

STANDARDIZATION OF ANESTHESIA WITH PENTOBARBITAL IN THE SNAKE *BOTHROPS JARARACA**

Ana Marisa CHUDZINSKI**
Marília C.L. SEELAENDER**
Eva M.A. KELEN**

ABSTRACT: A standardized surgical anesthesia was established for *Bothrops jararaca* snakes injected subcutaneously with 30 mg/kg of pentobarbital (*Nembutal*). Induction times ranged between 30 to 40 minutes for 63 of the 79 injected snakes (79,7%).

These uniform results are different from those obtained with intrapleuroperitoneal injections (17 snakes), currently used.

KEY WORDS: Subcutaneous anesthesia, anesthesia in snakes with pentobarbital, *Bothrops jararaca* anesthesia.

INTRODUCTION

A standardization of anesthesia during experiments with the Crotalidae snake *Bothrops jararaca* was required for surgical procedures. A long-lasting, stable state of anesthesia and a fast induction time were needed.

Inconstant results are reported for anesthesia after intrapleuroperitoneal (IPP) or intramuscular (IM) injections of pentobarbital in different snakes^{1,2}. Karlstrom and Cook⁵ suggested that results suffer the influence of factors as size, individual physiology, condition of the snake at the time of injection, room temperature, site of injection and degree of handling of the animal.

The subcutaneous (SC) route for pentobarbital administration has not been reported routinely, although it has been used for anesthesia with an ultrashort-acting barbiturate, Brevital Sodium⁶ and with Ketamine Hydrochloride⁴. The SC injection of Brevital Sodium lead to a short induction time and a short-lasting anesthesia, which allowed surgical procedures

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**Seção de Fisiopatologia Experimental. Instituto Butantan.

Correspondente to: Dr. Eva M.A. Kelen.

Instituto Butantan — C.P. 65 — 01051 — São Paulo-SP, Brasil.

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when 15 mg/kg body weight were administered in *Thamnophis sirtalis* and *Natrix sipedon sipedon*⁶.

The efficiency of the subcutaneous administration of pentobarbital for the anesthesia of *Bothrops jararaca* snakes is here reported.

MATERIAL AND METHODS

The anesthetic employed was Sodium Pentobarbital (*Nembutal*, Abbott Laboratories) as a 5% solution prepared from capsules containing 100mg. The salt was dissolved in distilled water with the help of a magnetic stirrer and stored at 4°C after centrifugation. *Bothrops jararaca* snakes, 42 males (70 to 400g, mean of 154g) and 54 females (90 to 655g, mean of 260g), received each, an optimal dose which was standardized for these snakes as 30mg/kg body weight, either subcutaneously or intrapleuroperitoneally. The administration of the anesthetic was performed while an operator immobilized the snake by holding head and tail, and a second operator made the injection. IPP injections (17 snakes) were made ventrally, into the distal third of the body, avoiding the pericardial region. The SC injections (79 snakes) were made at the junction of ventral and dorsal scales, approximately at 10cm below the heart. The presence of a gap, felt with the needle, indicates the space between skin and muscle to be injected.

Three main stages of anesthesia were arbitrarily established:

I-Sedation: slow movements as response to pressure of the tail with a hook. Presence of righting reflex. Normal size pupils, easily distinguished in the light brown colored eyes of this snake.

II-Partial anesthesia: incapacity of promoting serpentine movements. Loss of righting reflex. Tail-withdrawal reflex on pressure still present. Semi-contracted pupils.

III-Deep anesthesia: loss of tail-withdrawal reflex, lack of any sort of response to pressure of the hook. Contracted pupils.

The stage of anesthesia required was stage III which lasted for a minimum of three hours. Experiments were carried out at different ambient temperature ranges. No artificial respiration was needed. The snakes were not fed over a period of, at least, 96 hours before anesthesia.

