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Prevalence of Patients Receiving Dental Treatments Under Sedation: A Retrospective Study

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Abstract: ***Background: The objective of the study was to assess the prevalence of patients under sedation for dental treatments and to compare patients under either deep sedation with ketamine (DSK) or general anesthesia (GA). Methods: This retrospective study included 28 patients among 11581 clinical files over the last 5 years. All patients received dental treatment either under DSK (n=6) or GA (n=22). Demographic and clinical data were recorded. Results were reported as mean ± standard deviation and frequencies, the fisher exact test was used for comparison with significant p value <0.05. Results: The prevalence of patients under sedation was 0.024%. The mean age was 20.4 ± 16.1 with male predominance (60.7%).Most of patients were referred by other departments (64.3%) and nearly 80% of them had a systematic condition. Of these, 60.7% suffered from a mental disorder. In fact, in these patients (n=18) GA was most commonly performed (p<0.02). Indeed, there was a significant difference regarding the mean age between patients under DSK vs those under GA, 8.16 years ± 3.25 vs 22.31 years ± 16.81 respectively. (81.8% vs 16.7%, p <0.02).Finally, tooth extraction was the most common treatment (67.8%). Conclusion: Within the limits of the present study, the prevalence of patients receiving dental treatment under sedation is low. Most patients with a mental disorder were treated under GA.***

Keywords: sedation, dental treatment, general anesthesia, ketamine

1. Introduction

Dental treatments in some patients who are not cooperative or have specific conditions, require the use of sedation [1]. According to the French Society of Anesthesia and Resuscitation, sedation is defined as « all the medicinal means, or not, intended to ensure the physical and mental comfort of the patient and to facilitate the techniques of care [2] ». The American Society of Anesthesiologists has established four levels of sedation:

- Minimal conscious sedation (level 1);
- Moderate conscious sedation (level 2);
- Deep sedation (level 3);
- General anesthesia (level4). [3]

Several drugs are used during sedation: volatile inhalation agents including halothane, desflurane, flurane, and sevoflurane; intravenous anesthetics including propofol, methohexital, and etomidate; ketamine; and sedative hypnotics including lorazepam, midazolam, and pentobarbital. [1]

"General anesthesia is the set of techniques that allow the performance of a surgical, obstetrical or medical act (endoscopy, radiology. . .), by removing or reducing pain. General anesthesia can be compared to sleep, produced by the injection of drugs, intravenously and / or by breathing anesthetic vapors, using an appropriate device » [4]. It should be seen as the last solution, after the failure of other techniques, and not as one technique among many, which would be chosen as an easy way out. However, there are cases where the indication for general anesthesia arises in the following cases:

- Contraindication of local anesthesia;
- Psychotic or cerebral palsy subjects;
- Multiple extractions in cardiac patients who require an open - heart surgery;
- Certain patients with hemophilia or those subjected to anticoagulant treatments
- Patients called ASAIII (severe disease of a major function according to the American society of anesthesiologists;
- Maxillary fractures or maxillofacial surgery [5].

The objectives of this study are:

- To determine the prevalence of patients who received dental treatment under sedation;
- Describe their demographic and clinical data;
- Compare two groups of patients under deep sedation with ketamine and under general anesthesia.

2. Methods

To reach this objective, a cross - sectional study was carried out in the dental medicine department of the Fattouma Bourguiba hospital in Monastir. This is an exhaustive study; all patients who received dental treatment under general anesthesia or deep intravenous sedation with ketamine between 1/1/2014 and 12/31/2018 were included.

General and clinical data were collected from clinical records. Any subject with an incomplete clinical record was excluded.

The clinical data determined were: general state of health (good general health, mental disorders and other pathologies), the patient's attitude (cooperating or not), the reason for the consultation (first - line consultation or sent by another service / colleague), the type of sedation (general anesthesia or deep sedation), the place of sedation in the overall care and treatment of the patient (first - line or after a psychological approach and attempted local anesthesia), the act performed under sedation (treatment, extraction, etc.).

