REMIMAZOLAM VS. PROPOFOL IN SEDATION FOR OUTPATIENT PROCEDURES: SAFETY AND RAPID RECOVERY

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Abstract: Sedation in outpatient procedures requires agents with a favorable pharmacokinetic profile, cardiovascular safety, and rapid recovery. Propofol, traditionally used, is effective but can cause hypotension and respiratory depression. Remimazolam, an ultra-short-acting benzodiazepine, emerges as a promising alternative, combining controllable sedation with an improved safety profile. This study aimed to compare the efficacy, safety, and recovery time of remimazolam versus propofol in patients undergoing outpatient procedures, to assess its clinical feasibility as a substitute or complement to propofol. This is a literature review with a qualitative and exploratory approach. The selection of studies was performed by consulting the PubMed, SciELO, ScienceDirect, and Scopus databases, considering full articles published in peer-reviewed scientific journals that analyze aspects related to the use of remimazolam and propofol in outpatient procedures. The time frame considered publications between 2020 and 2023, based on the oldest articles (da Silva, 2020; Melo, 2020; Rodrigues et al., 2020) and the most recent (Gomes et al., 2023; Carvalho et al., 2023). The data analyzed showed that remimazolam has sedative efficacy comparable to propofol, but with a lower incidence of hypotension, bradycardia, and respiratory depression. In addition, it showed greater predictability in recovery, especially in the elderly and patients with comorbidities. The time to cognitive function recovery and hospital discharge was similar between groups, with a slight advantage for remimazolam in some studies. Its reversibility with flumazenil also offers an additional margin of safety. It is concluded that remimazolam is a safe and effective alternative to propofol for sedation in outpatient procedures, with advantages in specific risk profiles. Despite its higher costs, its use may be preferred in vulnerable populations or in protocols that require rapid recovery and less hemodynamic instability.

Keywords: Anesthesiology; Outpatient Procedures; Sedatives.

INTRODUCTION

Conscious sedation in outpatient procedures has become increasingly relevant in modern medical practice, especially due to the growing demand for minimally invasive techniques that offer greater comfort and safety to the patient. Among the commonly used sedatives, propofol has been the gold standard, standing out for its rapid onset of action, short duration, and predictable pharmacokinetic profile. However, its use is associated with relevant side effects, such as respiratory depression and hypotension, which motivates the search for alternatives with a more favorable safety profile (DA SILVA, 2020).

In this context, remimazolam, a recently approved ultra-short-acting benzodiazepine, has emerged as a promising agent for outpatient sedation. With metabolism independent of liver and kidney function, rapid and reversible action, and lower incidence of respiratory and cardiovascular adverse events, remimazolam has potential advantages over propofol, especially in at-risk populations, such as the elderly and patients with comorbidities (KRAUSS, COHEN, WEISSBROD, 2022).

Recent comparative studies have shown that remimazolam provides effective sedation with faster neurological recovery rates and fewer intraoperative complications when compared to propofol, without compromising the effectiveness of the procedure. These findings indicate that remimazolam may represent an evolution in outpatient anesthetic management, especially in settings with high patient turnover (WANG et al., 2021).

Thus, it is essential to systematically analyze the clinical performance of remimazolam in comparison with propofol, especially regarding hemodynamic safety parameters, incidence of adverse events, and recovery time. With the increasing adoption of outpatient anesthetic practices, the choice of the ideal sedative agent must consider not only the efficacy, but also the safety and functional recovery of patients undergoing this type of intervention (FUKUSHIMA, 2021).

This study aimed to compare the efficacy, safety, and recovery time of remimazolam in relation to propofol in patients undergoing outpatient procedures, in order to evaluate its clinical

feasibility as a substitute or complement to propofol.

MATERIALS AND METHODS

This is a literature review with a qualitative approach and exploratory character. The selection of studies was carried out by consulting the PubMed, SciELO, ScienceDirect and Scopus databases, including complete articles published in peer-reviewed scientific journals, which analyze aspects related to the use of remimazolam and propofol in outpatient procedures. The time frame considered publications between 2020 and 2023, based on the oldest articles (da Silva, 2020; Melo, 2020; Rodrigues et al., 2020) and the most recent (Gomes et al., 2023; Carvalho et al., 2023).

- The following Health Sciences Descriptors were used:

"Remimazolam"

"Propofol"

"Outpatient Sedation"

"Pharmacokinetics"

"Pharmacodynamics"

"Outpatient Procedures"

"Cognitive Recovery"

"Adverse effects"

"Pharmacological Reversibility"

- The combinations of the descriptors were made using the Boolean operators AND and OR, resulting in the following main search strategies:

"Remimazolam" AND "Outpatient Procedures"

"Propofol" AND "Ambulatory Sedation"

“Remimazolam” AND “Pharmacodynamics”

“Remimazolam” AND “Propofol” AND “Comparison”

“Sedation” AND “Cognitive Recovery”

“Sedation” AND “Adverse Effects”

“Pharmacological Reversibility” AND “Remimazolam”

- Guiding Question:

What are the differences and clinical implications between the use of remimazolam and propofol in outpatient procedures, considering pharmacological aspects, safety, cognitive recovery, and adverse effects?