RESULTS

Table 1 indicates the number of anesthetized snakes related to time (minutes) of anesthesia induction at the level of stage III. Results are expressed in ten minutes intervals. Among the 79 subcutaneously injected snakes, 63, weighing from 70 to 655 g, were anesthetized within the range of 30 to 40 minutes (79,7%). The stage of anesthesia was demonstrated to be stable and no supplementation of dose was ever necessary. The effect of the anesthetic lasted for at least three hours but the exact time of recovery was not observed with the exception of two animals, which recovered within 48 hours. None of the 79 animals died under this treatment. The stage of recovery from anesthesia was considered when the snake was back to all the reflexes affected during anesthesia (stages I through III).

Among the 17 intrapleuroperitoneally injected snakes, increasing times of induction were directly proportional to increasing body weight. For ex-

ample, 3 snakes, weighing 106 to 127 g were anesthetized after 30 minutes, while 4 others, weighing 161 to 400g reached stage III within 50 minutes. Stage III suffered oscillations in three animals. Recovery took 23 to 48 hours and 5 of the snakes died before recovery. Figures 1 and 2 illustrate the different behaviour of subcutaneously and intrapleuroperitoneally injected *Bothrops jararaca* snakes, in relation to the time of induction of stage III.

TABLE 1

Anesthesia of *Bothrops jararaca* snakes with pentobarbital. Time of induction to the level of stage III in 10 minutes intervals after intrapleuroperitoneal (IPP) or subcutaneous (SC) injections of a 5% anesthetic solution. Dose: 30 mg/kg body weight.

| | Induction time of stage III minutes | Number of snakes | Body weight g | |
|-----|-------------------------------------|------------------|---------------|---------|
| | | | mean | range |
| SC | 10 | 00 | — | — |
| | 20 | 04 | 360 | 206-564 |
| | 30 | 39 | 179 | 75-353 |
| | 40 | 24 | 288 | 70-655 |
| | 50 | 09 | 196 | 120-335 |
| | 60 | 00 | — | — |
| | 70 | 02 | 415 | 345-485 |
| | 80 | 00 | — | — |
| | 90 | 01 | 369 | 369 |
| | no induction | 00 | — | — |
| IPP | 10 | 00 | — | — |
| | 20 | 00 | — | — |
| | 30 | 03 | 118 | 106-127 |
| | 40 | 02 | 195 | 140-250 |
| | 50 | 04 | 288 | 161-400 |
| | 60 | 02* | 253 | 200-305 |
| | 70 | 01 | 405 | 405 |
| | 80 | 00 | — | — |
| | 90 | 01* | 431 | 431 |
| | no induction | 04 | 272 | 204-445 |

