# Comparison of Ketamine-Dexmedetomidine and Ketamine-Propofol for Sedation of Pediatric Patients for MRI and CT scans

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## ABSTRACT

**Background:** Children often need sedation for MRI/CT to prevent motion artifacts and repeat scans. Ketamine– propofol may allow quicker onset and recovery but can cause hypotension or respiratory events, while ketamine– dexmedetomidine may provide steadier sedation with slower onset and longer recovery. This study aimed to compare KD versus KP for sedation success, image quality, safety, and recovery time in pediatric MRI/CT. **Methods & Materials:** This comparative study at Gazi Medical College, Khulna, from January to December 2019, enrolled 70 children undergoing MRI/CT sedation, allocated 1:1 to ketamine–dexmedetomidine (n=35) or ketamine–propofol (n=35). IV agents were titrated for immobility with rescue boluses allowed, standard monitoring was used, and outcomes assessed sedation success and timing, image quality and motion, adverse events and airway interventions, plus recovery and 24-hour events, with analyses in SPSS v26 ($p<0.05$). **Results:** Baseline characteristics were similar between KD and KP (N=70), and scan completion was high (98.6%). KP achieved faster sedation onset than KD (7.5 ± 2.4 vs 10.1 ± 2.8 min, $p<0.001$) and shorter recovery, time to arousable (11.6 ± 4.4 vs 18.2 ± 8.8 min, $p<0.001$) and discharge readiness (38.3 ± 16.7 vs 57.3 ± 17.3 min, $p<0.001$). Image quality was mostly excellent (68.6%) with few motion repeats (10%), adverse events and airway interventions were similar (51.4% each; 18.6%), while KP had a larger MAP reduction ($p=0.007$). **Conclusion:** Both KD and KP provided effective, generally safe sedation for pediatric MRI/CT with high scan completion and similar image quality; however, KP achieved faster sedation onset and significantly shorter recovery and discharge times, while KP showed a greater reduction in mean arterial pressure.

***Keywords:*** *Pediatric procedural sedation, Ketofol (ketamine–propofol), Ketamine–dexmedetomidine, MRI and CT imaging*

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## INTRODUCTION

Pediatric MRI and CT procedures require complete immobility in noisy, confined environments, which many children are unable to tolerate, resulting in motion artifacts. Consequently, sedation or anesthesia is frequently employed to prevent repeat scans, minimize delays, and ensure diagnostic quality, especially in younger patients. With the global increase in pediatric imaging volumes, there is a growing need for safe and efficient radiology sedation protocols that facilitate rapid recovery without compromising cardiorespiratory safety [1].

Even with modern monitoring, pediatric sedation continues to present risks. Common adverse events include vomiting, agitation, and hypoxia, while rare but significant complications such as laryngospasm and the need for airway intervention may still occur. The incidence of these events varies according to sedation regimen and patient characteristics [2]. Studies of imaging cohorts indicate that younger children have higher rates of adverse events, underscoring the importance of careful drug selection and standardized protocols [3]. In South Asian and other low- and middle-income country (LMIC) settings, limitations in staffing and monitoring, combined with high patient throughput, necessitate the use of sedation protocols that are stable, easily titrated, and adaptable to resource constraints [1].

Propofol is widely used for imaging due to its rapid onset and short duration of action; however, it is associated with dose-dependent airway obstruction, respiratory depression, and hypotension [1]. In contrast, ketamine preserves airway reflexes and provides analgesia, but may result in emergence reactions, hypersalivation, occasional laryngospasm, and prolonged recovery times [2]. The combination of these agents as ketofol is intended to reduce the required propofol dose while maintaining effective and stable sedation. This approach is supported by cohort studies and systematic reviews, with recent pediatric MRI data indicating a lower incidence of sedation-associated atelectasis compared to propofol alone [4–6].

