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Intravenous retrograde regional anaesthesia of thoracic limb in donkey

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Abstract

Intravenous retrograde regional aneasthesia of thoracic limb was attempted in 36 donkeys using 1% and 2% solutions of lignocaine hydrochloride. The anaesthetic was administered into radial vein after application of a rubber tourniquet above the elbow. Twenty ml of 2% lignocaine hydrochloride was found to be adequate to produce perfect analgesia, muscle relaxation and motor block withaut any serious postanaesthetic compliction. The use of lower concentration and dose were not found satisfactory as it took significantly longer time to produce complete analgesia and leaving less time for surgical manoeuvers. Preinjection tourniquet ischemia for 15 minutes before injection of anaesthetic resulted in significantly quick onset of anaesthesia. The placement of tourniquet for 90 minutes was not considered safe as it caused more severe complications.

Key words : Regional anaesthesia, thoracic limb, donkey

Intravenous regional analgesia of limb has been reported to be a simple and effective technique in ruminants (Weaver, 1972, Manohar *et al*, 1971, Tyagi *et al*, 1973). This method of desensitizing the limbs is useful especially where the animal has not to be prepared for general anaesthesia. This technique of producing anaesthesia has also been used for distal limb in camel (Dudi *et al*, 1984). In this study intravenous regional anaesthesia has been used for thoracic limb of donkey.

Materials and Methods

Thirty six healthy adult donkeys of either sex were used. They were randomly divided into six groups of six animals each. All the animals were premedicated with intramuscular administration of acepromazine hydrochloride 0.1 mg/kg. The animal was secured in lateral recumbency and a rubber tourniquet was applied above the elbow joint of the limb to be anaesthetized.

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Two ml. of lignocaine hydrochloride was given through radial vein in animals of groups 1, 2, 3, 5 and 6, whereas 10 ml was given in animals of group 4. One percent lignocaine solution was used in animals of group 3 and 6 and 2% in groups 1, 2, 4 and 5. A pre-injection tourniquet ischaemia of 15 minutes was used in animals of groups 5 and 6. The tourniquet was released in 90 minutes in animals of group I and 60 minutes in rest of the animals. The animals then were allowed to rise to their feet. The loss of skin sensation below the tourniquet was ascertained by periodic pin-pricks. Time taken for the development of analgesia first incomplete (upto carpus) and then complete (below tourniguet) were recorded. After release of tourniquet, the time taken for return of sensation, bearing of weight and return of moderate motor function were recorded in each animal. The animals were kept under observation for a week after the experiment to see the development of complications i. e. bedema, lameness or paralysis, if any.

Results and Discussion

Complete and satisfactory anaesthesia was achieved in the animals of all the groups. In the animals of first two groups, where 20 ml of 2% lignocaine hydrochloride was used, time taken for induction of complete anaesthesia and return of sensation after release of tourniquet were almost same (Table-1). However, return of moderate motor function took significantly ($P<0.05$) more time in animals, where tourniquet was released after 90 minutes (group I) as compared to the animals of group 2, where tournipuet was released after 60 minutes.

The post-anaesthetic complications i. e. oedema and lameness were more severe, frequent and for longer duration in the animals of group I than those of group II.

Lignocaine 1% (20 ml) took significantly longer time to produce complete analgesia as compared to 2% solution. However, return of moderate motor function was achieved significantly earlier in animals of former group. The use of lower dose of 2% lignocaine hydrochloride (group 4) took significantly longer time for the onset of analgesia.

The onset of analgesia took significantly shorter time, when 15 minutes were allowed for the development of pre-injection tourniquet ischemia regardless of concentration of anaesthetic used. Induction time was more in 1% lignocaine group. However there was no significant difference in the time taken for return of motor function in either of concentrations.

Some animals exhibited varying degree of uneasiness, which could be correlated to the tourniquet. However, it was observed that the placement of tourniquet for more than 90 minutes may not be safe in donkey. The complication like oedema and lameness were more severe and persisted for long duration when the tourniquet was placed for 90 minutes than for 60 minutes The lameness might be an indication of pain due to oedema and imflammation caused by tourniquet. Tourniquet ischemia is reported to cause local venous acidemia with a decrease in PO_2 and increase in PCO^2 (Scott *et al*, 1979, Singh *et al* 1982), The accumulation of PCO_2 and metabolites

Table –(1) Duration of analgesia, return of sensation and time taken for weight bearing and motor function after intravenous retrograde anaesthesia.

Groups	Analgesia (min) Incomplete	Analgesia (min) complete	Return of sensation (min)	Weight bearing (min)	Moderate motor function (min)
I	6.1 [d, e] ± 0.494	11.6 [c, d, e, f] ± 0.714	5 3 ± 0.738	18.2 [d] ± 2.264	162.5 [b, c, d, e, f] ±12.461
II	6.0 [d, e, f] ± 0.300	12.0 [c, d, e, f] ± 0.987	5.2 ± 0.668	12.5 ± 0.683	71.5 [a, c, d, e, f] ± 3.832
III	8.5 [d, e, f] ± 1.230	18.4 [a, b, d, e, f] ± 1.676	4.5 ± 0.577	11.4 ± 1.158	58.5 [a, b] ± 1.812
IV	15.5 [a, b, c, e, f] ± 1.455	25.1 [a, b, c, e, f] ± 0.703	3.8 ± 0.333	10.0 [a] ± 1.208	51.3 [a, b] ± 4.703
V	1.8 [a, b, c, d, f] ± 0.380	4.9 [a, b, c, d] ±0.583	4.7 ± 0.573	1. 8 ± 1.276	61.8 [a, b] ± 2.758
VI	4.2 [c, d, e] ± 0.588	7.5 [a, b, c, d] ± 0.638	4.0 ± 0.357	11.4 ± 0.840	65.1 [a, b] ± 4.074

Superscripts show statistically different values ($P < 0.05$)

and poor tissue oxygenation alongwith compression of nerve for longer duration may be responsible for these complications.

The anaesthetic effects obtained by using 2% lignocaine hydrochloride was adequate and satisfactory in the present study. The overall anaesthetic effect was in no way inferior to that produced by using higher concentration of procaine solution and also the induction time for complete analgesia with 2% lignocaine solution was almost same as obtained with 5%, 8%, or 12% procaine solutions in previous studies (Manohar *et, al* 1971 ; Tyagi *et, al* (1973). The use of lower cocentration or lower dose of 2% solution was not found satisfactory as it took longer time to produce analgesia and thus leaves less time for surgical manoeuvers.

Pre-injection tourniquet ischemia of 15 minutes produced quick and complete analgesia and confirms the observations of Harris *et al*, 1965 in man and Tyagi *et al*, 1978 in animals.

It is pertinent to note that even 1% anaesthetic solution could safely be used with pre-injection tourniquet ischemia.

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