MOTOR ACTIVITY DURING XYLAZINE-KETAMINE ANAESTHESIA IN A GERMAN SHEPHERD DOG: A CASE REPORT

Case report submitted in partial fulfillment of the Masters of Veterinary Surgery of the University of Nairobi.

Author
Dr. Willy Mwangi Edwin

Supervisor
Prof. Susan Mbugua
Summary

A German shepherd dog was anaesthetized for ear cleaning using xylazine and ketamine. One minute after ketamine administration, the patient displayed myoclonic muscular activity of the front limbs and head, characterized by paddling of the front limbs and twitching of lips and eye lids.

Case presentation

A four years old German Shepherd male dog weighing 28.5 Kgs (case number 33527) underwent general anaesthesia for ear cleaning. The dog had no previous history of disease, and pre-anaesthetic physical examination revealed bilateral waxy discharge from the ears. All the vital parameters were within the normal range. On the day of the procedure, the dog was premedicated with an intramuscular injection of 32mg Xylazine Hydrochloride (Bomazine 2%, Bomac Laboratories Limited, Auckland- New Zealand). General anaesthesia was induced and maintained by an intramuscular injection of ketamine 150mg (Ketalar 50 mg/ml, Pfizer Inc, New York, USA) which was administered 10 minutes after Xylazine injection. The dog was placed in lateral recumbency and allowed to breathe spontaneously. Several parameters were monitored including: pulse rate, respiratory rate, temperature, palpebral reflex, pedal reflex, eye position, pupil size, tongue movement and salivation (Table 1).

Approximately one minutes after induction of anaesthesia the dog displayed myoclonic muscular activity of the front limbs and head, including paddling of the front limbs and twitching of lips and eye lids. Concurrently pulse rate and respiratory rate decreased from 100 beats/minute to 80 beats/minute and 20 breaths/minute to 12 breathes/minute respectively and there was a transient increase in temperature from 38.4°C to 39.1°C. The muscular activity lasted for 30 seconds and did not occur again until the patient recovered 30 minutes after induction of general anaesthesia.
On average the respiratory rate was 18±5.96 breaths/minute, temperature 38.6±0.35 °c and pulse rate 88±11.99 beats/minute. The onset of anaesthesia was 5 minutes and duration of anaesthesia 25 minutes from administration of ketamine.

Table 1: parameters monitored during anaesthesia

<table>
<thead>
<tr>
<th>Drugs</th>
<th>XYL</th>
<th>KET</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Time in minutes</td>
<td>0</td>
<td>5</td>
</tr>
<tr>
<td>Pulse rate bts/min</td>
<td>104</td>
<td>100</td>
</tr>
<tr>
<td>Respiratory Rate brt/min</td>
<td>24</td>
<td>24</td>
</tr>
<tr>
<td>Temperature (°C)</td>
<td>38.7</td>
<td>38.5</td>
</tr>
<tr>
<td>Palpebral reflex</td>
<td>Pos</td>
<td>Pos</td>
</tr>
<tr>
<td>Pedal reflex</td>
<td>Pos</td>
<td>Pos</td>
</tr>
<tr>
<td>Eye position</td>
<td>C</td>
<td>C</td>
</tr>
<tr>
<td>Pupil size</td>
<td>O</td>
<td>O</td>
</tr>
<tr>
<td>Tongue movement</td>
<td>Pos</td>
<td>Neg</td>
</tr>
<tr>
<td>Salivation</td>
<td>Pos</td>
<td>Pos</td>
</tr>
</tbody>
</table>

Key:

Bts/min- beats/minute
Brt/min- breathes/minute
Pos- positive
XYL-Xylazine

Neg- negative
C- central
O- pupil size (normal)
Ket-Ketamine
Discussion

The purpose of anaesthesia is to provide reversible unconsciousness, amnesia, analgesia, and immobility with minimal risk to the patient (Thurman and Tranquilli, 1996), in addition to that ideal anaesthesia must satisfy the need for muscular relaxation for efficiency during surgery (Hall and Clarke, 1992).

