Study Protocol

Official Title: Comparison of Total Intravenous Anesthesia Methods in Patients Undergoing Neuromonitoring
NCT Number: Pending
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Study Design and Methods

Data from a total of 72 patients were collected. All patients included in the study were informed about the procedure, and their consent was obtained preoperatively.

Routine Anesthesia Management:
The routine anesthesia management administered by the neuroanesthesia team included premedication with midazolam at a dose of 0.02–0.04 mg/kg, standard anesthesia monitoring (pulse oximetry, non-invasive blood pressure, and electrocardiography), BIS monitoring (Medtronic COVIDIEN BIS™ Monitor), and preoxygenation. Anesthesia induction was performed using lidocaine (1 mg/kg bolus), remifentanil (1 μg/kg), propofol (2 mg/kg), and rocuronium (0.6 mg/kg). Invasive blood pressure monitoring and neuromonitoring were applied to all patients.
For patients positioned prone, anesthesia maintenance was achieved with classical TIVA (50% oxygen-air mixture, propofol, and remifentanil infusions) or multimodal TIVA protocols incorporating ketamine, lidocaine, or dexmedetomidine, as determined by the anesthesiologist. Propofol and remifentanil infusion rates were adjusted to maintain a BIS score between 40 and 60 throughout the surgery.
Post-induction, 0.1 mg/kg morphine HCL and 1 mg/kg methylprednisolone were administered for postoperative pain management, and 4 mg ondansetron was given at the end of surgery.

Multimodal Drug Protocols:
Intraoperative infusions were administered at fixed doses: lidocaine (1.2 mg/kg/h), ketamine (5 mcg/kg/min), and dexmedetomidine (0.2 mcg/kg/h).

Monitored Parameters:

- **Demographic and Clinical Data:** Age, gender, weight, comorbidities, ASA classification, surgery duration, and the number of stabilization levels were recorded.
- **Intraoperative Monitoring:** Blood pressure, heart rate, BIS values, and cardiac events (bradycardia/tachycardia, arrhythmia, hypotension/hypertension) were documented at baseline and at 30, 60, 120, and 180 minutes post-induction. The total doses of propofol, remifentanil, and other drugs used were noted at the end of surgery. Additionally, adverse events such as laryngospasm, bronchospasm, muscle rigidity, agitation, or shivering were recorded post-extubation.
- **Postoperative Monitoring:** Hemodynamic parameters (blood pressure, heart rate), nausea/vomiting occurrence, and Ramsey sedation scores were recorded at 30 minutes, 2, 6, 12, and 24 hours postoperatively (Table 1). If nausea/vomiting occurred, the administered treatment was documented. Pain intensity was evaluated using the

Visual Analog Scale (VAS, 0 = no pain, 10 = worst pain) (Figure 1). Total drug usage over 24 hours postoperatively was calculated as morphine equivalents (Table 2).

Table.1 Ramsey Sedation Scala	
Score	**Clinical Condition**
1	Awake, anxious, agitated, or restless
2	Awake, cooperative, oriented, and calm
3	Responds to verbal commands
4	Asleep, but responds quickly to light glabellar tapping
5	Asleep, responds slowly to verbal or physical stimuli
6	No response to painful stimuli

Recovery and Follow-Up Parameters:

- The first oral intake time, time to first bowel movement, time to first ambulation, and length of hospital stay were recorded. Gastrointestinal recovery was defined as the first time the patient reported passing gas or having a bowel movement. Hospital stay was calculated from the time the patient left the operating room to discharge.
- Patients were monitored for drug-related side effects (e.g., perioral numbness, tingling, dizziness, tinnitus, diplopia, seizures, arrhythmia, extremity numbness, muscle twitching, color perception changes, blurred vision, hallucinations).
- On postoperative day 30, patients were contacted via telephone to assess opioid requirements after discharge.

Table 2. Opioid Rotation Doses			
Drug	**Route of Administration**	**Unit**	**Dose**
Morphine	IV/IM/SC	mg	10
Meperidine	IV	mg	75
Tramadol	IV	mg	100

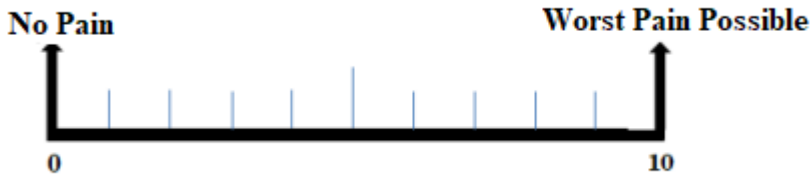

Figure 1. Visual Analog Scale for Pain

Sample Size:
Based on previous studies, a power analysis determined that 24 patients per group were needed to detect a 10 mm difference in VAS pain scores with a two-tailed $\alpha = 0.05$ and 80% power.