Dexmedetomidine provides arousable sedation with minimal respiratory depression, but may cause bradycardia, hypotension, and slower onset when used alone [1,7]. A ketamine–dexmedetomidine regimen is therefore appealing because ketamine can offset dexmedetomidine-related cardiovascular effects, while dexmedetomidine can reduce ketamine-related agitation, potentially improving scan conditions and recovery; recent imaging studies report better sedation quality, fewer rescue doses, and stable hemodynamics, with ongoing prospective work refining dosing in young children [7–9].

Despite the increasing use of both combinations, direct and context-specific comparisons between ketamine-dexmedetomidine and ketamine-propofol for pediatric MRI and CT remain limited. In particular, there is a lack of comparative data regarding sedation success, motion-free image acquisition, recovery profiles, and adverse event patterns under real-world radiology workflow constraints [1,4,7]. Therefore, the study aims to compare ketamine- dexmedetomidine versus ketamine-propofol for sedation success, image quality, safety, and recovery time in pediatric MRI/CT in a tertiary care setting.

## METHODS & MATERIALS

This prospective, comparative study was conducted in the Department of Anesthesiology at Gazi Medical College, Khulna, Bangladesh, from January to December 2019. Seventy pediatric patients (0–12 years) scheduled for elective MRI or CT imaging with procedural sedation were enrolled. Inclusion criteria were clinical stability and ASA physical status I–III. Exclusion criteria included known hypersensitivity to ketamine, dexmedetomidine, or propofol; ASA IV or higher; baseline hemodynamic instability; anticipated difficult airway or major airway anomaly; and severe obstructive sleep apnea or significant uncontrolled respiratory conditions.

Participants were allocated into two equal groups (n=35 each) according to the regimen received: ketamine–dexmedetomidine (KD) or ketamine–propofol (KP). Sedation was administered intravenously after cannulation, with ketamine as the base agent and either dexmedetomidine (KD) or propofol (KP) as the adjunct. Additional bolus doses were given if sedation was inadequate or if patient movement affected imaging quality. Pre-sedation assessments included age, sex, weight, ASA class, scan type and indication, recent upper respiratory tract infection, comorbidities, prior sedation history, and fasting duration for solids. Standard monitoring was maintained throughout, including continuous pulse oximetry, noninvasive blood pressure, and heart rate recording. End-tidal $CO_2$ monitoring was used when available. Supplemental oxygen was provided as needed. Primary efficacy outcomes included successful scan completion and time to achieve adequate sedation. Imaging quality, motion- related repeat sequences, and the need for rescue sedation were also recorded. Safety outcomes included changes in maximum heart rate and mean arterial pressure from baseline, lowest $SpO_2$, adverse events, and airway interventions. Recovery outcomes included time to arousable state, time to meet discharge criteria, prolonged recovery beyond 60 minutes, and delayed events within 24 hours.

All data were analyzed using SPSS (V-26.0). Continuous variables were summarized as mean ± SD or median (IQR) and compared between groups using independent-samples tests. Categorical variables were compared using chi-square or Fisher's exact tests. A two-sided p-value less than 0.05 was considered statistically significant.

## RESULTS

The two groups were well matched, with no meaningful baseline imbalance, mean age was 56.3 ± 25.2 months in both groups, males were 62.9% overall, most children were ASA I–II (90.0%), MRI was more common than CT (64.3% vs 35.7%), and key clinical factors like recent URTI (14.3%), comorbidity (30.0%), prior sedation (20.0%), and fasting time were similar between KD and KP (all $p > 0.05$) (*Table I*).

