resuscitation (FSAR).

Introduction

Dexmedetomidine is a selective short-acting alpha2-adrenergic receptor agonist [1,2]. It it is a drug that has sympatholytic, analgesic and sedative effects, which makes it a molecule of first choice for the sedation of patients in intensive care [1,2,3]. Dexmedetomidine also finds many indications in the field of perioperative medicine [4]. Its clinical use has been authorized since 1999 in the United States [5,6]. Dexmedetomidine has been marketed in France since February 20, 2013 [7]. this drug has been granted marketing authorization in Europe since September 16, 2011 [8]. This molecule is recently introduced in the therapy of anesthesiologists and intensive care physicians in Cameroon. The main objective of this study was to report the first use of dexmedetomidine in intensive care, in a reference hospital in Central Africa, and to assess the compliance of its use on the basis of the criteria established by the French Society of Anesthesia and Resuscitation (SFAR).

Materials and Methods

This was a quantitative, descriptive study with retrospective data collection. It took place at the Essos hospital center (Cameroon) over a period of 12 months from April 1, 2022 to May 1, 2023. All the files of patients admitted to intensive care during the period mentioned, and having benefited from the administration dexmedetomidine during their hospitalization were included. Subjects whose age was greater than or equal to 65 years and children less than or equal to 16 years of age were excluded. The variables studied were: socio-demographic data, clinical characteristics and history of the study population, indication, duration and mean dose of dexmedetomidine. Data was collected using an observation grid. The results obtained were analyzed with IBM SPSS Statistical Base 29.0 software.

Results

During the survey period, we analyzed 15 files out of a total of 365 intensive care unit admissions, i.e. a frequency of 4.1%. The characteristics of the study population are shown in Table 1. The mean age of the patients was 53 years with extremes ranging from 35 to 63 years, the sex ratio of 2/1. The most found history was arterial hypertension (33.3%), followed by the association of diabetes and arterial hypertension (6.7%) and alcoholism (13.3%). In our sample, postoperative complications (40%) were the main reason for admission to the intensive care unit, followed by acute respiratory distress (26.7%).

Awake comfort sedation (60%) was the first indication for administration of dexmedetomidine in these patients (Table 2), followed by agitation 26.7% (n=4). The mean infused dose was 0.5 µg/kg/h ± 0.2 using an electric syringe pump. The administration of a bolus dose before the continuous infusion was not found. No patient received a dose greater than 1.5 µg/kg/h. In the majority of cases (66.7%), the duration of the infusion was less than 24 hours for an average length of stay in intensive care of 11 days ±7. The population of patients under mechanical ventilatory assistance and benefiting from dexmedetomidine infusion was 40% (n=5). Dexmedetomidine was combined with an opioid for analgesic purposes in 60% of cases (n=9). Morphine was the only opioid used in combination with dexmedetomidine.

Table 1: Caractéristiques de la population d'étude.

Sociodemographic data		**n (%)**
Number of patients	Male	10 (66.7 %)
	Female	5 (33.3 %)
	Total	15 (100 %)
Average age (year)		53 (35-53)
Sex ratio (Male/Female)		2/1
Past medical history		**n (%)**
High blood pressure		5 (33.3 %)
High blood pressure + Diabetes		1 (6.7 %)
Alcoholism		2 (13.3 %)
HIV		1 (6.7 %)
Obesity		1 (6.7 %)
None		5 (33.3 %)
Body Mass Index (kilogram/m ^{2})		**n(%)**
Normal (18.5 to <25)		11 (73.3 %)
Overweight (25.0 to <30)		3 (20 %)
Obesity (30.0 or higher)		1 (6.7 %)
ICU Admission Diagnosis		**n(%)**
Postoperative complications		6 (40 %)
Respiratory distress		4 (26.7 %)
Polytrauma		2 (13.3 %)
Head trauma		2 (13.3 %)
Seizures		1 (6.7 %)

Table 2: Clinical characteristics of the study population.