* Oscillation of stage III

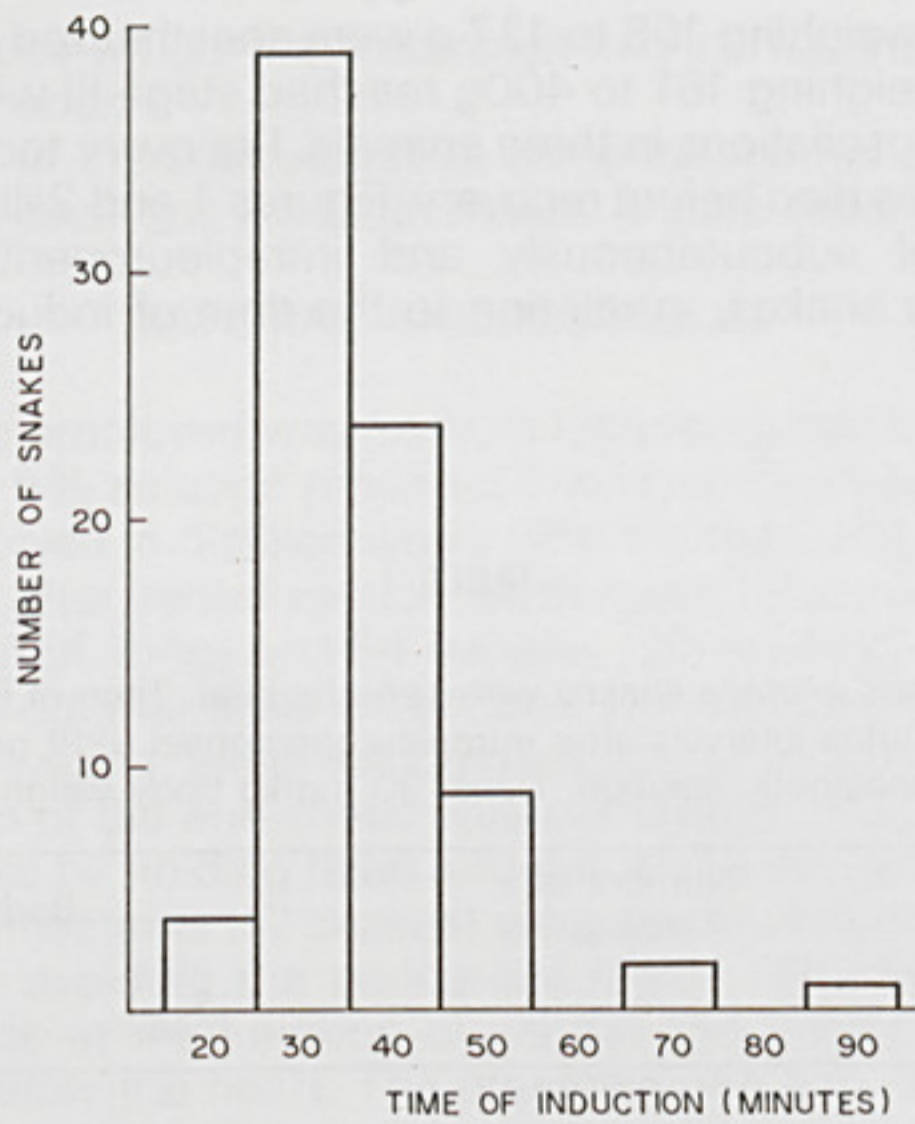


FIG. 1: Distribution of *Bothrops jararaca* snakes according to time of induction of deep anesthesia (stage III) in 10 minutes interval, after subcutaneous injections of pentobarbital (30 mg/kg body weight).

