

Target controlled infusion (TCI) method with Propofol used in day-case patients in oral surgery

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Summary

Objective. One of our objectives was to establish the optimum “target” concentration (Ct) of Propofol required, for which there are no current guidelines, and which will improve the quality of sedoanalgesia by using TCI method, as a possible forthcoming standard.

Method. The present prospective randomised study is an assesment of a new technique of administration of Propofol using TCI (Target Controlled infusion) by means of Fresenius Vial Medical infusion device (Germany) upgraded with Master TCI containing the “Diprifusor” software (Astra Zeneca Pharmaceuticals, USA) in sedoanalgesia for day-case patients undergoing different types of oral surgery operations.

Results. Sedoanalgesia with Propofol administered using TCI method, ensures the calm and relaxation of the patient without complete loss of conscience, with smooth and rapid onset of the sedation and rapid recovery.

Conclusion. The administration of Propofol with TCI method allows an easy control of the level of sedation. The rapid recovery makes this method suitable and safe for one-day surgery practice.

Key words: target controlled infusion, TCI, sedoanalgesia, oral surgery.

Introduction

Intravenous sedation is becoming more common in oral surgery and dental practice. It is particularly useful for patients with a high level of anxiety, who have a phobia of local analgesia or dentistry in general. In the present study we intended the following:

- assesment of target controlled infusion (TCI) technique in sedoanalgesia used for day-case patients in oral surgery;
- to determine the optimum range of target blood propofol concentration settings required when “Diprifusor” TCI systems are used to administer propofol for sedation in this type of surgical operations.

Material and method

The study was prospective, non-comparative, randomised and included 25 patients, aged between 15-70 years, operator risk cathegory ASA I-II.

The sedation level intended was 3-4 on the Observer’s Assessment Of Alertness/ Sedation Scale (OAA/S) (*Table 1*), maintaining the arterial oxigenation (SaO₂), greater than 90% [1].

We combined the injection of local anesthetic with sedoanalgesia with Propofol administered by TCI (target controlled infusion) technique which was performed by

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Table 1. Observer's Assessment Of Alertness/Sedation Scale (OAA/S)

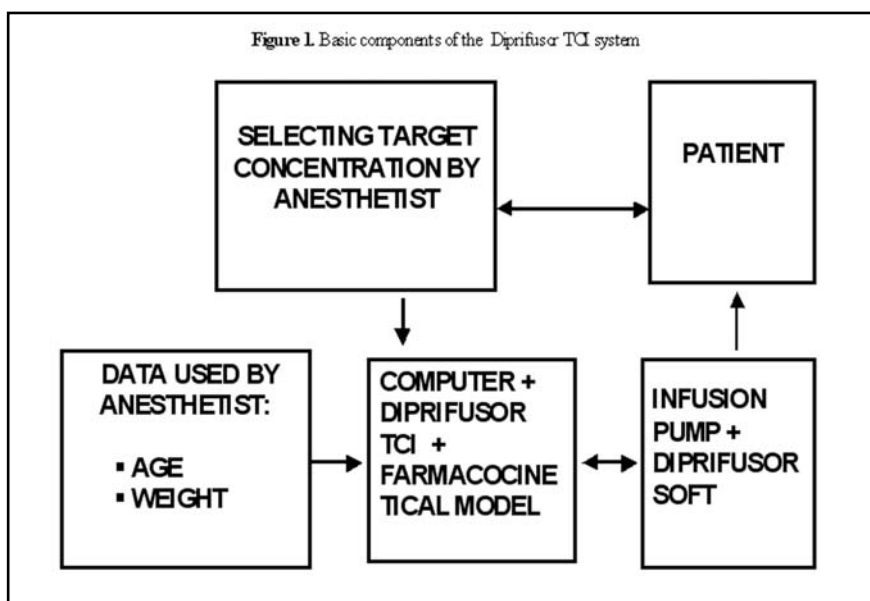
RESPONSE	SPEECH	FACIAL EXPRESSION	EYES	SCORE
Responds readily to name spoken in normal tone	Normal	Normal	No ptosis	5 (alert)
Lethargic response to name in normal tone	Mild slowing or thickening	Mild relaxation	Glazed or mild ptosis (less than half the eye)	4
Responds only after name is called loudly <u>Repeatedly</u>	Slurring or prominent slowing	Marked relaxation (slack jaw)	Glazed and marked ptosis (half of the eye or more)	3
Responds only after mild prodding or shaking	Few recognizable words	-	-	2
Does not respond to mild shaking	-	-	-	1 (asleep)

using *Fresenius Vial Medical* infusion device, upgraded with *Master TCI*, containing the „Diprifusor” software.

Objectives: 1. behavioral (improvement of patients comfort by anxiolysis, amnesia, maintaining verbal communication and cooperation with the patient-sedoanalgesia) [2].

2. physiological: decreasing sympathetic activity, decreasing muscular tone.

Target controlled infusion technique enables the anesthetist to maintain a level of adequate sedation by entering 2 parameters (age and weight) into the microcomputer which runs the “Diprifusor” soft (*Figure 1*), and by selecting the “target concentration” of the plasma level of Propofol. The output in the incorporated computer, in turn, adjusts the infusion rate in real time to obtain the set Ct [3,4].