**Table I**

Baseline demographic and clinical characteristics of pediatric patients by study group (KD vs KP).

| Variable | Category | Total (N=70) n (%) | KD (n=35) n (%) | KP (n=35) n (%) | p value |
|---|---|---|---|---|---|
| Age group (in months) | 0–12 | 4 (5.7) | 2 (5.7) | 2 (5.7) | 0.99 |
| | 13–36 | 11 (15.7) | 6 (17.1) | 5 (14.3) | |
| | 37–72 | 37 (52.9) | 18 (51.4) | 19 (54.3) | |
| | >72 | 18 (25.7) | 9 (25.7) | 9 (25.7) | |
| | Mean ± SD | 56.3 ± 25.2 | 56.3 ± 26.1 | 56.3 ± 24.5 | 0.996 |
| Sex | Male | 44 (62.9) | 21 (60.0) | 23 (65.7) | 0.805 |
| | Female | 26 (37.1) | 14 (40.0) | 12 (34.3) | |
| Weight (kg), mean ± SD | | 16.3 ± 5.5 | 16.5 ± 5.9 | 16.1 ± 5.1 | 0.926 |
| ASA class | ASA I | 38 (54.3) | 22 (62.9) | 16 (45.7) | 0.356 |
| | ASA II | 25 (35.7) | 10 (28.6) | 15 (42.9) | |
| | ASA III | 7 (10.0) | 3 (8.6) | 4 (11.4) | |
| Scan type | MRI | 45 (64.3) | 21 (60.0) | 24 (68.6) | 0.458 |
| | CT | 25 (35.7) | 14 (40.0) | 11 (31.4) | |
| Recent URTI | | 10 (14.3) | 5 (14.3) | 5 (14.3) | 1 |
| Comorbidity present | | 21 (30.0) | 10 (28.6) | 11 (31.4) | 0.804 |
| Prior sedation history | | 14 (20.0) | 7 (20.0) | 7 (20.0) | 1 |
| Fasting time-solids (h), Median (IQR) | | 8.5 (7.3–9.5) | 8.4 (7.4–9.8) | 8.5 (7.3–9.5) | 0.989 |

Scan context and sedation delivery were comparable, mean scan duration was about 21 minutes, IV access succeeded on first attempt in 81.4%, oxygen was used in 81.4%, $EtCO_2$ monitoring was available in only 22.9%, ketamine dose was similar in both groups (1.6 ± 0.4 mg/kg), and while KD showed a higher proportion needing additional bolus dosing than KP (20.0% vs 5.7%), this difference was not statistically significant ($p = 0.114$) (*Table II*).

**Table II**

Scan characteristics, procedural variables, and sedative dosing parameters, overall and by study group (KD vs KP).

| Variable | Category | Total (N=70) n (%) | KD (n=35) n (%) | KP (n=35) n (%) | p value |
|---|---|---|---|---|---|
| Indication category | Neurological | 43 (61.4) | 22 (62.9) | 21 (60.0) | 0.65 |
| | Respiratory | 7 (10.0) | 2 (5.7) | 5 (14.3) | |
| | Abdominal | 8 (11.4) | 4 (11.4) | 4 (11.4) | |
| | Other | 12 (17.1) | 7 (20.0) | 5 (14.3) | |
| Scan duration (minutes) | Mean ± SD | 20.6 ± 11.0 | 20.3 ± 12.0 | 20.9 ± 10.0 | 0.821 |
| IV access at first attempt | | 57 (81.4) | 29 (82.9) | 28 (80.0) | 0.758 |
| Oxygen administered | | 57 (81.4) | 27 (77.1) | 30 (85.7) | 0.345 |
| $EtCO_2$ monitoring available | | 16 (22.9) | 7 (20.0) | 9 (25.7) | 0.567 |
| Total ketamine dose (mg/kg) | Mean ± SD | 1.6 ± 0.4 | 1.6 ± 0.4 | 1.6 ± 0.4 | 0.588 |
| Total dexmedetomidine dose (mcg/kg) | Mean ± SD | NA | 0.8 ± 0.2 | NA | NA |
| Total propofol dose (mg/kg) | Mean ± SD | NA | NA | 2.2 ± 0.7 | NA |
| Additional bolus required | | 9 (12.9) | 7 (20.0) | 2 (5.7) | 0.114 |
| Number of additional boluses | Mean ± SD | 0.13 ± 0.33 | 0.20 ± 0.40 | 0.06 ± 0.23 | 0.106 |

Both regimens achieved very high procedural success, scans were completed in 98.6% overall (97.1% KD vs 100% KP), but KP produced faster onset of adequate sedation than KD (7.5 ± 2.4 vs 10.1 ± 2.8 minutes, $p < 0.001$); motion-related repeat sequences were uncommon (10.0%), image quality was mostly excellent (68.6%), and rescue sedation was numerically higher in KD (20.0% vs 5.7%) without statistical significance ($p = 0.114$) (*Table III*).