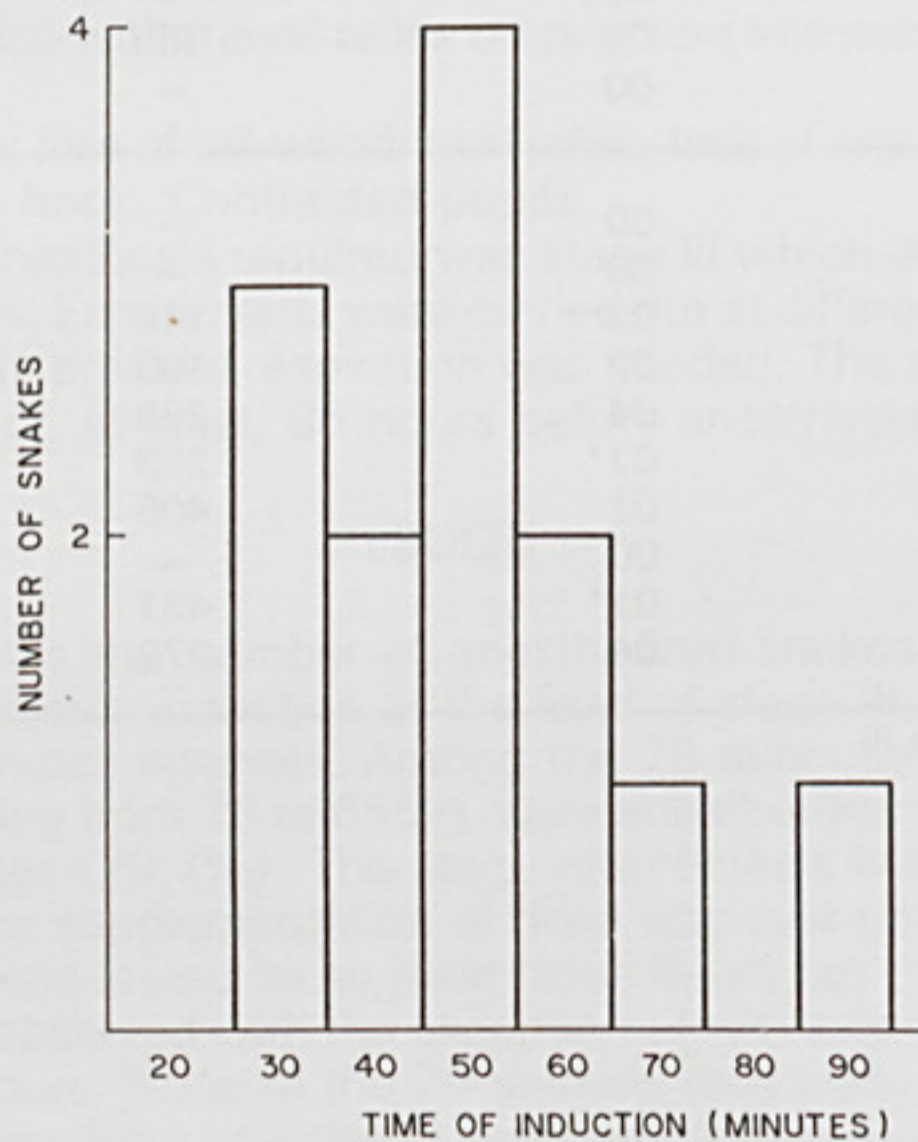


FIG. 2: Distribution of *Bothrops jararaca* snakes according to time of induction of deep anesthesia (stage III) in 10 minutes interval, after intrapleuroperitoneal injections of pentobarbital (30mg/kg body weight).

DISCUSSION

Results demonstrate that a standard dose of the anesthetic (*Nembutal*) per unit of body weight, can be used with no need for supplementation when SC administration is performed in *Bothrops jararaca* snakes. According to these results, about 80% of the snakes reached stage III of anesthesia within 30 to 40 minutes, their body weight ranging from 70 to 655 g. Experiments were performed at different seasons, when the temperature variation was from 3.5 to 34.6°C. From this, it is evident that subcutaneously induced anesthesia with pentobarbital is not influenced by size variation or by ambient temperature modification during the procedure.

The criteria of stages arbitrarily established to follow intensity degrees was a helpful step for the standardization procedure. It was also used by Genevois *et al*³. with slightly different definitions.

The results obtained with IPP injections of pentobarbital in 17 *Bothrops jararaca* corroborate the data from literature, concerning the influence of weight variation in snakes under a same anesthetic dose, since larger ones had an elongated induction time as demonstrated in table 1.

The possibility that the intense integumentary vascularization in snakes⁷, in which circulation is modified during thermoregulation⁸, might be involved in the regular absorption of the anesthetic by the SC route should be further investigated. Inconsistent results in the IPP induced anesthesia may be due to difficulties in defining the site and the depth of injection, in view of the extense and not well delimited pleuroperitoneal cavity, in which the diaphragm is lacking. The risk of organ injury must be also mentioned.

The standardization obtained for *Bothrops jararaca* with the SC route of injection of *Nembutal* indicates this administration as extremely convenient when deep anesthesia is required.

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RESUMO: Foi obtido um método padronizado de anestesia cirúrgica para serpentes *Bothrops jararaca*, injetadas com 30mg/kg de pentobarbital (*Nembutal*) por via subcutânea. O tempo de indução variou entre 30 e 40 minutos para 63 de 79 serpentes estudadas (79,7%). Estes resultados uniformes contrastam com os obtidos com a via intrapleuroperitoneal (17 serpentes), normalmente adotada.

UNITERMOS: Anestesia subcutânea, anestesia em serpentes com pentobarbital, *Bothrops jararaca* anestesia.

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