Xylazine is a potent hypnotic drug with good muscular relaxant and analgesic properties. Its main disadvantages are that it produces significant cardiac arrhythmias, interfering with normal electrical activity in the heart, especially after intravenous administration (Thurman and Tranquilli, 1996).

Ketamine is a cyclohexylamine analogue which produces a cataleptic state in patients involving unconsciousness and somatic analgesia but no muscular relaxation. Its main advantage over other CNS depressants such as barbiturates is that ketamine tends to stimulate cardiopulmonary function and therefore has a wide margin of safety (Lyon, 2000).

Xylazine-Ketamine combination has been used before to produce anaesthesia in dogs (Haskins et al, 1986). The muscle relaxant, sedative and analgesic effects of xylazine are utilized in this combination while the cardiopulmonary depressant effects of xylazine minimized by the cardiopulmonary stimulation properties of ketamine hence producing safe and effective anaesthesia.

Ketamine provides good analgesia and has a rapid onset of action and short duration of action. Hall and Clarke (2001) have reported the onset of action to be 1 minute, Tomlinson (1994) 5 minutes and Ghurashi et al (2009) 6 minutes. These findings are consistent with our case in which the onset of action following administration of ketamine was 5 minutes. In dogs, the duration of action has been reported to be 20-45 minutes (Ingwersen et al, 1988). These findings are also consistent with our findings in which the duration of action was 25 minutes.
Paddling of limbs shown by the patient may be due to panic effect from rapid onset of action and muscle relaxation, usually the panic effect appear in horses (Muir and Sams, 1982) but has also been reported in goats following diazepam-ketamine anaesthesia (Ghurashi et al, 2009). Ketamine also enhances muscle tone to the extent that tremors or even tonic-clonic convulsions that are expressed as paddling movement of the limbs are produced (Thurman and Tranquilli, 1996). In dogs muscular activity following ketamine anaesthesia has been reported before (Haskins et al, 1985; Hellyer et al, 1991; Lervik et al, 2010).

Parameters used to monitor anaesthesia as reported in the literature include: palpebral and pedal reflex (Williams and Wyatt, 2007); palpebral, corneal, eyelid reflex (Tammisto and Aromaa, 1981); movement in response to clamping claw (Doherty and Redua, 2007); swallowing reflex and salivation (Prassinos and Galatos, 2005); Eye position and pupil size (Thurman and Tranquilli, 1996). Palpebral reflex remained positive after ketamine injection while the eye remained opened and pupil size did not change. These findings are as reported that during ketamine anaesthesia, the animal maintains pharyngeal, laryngeal, corneal, palpebral, and swallowing reflexes while the eyes remain wide open with nystagmus at times, requiring lubrication to protect cornea from drying (Lyon, 2000). However pedal reflex was negative for about 15 minutes after ketamine injection and was a good indicator of the level of analgesia.

Respiratory and pulse rate as shown in table (1) decreased from a high of 24 breaths/minute to a low of 10 breaths/minute and 100 beats/minute to 72 beats/minute respectively. These findings are contrary to what has been reported before, Ingwersen et al, (1988); Kul and Koc (2000) reported a non-significant changes in respiratory and heart rate while Farver et al, (1986) reported a significant increase in heart and respiratory rate following ketamine anaesthesia in dogs.
There was a transient increase in temperature following ketamine administration and this could have been caused by the paddling movement exhibited by the patient one minute after ketamine administration. However, it has been reported that ketamine may cause either hypothermia or hyperthermia. Hypothermia is due to its effect on thermoregulatory centers, and hyperthermia due to increased muscle activity or hyperactive behavioral change (Lyon, 2000).

Salivation was present during xylazine-ketamine anaesthesia and this is in line with what has been reported in literature by different authors (Green et al, 1981; Haskins et al, 1985; Hall and Clarke, 1992; Thurman and Tranquilli, 1996; Lyon, 2000).

References