**Table III**
Sedation efficacy and imaging outcomes in MRI or CT scans, overall and by study group (KD vs KP).

| Outcome | Category | Total (N=70) | KD (n=35) | KP (n=35) | p value |
|---|---|---|---|---|---|
| | | n (%) | n (%) | n (%) | |
| Successful completion of scan | Mean ± SD | 69 (98.6) | 34 (97.1) | 35 (100.0) | 1 |
| Time to adequate sedation (minutes) | Mean ± SD | 8.8 ± 2.9 | 10.1 ± 2.8 | 7.5 ± 2.4 | <0.001 |
| Repeat sequences due to motion | | 7 (10.0) | 4 (11.4) | 3 (8.6) | 1 |
| Image quality distribution | Excellent | 48 (68.6) | 23 (65.7) | 25 (71.4) | 0.568 |
| | Acceptable | 21 (30.0) | 11 (31.4) | 10 (28.6) | |
| Need for rescue sedation | | 9 (12.9) | 7 (20.0) | 2 (5.7) | 0.114 |

The key difference was blood pressure behavior, KP had a larger fall in MAP from baseline than KD (−9.0 ± 8.7 vs −3.3 ± 8.5, $p = 0.007$), heart rate changes were small and borderline different ($p = 0.059$), and overall oxygenation remained stable with similar lowest $SpO_2$ values between groups (around 95%, $p = 0.552$) (*Table IV*).

**Table IV**
Hemodynamic and oxygenation changes during the scan, overall and by study group (KD vs KP).

| Parameter | Mean ± SD | Mean ± SD | Mean ± SD | p value |
|---|---|---|---|---|
| Maximum HR change from baseline | -4.2 ± 9.6 | -6.4 ± 9.0 | -2.0 ± 9.9 | 0.059 |
| Maximum MAP change from baseline | -6.2 ± 9.0 | -3.3 ± 8.5 | -9.0 ± 8.7 | 0.007 |
| Lowest $SpO_2$ during scan | 94.8 ± 2.6 | 95.0 ± 2.3 | 94.6 ± 2.9 | 0.552 |

Safety signals were broadly similar, any adverse event occurred in about half of cases in both groups (51.4% each), desaturation was the most frequent event (18.6% overall), serious events were rare (laryngospasm 1.4%, bag-mask ventilation 2.9%), and airway interventions were needed in 18.6% overall with no significant between-group differences for individual events or interventions (all $p > 0.05$) (*Table V*).

**Table V**
Adverse events and airway interventions during sedation for MRI or CT, overall and by study group (KD vs KP).

| Event or intervention | Total (N=70) | KD (n=35) | KP (n=35) | p value |
|---|---|---|---|---|
| | n (%) | n (%) | n (%) | |
| Any adverse event | 36 (51.4) | 18 (51.4) | 18 (51.4) | 1 |
| Desaturation episode | 13 (18.6) | 5 (14.3) | 8 (22.9) | 0.539 |
| Apnea | 4 (5.7) | 1 (2.9) | 3 (8.6) | 0.614 |
| Airway obstruction | 3 (4.3) | 0 (0.0) | 3 (8.6) | 0.239 |
| Laryngospasm | 1 (1.4) | 1 (2.9) | 0 (0.0) | 1 |
| Hypotension | 6 (8.6) | 1 (2.9) | 5 (14.3) | 0.198 |
| Bradycardia | 5 (7.1) | 4 (11.4) | 1 (2.9) | 0.356 |
| Vomiting | 4 (5.7) | 3 (8.6) | 1 (2.9) | 0.614 |
| Excess salivation | 8 (11.4) | 5 (14.3) | 3 (8.6) | 0.71 |
| Emergence agitation | 3 (4.3) | 3 (8.6) | 0 (0.0) | 0.239 |
| Any airway intervention | 13 (18.6) | 6 (17.1) | 7 (20.0) | 0.758 |
| Repositioning only | 9 (12.9) | 3 (8.6) | 6 (17.1) | 0.478 |
| Suction | 6 (8.6) | 2 (5.7) | 4 (11.4) | 0.673 |
| Bag mask ventilation | 2 (2.9) | 1 (2.9) | 1 (2.9) | 1 |