Variable	**Number (n)**	**Percentage (%)**
Indication for administration of Dexmedetomidine		
Awake sedation	9	60.0
Agitation	4	26.7
Weaning from mechanical ventilation	2	13.3
Total	15	100
Dexmedetomidine Dosage (µg/kg/h)		
0,5 µg/kg/h	13	86.7
0,7 µg/kg/h	2	13.3
Total	15	100
Duration of intensive care stay (day)		
15 – 21 days	2	13.3
8 – 14 days	5	33.3
4 – 7 days	3	20.0
2 days	2	13.3
1 day	3	20.0
Total	15	100
Duration of Dexmedetomidine infusion		
≤ 24 hours	10	66.7
]24 – 48] hours	4	26.7
> 48 hours	1	6.6
Total	15	100

Discussion

Dexmedetomidine is a highly selective α2-adrenergic receptor agonist [1,2,9]. It has sympatholytic, analgesic and sedative effects which make it an attractive option for maintaining sedation in the intensive care unit [1,2,9]. Dexmedetomidine comes as a clear, colorless solution of 100µg/ml dexmedetomidine hydrochloride, which is usually diluted with 0.9% sodium chloride solution to a concentration of 4µg/ml or 8µg/ml [10]. The dosage varies depending on its use, but the most common dosing regimen for conscious sedation involves an infusion of 0.2 to 1.4 mcg/kg/h with or without an initial bolus dose of 1 mcg/kg in 10 minutes [10].

The use of sedation-analgesia protocols is usual for patients in the ICU department of the Essos hospital center. The drugs usually used in this indication are midazolam and fentanyl or alfentanil. Dexmedetomidine was recently introduced into the analgesia and sedation protocols in this ICU department. We did not find any literature that reports the use of this molecule in intensive care units in Central and West Africa. This is indeed a preliminary study that allows us to have an overview of the first uses of this molecule in intensive care in Sub-Saharan Africa.

Our study population consists mainly of young, non-obese adults, the male population being the most represented. These characteristics of the study populations are partially justified by the selection criteria which made it possible to exclude elderly subjects and the pediatric population. On the other hand, the prevalence of arterial hypertension and diabetes in [11], in terms of cardiovascular risk factor, in the population of young adults in Sub-Saharan Africa could explain the strong representation of these antecedents in our sample.

In terms of indications, the need for sedation in an awake patient comes first. Mylène et al [12], in a work reviewing the use of dexmedetomidine in intensive care, found that respiratory problems were the first indication for the use of this molecule (34.4%), followed by postoperative complications (25.7%). Our results could be explained by the need to continue mechanical ventilation in the postoperative period in our patients. Postoperative complications were the main reason for intensive care admission in our cohort. Sedation-analgesia in intensive care is the main indication for dexmedetomidine. The dosage recommended by the French society of anesthesia-resuscitation is between 0.2 and 1.4 mg/kg/h, with a starting dosage usually of 0.7 mg/kg/h by continuous intravenous route [13]. In this indication, dexmedetomidine has the advantage of faster weaning from artificial ventilation and avoiding the propofol-related infusion syndrome, which is uncommon but associated with high mortality [10,13,14]. Another important indication is the phase of weaning from the respirator and tracheal extubation after long-term sedation [13]. In this latter indication, dexmedetomidine makes it possible to avoid continued sedation when stopping hypnotics is poorly tolerated [13,15].

In our series, continuous intravenous administration of dexmedetomidine was at an average dose of 0.5 µg/kg/h. Mylène et al [12] found an average dexmedetomidine infusion dose of 0.52 µg/kg/h. In their research work, 25% of patients received a dose greater than 0.7 µg/kg/h, which is the maximum dose found in the dexmedetomidine manufacturer's monograph. The average value of 0.5 µg/kg/h in our series would be justified by the caution of practitioners when introducing a new molecule into their therapeutic habits, the ultimate goal being to minimize the potential side effects associated with the use of this drug.

We found an average duration of infusion of 2.7 days with extremes ranging from 1 to 5 days. Mylène et al [12], report use times of 5 days with extremes ranging from 1 to 23 days. The maximum duration recommended by the literature is 5 days [10]. Some authors released relatively longer durations of administration of dexmedetomidine in the context of sedation in the intensified care unit [16].

Conclusion

Dexmedetomidine is a drug that finds many applications in intensive care. Despite its many demonstrated benefits for intensive care patients, the introduction of this molecule into the therapeutic arsenal of practitioners in our work environment is not yet relevant. In intensive care at the Essos hospital center, the assessment of its first year of use remains in accordance with the standards established by the French Society of Anesthesia and Resuscitation in most indications. Understanding its mechanism of action and potential side effects is a prerequisite for its safe use.

Conflict of interest

The authors declare that they have no conflict of interest in relation to this article.

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