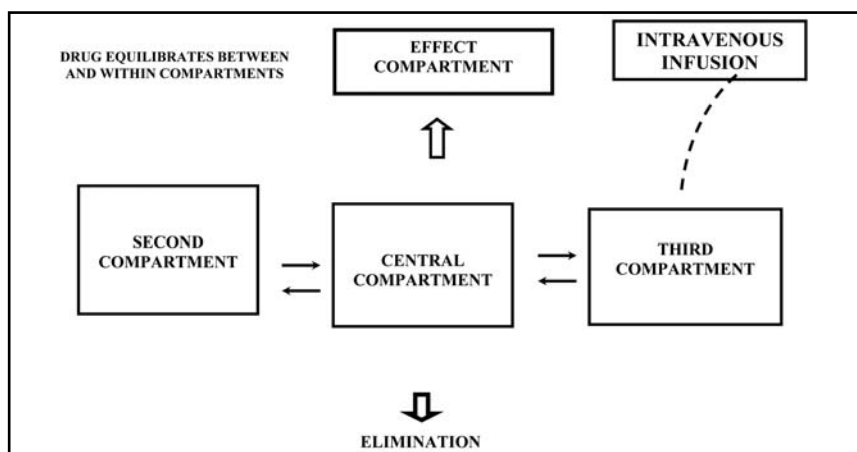


Figure 2. Pharmacokinetic properties of Propofol: three-compartment model

Propofol has unusual pharmacokinetics because of its high lipid solubility [5,6]. The standard approach to describing the pharmacokinetics of propofol is by a multi-compartmental model (*Figure 2*) [7,8].

The advantages of using Propofol: rapid onset of sedation, rapid recovery, lower incidence of postoperative nausea and vomiting. It can be used in patients susceptible of malignant hyperthermia.

Results

The results are summarised in *Figure 3* and *Table 2*.

Discussions

The surgical operations performed were: apicectomy (6 cases), odontectomy (6

cases), alveoloplasty extraction (3 cases), alveolar process plasty (3 cases), cystectomy (4 cases), periapical curettage (3 cases).

We monitored the following parameters pre- and postoperatorily: blood systolic pressure, arterial oxygenation (SaO_2), and patient's reaction during topical anesthesia, Ct ("target" plasmatic concentration of Propofol).

The target concentrations used for achieving the behavioral and physiological objectives of the sedoanalgesia mentioned above were correlated with the OASS score.

As we can see, there is a large variability within the same group of patients, which achieved a certain level of sedation on the OASS scale. It seems rough that a certain Ct selected has to be adjusted within the limits

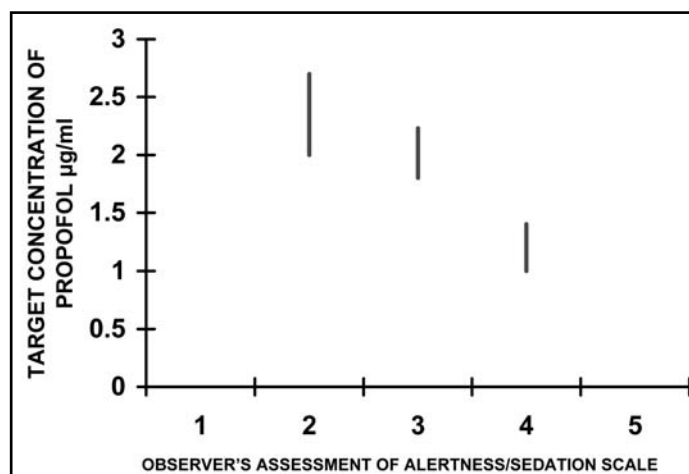


Figure 3. Correlation between OAA/S and Ct obtained

Table 2. Correlation between OAA/S and Ct obtained

OAS/S	1	2	3	4	5
CT (TARGET)	—	2.25±0.475	1.69±0.51	1.4±0.4	—

of plus/minus 0.5 µg/ml to meet the specific requirements of each patient, due to the individual pharmacokinetics of Propofol. Furthermore, with prolonged proceedings there can be observed variations of the Ct needed to maintain a specific effect in the same person, as different from the acute tolerance syndrome [9].

Best status for this type of operations seem to be level 3 and 4 on the OASS scale, which maintain an adequate oxygenation and a certain level of patient's cooperation [10].

Conclusions

Optimum target concentration (Ct) of Propofol range was [1.4-1.7 µg/ml] and correlates with appropriate sedation level (3-4 OAA/S) for this type of surgical interventions.

There were no such adverse reactions such as postoperative nausea and vomiting

(PONV).

Postoperative questionnaires revealed a high percentage of patient satisfaction (96%).

Sedation with propofol administered using TCI method, ensures the calm and relaxation of the patient without complete loss of conscience, with smooth and rapid onset of the sedation and rapid recovery.

The administration of Propofol by TCI method allows easy control of the level of sedation.

The rapid recovery makes this method suitable and safe for one-day surgery practice.

The continuous adjustment of the Ct by the anesthetist according to the clinical response is mandatory since, within certain limits, there is quite a large pharmacokinetic variability among patients [6,10].

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