Recovery was clearly faster with KP, time to arousable was shorter (11.6 ± 4.4 vs 18.2 ± 8.8 minutes, $p < 0.001$) and time to discharge criteria was also shorter (38.3 ± 16.7 vs 57.3 ± 17.3 minutes, $p < 0.001$); prolonged recovery beyond 60 minutes was more common with KD (34.3% vs 14.3%), though not statistically significant ($p = 0.094$), and vomiting or delayed events within 24 hours were uncommon in both groups (*Table VI*).

**Table VI**
Recovery profile and post-sedation outcomes, overall and by study group (KD vs KP).

| Recovery outcome | Total (N=70) | KD (n=35) | KP (n=35) | p value |
|---|---|---|---|---|
| | Mean ± SD | Mean ± SD | Mean ± SD | |
| Time to arousable (minutes) | 14.9 ± 7.7 | 18.2 ± 8.8 | 11.6 ± 4.4 | <0.001 |
| Time to discharge criteria met (minutes) | 47.8 ± 19.4 | 57.3 ± 17.3 | 38.3 ± 16.7 | <0.001 |
| Prolonged recovery >60 min, n (%) | 17 (24.3) | 12 (34.3) | 5 (14.3) | 0.094 |
| Vomiting in recovery, n (%) | 1 (1.4) | 0 (0.0) | 1 (2.9) | 1 |
| Delayed event within 24 h, n (%) | 5 (7.1) | 1 (2.9) | 4 (11.4) | 0.356 |

## DISCUSSION

This comparative study of children undergoing MRI or CT with ketamine-based sedation found that both ketamine-dexmedetomidine (KD) and ketamine-propofol (KP) regimens achieved high procedural success, comparable image quality, and low rates of major airway rescue. However, their time profiles differed; KP was associated with more rapid achievement of adequate sedation and faster recovery to discharge readiness, while KD demonstrated slower onset and prolonged recovery. These findings are consistent with the established trade-off in pediatric procedural sedation literature, where propofol-containing regimens typically enable rapid onset and throughput, whereas dexmedetomidine-containing regimens offer a smoother sedation course but often extend recovery time [11-13].

The near-universal scan completion rate observed in this cohort (98.6%) aligns with existing evidence that both KD and KP reliably support pediatric procedures across various clinical settings [11]. Additionally, ketamine–propofol strategies have been shown to maintain scan quality and facilitate relatively rapid emergence and discharge, reinforcing the operational advantages of KP in radiology environments [6,14].

The shorter time to adequate sedation and recovery observed with KP is consistent with previous comparative studies. For example, a randomized MRI sedation study following ketamine premedication found that propofol resulted in shorter recovery times, whereas dexmedetomidine required fewer interventions but prolonged awakening [13]. The present findings show this recovery difference, and a meta-analysis comparing ketadex and ketofol reported longer recovery with ketadex, despite similar efficacy and no significant increase in hypotension or bradycardia events compared to ketofol [11]. A comparable recovery advantage for propofol–ketamine over dexmedetomidine–ketamine has also been demonstrated in randomized pediatric endoscopy sedation studies [15]. In clinical practice, prolonged recovery may contribute to post-anesthesia care unit (PACU) congestion and reduced scanner turnover, particularly in settings with limited recovery capacity.