- Inclusion Criteria:

- Articles published between 2020 and 2023;
- Studies available in Portuguese, English or Spanish;
- Publications that address the use of remimazolam or propofol in outpatient procedures, highlighting aspects such as pharmacokinetics, pharmacodynamics, safety, reversibility, adverse effects, and recovery;
- Clinical studies, systematic or narrative reviews, and randomized controlled trials.

- Exclusion Criteria:

- Articles that exclusively address hospital or intensive care use, without focusing on outpatient procedures;
- Studies with animal or experimental models without direct clinical correlation;
- Works not available in full text;
- Isolated case reports without robust scientific basis.

THEORETICAL FOUNDATION

Sedation in outpatient procedures plays a fundamental role in modern medicine by promoting patient comfort, amnesia and cooperation, with rapid recovery and minimal hospital stay. Propofol, a widely used intravenous hypnotic agent, has a rapid onset of action and predictable recovery, characteristics that make it popular. However, its adverse effects, such as hypotension and respiratory depression, limit its use in vulnerable populations (MELO, 2020).

In recent years, remimazolam has been studied as an alternative to propofol. It is an ultra-short benzodiazepine with rapid hepatic metabolization by esterases, which allows safer control of sedation and reversibility with flumazenil. In addition, remimazolam has shown less cardiovascular and respiratory impact, making it an attractive option, especially in patients at higher clinical risk (FERREIRA, OLIVEIRA, NASCIMENTO, 2021).

In direct comparison, studies show that remimazolam has a superior safety profile to propofol in several parameters, including hemodynamic stability, lower desaturation rates, and less need for anesthetic intervention during procedures. Although the induction time of remimazolam may be slightly longer, the total recovery time and hospital discharge tends to be similar or even faster, due to the lower risk of adverse effects (SOUZA et al., 2022).

Another relevant aspect is the pharmacokinetic profile. While propofol has intense hepatic metabolism and can accumulate in cases of prolonged administration, remimazolam has a short sensitive context half-life and metabolism independent of liver function, which reduces the risks in patients with hepatic or renal impairment (ALMEIDA, 2021).

From a pharmacoeconomic point of view, although remimazolam has a higher cost than propofol, the reduction in intra- and post-procedural complications, in addition to the lower need for ventilatory support or prolonged hospitalization, may justify its use in certain clinical contexts (RAMOS, SOUZA, LOPES, 2022).

In addition, post-procedure cognitive effects have also been evaluated. Studies suggest that

patients sedated with remimazolam recover their cognitive functions faster than those sedated with propofol, which may be especially important in procedures in the elderly, or in high-turnover settings such as outpatient clinics (GOMES et al., 2023).

Thus, the pharmacological reversibility of remimazolam represents a clinical differential compared to propofol. While propofol does not have a specific antidote, remimazolam can be quickly reversed with flumazenil, which provides greater control of sedation and additional safety in unforeseen situations, such as adverse reactions or the need for abrupt interruption of the procedure (NASCIMENTO, 2022). This is especially relevant in procedures performed outside the operating room, where surveillance and resources may be limited.

In addition to hemodynamic and respiratory safety, remimazolam has demonstrated advantages in neurological recovery time. In a recent study, it was observed that patients sedated with remimazolam returned more quickly to cognitive baseline and had a lower incidence of postoperative delirium, when compared to the group sedated with propofol (CARVALHO, SOUSA, PEREIRA, 2023). This is especially relevant in the elderly and patients at risk of neurological impairment.

The tolerability profile is also a prominent aspect. Propofol, while effective, is often associated with injection site pain and a higher incidence of nausea and vomiting in the immediate postoperative period. In contrast, remimazolam has a lower incidence of these side effects, which contributes to greater acceptance and comfort by patients (MARTINS et al., 2021).

Another important point to be considered is the applicability of remimazolam in different clinical contexts. Its predictable pharmacokinetics and low inter-individual variability allow it to be used safely in pediatric, geriatric, and metabolically compromised patients, while propofol requires greater caution in such situations (RODRIGUES et al., 2020). Thus, remimazolam emerges as a versatile and promising tool in ambulatory anesthesiology.

CONCLUSION

The comparison between remimazolam and propofol in sedation for outpatient procedures shows significant advances in terms of safety, pharmacological control and patient recovery. Remimazolam, due to its more predictable pharmacokinetic profile, lower hemodynamic impact, and possibility of reversal with flumazenil, emerges as a promising alternative to propofol, especially in clinical contexts of higher risk or that require high turnover and rapid recovery.

Although propofol remains widely used and effective, its adverse effects, such as respiratory depression and hypotension, limit its application in certain groups of patients. On the other hand, remimazolam is advantageous because it provides effective sedation with a lower risk of complications and greater intraoperative stability.

With this, the choice of sedative agent must consider the patient's profile, the type of procedure and the available resources. The introduction of new options such as remimazolam expands the therapeutic possibilities in outpatient anesthesiology, contributing to safer, more comfortable procedures with accelerated recovery, meeting contemporary demands for efficiency and quality in perioperative care.

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