Data entry was performed using SPSS software (Statistical Package for the Social Sciences - version 18; USA). The significance threshold was set at 5%. The analysis of the distribution of quantitative variables was carried out using the Kolmogorov - Smirnov test. If the distribution was normal, the results were expressed by their means ± standard deviations and the comparison of the means was carried out using the student t - test. Qualitative variables are expressed by their percentages. The comparison of the percentages was made using the Khi^2 test, if the calculated number is greater than five. Otherwise, we used Ficher's exact test

3. Results

The number of patients treated in the department of dental Medicine of Fattouma Bourguiba Hospital during the last 5 years is 11581. The prevalence of subjects requiring general anesthesia / deep sedation was 0.024%. Indeed, 28 patients were included in this study: 22 (78.6%) were treated under general anesthesia with intubation and six (21.4%) under deep intravenous sedation with ketamine.

The mean age was 20.4 ± 16.1 with a predominance of men (60.7%). Eighteen (64.3%) patients were referred either by free practice dentists (7 subjects) or by other services (11 subjects). The Pediatric Odontology and Prevention department of the Monastir dental clinic came in first place (with seven subjects) followed by the Otorhinolaryngology (with two subjects) and pediatric surgery (with two subjects) departments of the hospital of Fattouma Bourguiba in Monastir.

The general condition of patients was altered in 79.6%. Among them, 10 had mental impairment, two had poly - malformative syndrome, two had encephalopathy, two had autism, one had Down's syndrome, one had diabetes, one had high blood pressure, one had liver failure, and one had thrombocytopenia.

The mental state was altered in 17 (60.7%) patients and 24 (85.7%) of them were uncooperative.

Regarding the place of sedation in the overall management of the patient, ten (35.7%) patients underwent general anesthesia after attempting treatment with local anesthesia.

The most performed dental procedure under sedation was tooth extraction (in 19 patients), followed by cystic enucleation and coronary care (three patients for each procedure)

General information as well as clinical data for the two groups is summarized in the table.1.

There was no statistically significant difference between patients treated with GA and those treated with ketamine in terms of gender, general condition, reason for consultation and attitude.

The main results of this study were:

- Patients treated with ketamine were younger;
- Patients treated with GA had more mental disorders than those treated with ketamine;
- The use of ketamine treatment occurred after a psychological approach and an attempt at treatment under local anesthesia compared to the group treated with general anesthesia which was rather first - line

4. Discussion

The objectives of this study were to determine the prevalence of subjects requiring general anesthesia / deep sedation and to compare the characteristics of patients treated under deep sedation with ketamine and under general anesthesia. The main result of this study was the very low prevalence of patients requiring sedation (Ketamine or GA).

To our knowledge, this is the first study on this subject conducted among a Tunisian population. It is a descriptive and comparative study. The collection of information was done in a retrospective manner. In fact, the data was been collected from the clinical files of the dental medicine department of the hospital of Fattouma Bourguiba in Monastir. The downside is that clinical records may lack information. To overcome this objective, any subject with an incomplete clinical file was excluded. For all these reasons, prospective studies are desired in the future.

During the five years of the study, the use of sedation (general anesthesia / deep sedation) represented 0.024% of the clinical activity of our department. Therefore, it is a very rare event. Patients are generally treated under local anesthesia in dental medicine. This prevalence is below that found in other studies [1, 6]. In fact, 13.1% of consultants in a private pediatric dentistry practice in Virginia (United States) had undergone general anesthesia in 2016. [1]A study of dentists in Ontario (US) found that 74.5% of them had used deep sedation / GA in the last 12 months of their practice [6]. In addition, Flick and Lloyd showed that among the 234 dentists who participated in the study, 34% had a license for moderate sedation and 64% had a license for general anesthesia. [7]Furthermore, Trost [8] showed that the surgical extraction of third molars under general anesthesia represented about 9% of the annual activity of the operating room.