Hemodynamic responses observed in this cohort also inform regimen selection. KP was associated with a greater reduction in mean arterial pressure (MAP), while heart rate changes were minimal and not significantly different between groups. This finding is consistent with propofol-induced vasodilation and hypotension, which ketamine may only partially mitigate, as reported in pediatric MRI sedation studies comparing dexmedetomidine- and propofol-based regimens [6,16]. However, dexmedetomidine is not hemodynamically neutral; bradycardia and hypotension are recognized adverse effects, and the overall hemodynamic profile likely depends on dosing and titration strategies [7].

Respiratory and airway safety outcomes were broadly comparable between groups, with similar rates of desaturation and airway interventions and very few serious events. This observation is consistent with pooled evidence indicating that both ketadex and ketofol possess acceptable safety profiles, although some analyses suggest a lower risk of respiratory depression with ketadex, offset by longer recovery times [11]. Reviews of ketofol also highlight that adverse event rates may vary depending on the routine use of capnography and the classification of minor airway maneuvers as events [12]. In this cohort, $EtCO_2$ monitoring was available in only a minority of cases, which may have influenced event detection and underscores a modifiable quality gap.

These results are consistent with pediatric MRI studies that explore strategies to optimize dexmedetomidine use. Intranasal dexmedetomidine has been demonstrated to be feasible as MRI premedication, although its onset is often slower than propofol-dominant approaches, which aligns with the delayed onset observed in KD [17]. Conversely, a randomized trial incorporating a small dexmedetomidine premedication dose into ketofol reported improved sedation quality and hemodynamic stability without prolonging recovery [8].

## LIMITATIONS

This single-center study included a small sample size, which limited the statistical power to detect uncommon adverse events and perform subgroup analyses. Although sedation was titrated according to protocol, variability in sedation depth and provider technique may have occurred. Additionally, limited capnography availability may have resulted in under-detection of hypoventilation or apnea during scanning.

## CONCLUSION

Both ketamine–dexmedetomidine and ketamine–propofol regimens provided effective and generally safe sedation for pediatric MRI and CT procedures, resulting in high scan completion rates and comparable image quality. However, ketamine–propofol was associated with a more rapid onset of sedation and significantly faster recovery and discharge readiness. In contrast, ketamine–dexmedetomidine produced a greater reduction in mean arterial pressure.

## RECOMMENDATIONS

For pediatric MRI or CT sedation, ketamine–propofol is preferable when rapid onset, expedited recovery, and faster discharge are prioritized. In contrast, ketamine–dexmedetomidine may be selected when minimizing reductions in mean arterial pressure is essential. Regardless of the regimen, a standardized titration protocol and routine capnography should be implemented where feasible.

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## CONFLICT OF INTEREST

None declared

## REFERENCES

1. Jung SM. Drug selection for sedation and general anesthesia in children undergoing ambulatory magnetic resonance imaging. Yeungnam University Journal of Medicine. 2020 Jul 31;37(3):159-68.
2. Bellolio MF, Puls HA, Anderson JL, Gilani WI, Murad MH, Barrionuevo P, Erwin PJ, Wang Z, Hess EP. Incidence of adverse events in paediatric procedural sedation in the emergency department: a systematic review and meta-analysis. BMJ open. 2016 Jun 1;6(6):e011384.
3. Nong X, Lu Y, Jiang W, Qin Y, Jing S, Chi T, Peng W, Liu S, Lin Y. Age-related characteristics of sedation in pediatric patients and their correlated adverse events: a cohort study. Frontiers in Pediatrics. 2024 Dec 16;12:1475891.
4. Grunwell JR, Travers C, Stormorken AG, Scherrer PD, Chumpitazi CE, Stockwell JA, Roback MG, Cravero J, Kamat PP. Pediatric procedural sedation using the combination of ketamine and propofol outside of the emergency department: a report from the Pediatric Sedation Research Consortium. Pediatric critical care medicine. 2017 Aug 1;18(8):e356-63.
5. Choi EJ, Kim CH, Yoon JY, Kim EJ. Ketamine-propofol (ketofol) in procedural sedation: a narrative review. Journal of dental anesthesia and pain medicine. 2023 May 26;23(3):123.
6. Bang YJ, Kim J, Gil NS, Sim WS, Ahn HJ, Park MH, Lee SM, Kim DJ, Jeong JS. Pulmonary atelectasis after sedation with propofol vs propofol-ketamine for magnetic resonance imaging in children: a randomized clinical trial. JAMA Network Open. 2024 Nov 1;7(11):e2433029.
7. Angelopoulou VA, Pouliakis A, Alexiou N, Ioannidi P, Vagiona D, Ekmektzoglou K, Xanthos T, Boutsikou T, Iliodromiti Z, Iacovidou N. The effects of dexmedetomidine on children undergoing magnetic resonance imaging: a systematic review and meta-analysis. Children. 2023 May 26;10(6):948.
8. Chakravarty R, Goyal N, Kumar R, Mohammed S, Kamal M, Chhabra S, Bhatia P. Comparison of effects of dexmedetomidine with ketofol and ketofol alone on quality of sedation in pediatric patients undergoing magnetic resonance imaging: A prospective randomized

controlled double-blind trial. Saudi Journal of Anaesthesia. 2024 Oct 1;18(4):521-7.
9. Xie H, Zhao J, Tu H, Wang W, Hu Y. Combined sedation in pediatric magnetic resonance imaging: determination of median effective dose of intranasal dexmedetomidine combined with oral midazolam. BMC anesthesiology. 2024 Mar 23;24(1):112.
10. Zhou Q, Shen L, Zhang X, Li J, Tang Y. Dexmedetomidine versus propofol on the sedation of pediatric patients during magnetic resonance imaging (MRI) scanning: a meta-analysis of current studies. Oncotarget. 2017 Nov 1;8(60):102468.
11. Gao PF, Li SY, Li Y, Zhao L, Luo Q, Ji Y. The comparison of ketamine-dexmedetomidine (ketadex) and ketamine-propofol (ketofol) for procedural sedation in pediatric patients: A meta-analysis of randomized controlled trials. Heliyon. 2022 Oct 1;8(10).
12. Foo TY, Mohd Noor N, Yazid MB, Fauzi MH, Abdull Wahab SF, Ahmad MZ. Ketamine-propofol (Ketofol) for procedural sedation and analgesia in children: a systematic review and meta-analysis. BMC Emergency Medicine. 2020 Oct 8;20(1):81.
13. Brzózka VM, Piotrowski AJ. Prospective, randomised comparison of two intravenous sedation methods for magnetic resonance imaging in children. Anaesthesiology Intensive Therapy. 2023 Jun 30;55(2):81-6.
14. Sethi D, Gupta M, Subramanian S. A randomized trial evaluating low doses of propofol infusion after intravenous ketamine for ambulatory pediatric magnetic resonance imaging. Saudi Journal of Anaesthesia. 2014 Oct 1;8(4):510-6.
15. Amer AM, Youssef AM, El-Ozairy HS, El-Hennawy AM. Propofol-cetamina versus dexmedetomidina-cetamina para sedação durante endoscopia digestiva alta em pacientes pediátricos: estudo clínico randomizado. Revista Brasileira de Anestesiologia. 2020;70:620-6.
16. Abdellatif AA, Samara L, Mohamed A, Al-Ali A, Erbad A, Guizani M. Compress or Interfere?. In2019 16th Annual IEEE International Conference on Sensing, Communication, and Networking (SECON) 2019 Jun 10 (pp. 1-6). IEEE.
17. Gyanesh P, Haldar R, Srivastava D, Agrawal PM, Tiwari AK, Singh PK. Comparison between intranasal dexmedetomidine and intranasal ketamine as premedication for procedural sedation in children undergoing MRI: a double-blind, randomized, placebo-controlled trial. Journal of anesthesia. 2014 Feb;28(1):12-8.