This low proportion of subjects who have not been treated with local anesthesia is explained by the fact that sedation and GA in particular is a risky act. The decision to use it is taken after careful consideration, taking into account all the

indications and contraindications resulting from scientific data [9]. In addition, difficulties of access to the operating room were encountered especially for adult patients. In fact, the department of dental medicine at the hospital of Fattouma Bourguiba works closely with the department of pediatric surgery at the same hospital. For this reason, several patients have been referred to the department of Maxillofacial surgery at the hospital of Sahloul. Other reasons cited for not using these techniques of sedation include a lack of demand and additional costs for patients. [6]

This study also showed that tooth extraction was the most performed act under sedation. This is explained by the lack of the necessary equipment for conservative care in the operating rooms, hence the usefulness of acquiring this type of equipment to improve the quality of care for this type of patients. Indeed, Pummer [10]showed that coronary restorations 26performed in patients under sedation (by inhalation of nitrous oxide or under GA) were more effective than those performed in patients treated under local anesthesia.

Results showed that 60.7% of patients had a mental deficit with a difference between subjects treated with GA and those treated with ketamine. This proportion is higher than that mentioned in a study conducted in America. In this study, only 14% of patients who received GA for dental treatment had a mental deficit [11]. Therefore, we can think that sedation (mainly GA) is mainly reserved for patients with a mental disorder. Indeed, they do not tolerate dental treatment under local anesthesia. Other authors [12, 13] suggest sedation with ketamine as an alternative to GA for dental treatment in patients with mental disorder. However, ketamine is known for its effect of increasing intracranial pressure [14]. Therefore, this drug should be avoided for patients with hydrocephalus, defective ventriculoperitoneal shunt or head trauma. [14]. These features are more common in patients with mental deficit [14]. This is confirmed by the fact that the patients treated with ketamine included in this study had general illnesses, which did not affect their mental state. Therefore, they were more psychologically affordable. We started with psychological approach on first - line and then resorted to second - line sedation. As for the patients treated under general anesthesia, most of them had general illnesses affecting the mental state such as encephalopathy, poly - malformative syndrome, autism and trisomy 21. The psychological approach proved to be impossible for these patients and sedation was used as the first intention. In addition, patients treated with ketamine were younger than those treated with GA. This result can also be explained by the fact that the majority of patients treated with GA presented with mental disorders. These are, as already mentioned, generally associated with exclusion criteria for the use of ketamine [14].

The use of sedation remains relatively rare in the department of dental medicine at the hospital of Fattouma Bourguiba in Monastir. The majority of patients with mental disorders were treated under general anesthesia. The patients treated with ketamine were younger. Longitudinal studies with a higher number of subjects are desired.

5. Conclusion

Within the limits of the present study, the prevalence of patients receiving dental treatment under sedation is low. Most patients with a mental disorder were treated under general anesthesia.

6. Competing interests

The authors declare no competing interest.

7. Authors' Contributions

All authors contribute to this work and the writing of the manuscript.

Tables and figures

Table 1: General and clinical data of the two groups

Groupe		General anesthesia	Ketamine	p
Data are expressed in Means ± Standard deviation				
Age (years)		22, 3±16, 8	8, 2±3, 3	**0, 03***
Data are expressed as a number (percentage)				
Sex	Women	8 (36, 4)	3 (50, 0)	0, 6
	Male	14 (63, 6)	3 (50, 0)	
General condition	Altered	18 (81, 8)	3 (50, 0)	0, 5
	Not altered	4 (18, 2)	3 (50, 0)	
Mental state	Altered	18 (81, 8)	1 (16, 7)	**0, 02†**
	Not altered	4 (18, 2)	5 (83, 3)	
Attitude	Cooperating	4 (18, 2)	0 (0, 0)	0, 5
	Not cooperating	18 (81, 8)	6 (100, 0)	
Consultation	First line	9 (40, 9)	0 (0, 0)	0, 1
	Adressed	13 (59, 1)	6 (100, 0)	
Place of sedation	First line	17 (77, 3)	1 (16, 7)	**0, 01†**
	After local anesthesia	5 (22, 7)	5 (83, 3)	

* p<0, 05: Student test (General anesthesia Vs Ketamine)
† p<0, 05: Student test (General anesthesia Vs Ketamine)

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