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EPIDURAL CATHETERIZATION AND ANALGESIA IN DONKEYS

(With 2 Figs.)

By

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(Received at 25/6/1989)

قسطرة الأمجافية وتخديرها في الحمير

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أجرى هذا البحث على عدد ٣٠ حمار من الجنسين حيث قسمت إلى ثلاثة مجموعات متساوية وقد تم وصف طريقة إدخال القسطرة في الأمجافية لهذه الحيوانات . ثم حقنت عن طريق القسطرة المستخدمة والمثبتة بين الفقرة القطنية الأولى والثانية أو بين الفقرة القطنية الثانية والثالثة بجرعات ١ ، ٢ ، ٣ مللتر من الليدوكايين ٢٪ للمجموعات أ ، ب ، ج على التوالي . ولقد حدد تأثير الجرعات المختلفة من المخدر ووجد أن الجرعة المناسبة والمؤثرة على الفص الأمامي للأمجافية هي ٢ مللتر من الليدوكايين ٢٪ حيث إستمر تأثير المخدر لمدة ساعة من حقنة ثم زادت هذه الفترة لمدة ٤٠ دقيقة أخرى بعد حقن جرعة منخفضة (١ مللتر) من المخدر ولقد وجد أن طريقة القسطرة سهلة في التطبيق ومؤثرة لكي نحصل على إستمرارية تخدير الفص الأمامي للأمجافية في الحمير .

SUMMARY

Thirty donkeys of both sexes were used in this study. The animals were classified into 3 groups (each of ten animals). The technique for catheterization of the epidural space has been described. An initial dose of 1, 2 and 3 ml lidocaine hydrochloride 2% was injected between L1-L2 or L2-L3 for each animal in groups A, B and C respectively through the correctly placed epidural catheter. The analgesic effects of 2% lidocaine hydrochloride has been determined. The best dose of this local anaesthatic for production of cranial segmental epidural analgesia was 2 ml (group B). The analgesic period in this group was about one hour after the first injection. It has been maintained for another 40 minutes by fractional bolus of 1 ml lidocaine H CL 2%. The technique was found to be easily performed and effective for continuous cranial segmental epidural analgesia in donkeys.

INTRODUCTION

Donkeys were and still playing an important role to help the Egyptian farmer in his daily life and as a mean of cheap transportantion despite the mechanisation on the farm. Donkeys are frequently presented to veterinary clinics with many surgical affections. Satisfactory anaesthesia as epidural is essential for the performance of painful surgical interferences caudal to the last rib.

Anterior epidural anaesthesia in horses has been described by McLEOD and FRANK (1928) and BROOK (1935). Recently, because the risk of injury during recovery is so great, HALL and CLARKE (1983) stated that there is probably no place for anterior block in horses.

Segmental epidural anaesthesia in horses was suggested to be not practical because of inaccessibility to the lumbar epidural space (LUMB and JONES, 1973). SKARDA and MUIR (1982 & 1983 b) described in conscious horses the technique used for segmental thoracolumbar epidural and subarachnoid analgesia.

Continuous caudal epidural and subarachnoid anaesthesia in mares can be induced by using epidural catheter positioned into epidural or subarachnoid space at lumbosacral intervertebral junction (SKARDA and MUIR, 1983 b). GREEN and COOPER (1984) described a technique for continuous caudal epidural anaesthesia in the horses through the first intercaudal (intercoccygeal) space with an aid of epidural catheter.

The purpose of the present work is to implant a catheter into the epidural space for production of cranial segmental epidural analgesia in donkeys and to determine the analgesic effects after two injections of 2% lidocaine hydrochloride in different doses.

MATERIAL and METHODS

Experimental animals:

Thirty non medicated clinically healthy donkeys (19 males and 11 females) weighing from 80 to 130 kg and aged between 3-9 years were used. They were divided into three groups; A, B and C (each of ten animals).

Equipment:

Undirectional spinal needle with stylet, 1.3 mm diameter adn 91 mm long (curved tip Tuohy cannala, Vygon, Aachen, W. Germeny). Epidural catheter 90 cm long, 0.5x0.8 mm diameter, closed distally and with three side openings (Art. No. 186-08, Vygon, Aachen, W. Germany). X-ray contrast material (Urografin 76%, Schering AG Berlin, Bergkamen).

Anaesthetic agent:

Sterile 2% lidocaine hydrochloride (Xylocaine, Astra, Sweden) was used for epidural injection. An initial dose of 1, 2 and 3 ml for each animal in group A, B and C respectively was injected. Half these doses were given immediately upon return of sensation.

EPIDURAL CATHETERIZATION

Site of injection:

The site of injection was between the last lumbar vertebra (L6) and the sacrum (S1).

Technique:

Each animal was controlled by a twitch and secured in a stanchion. The lumbosacral area was prepared aseptically. With the thumb and middle finger, the sacral tuberosities were palpated and with the index finger, the depression leading to the lumbosacral foramen was felt. The spinal needle with stylet was inserted along the median plane at the L6-S1 intervertebral space. The tip of the needle was directed 5° to 10° cranially from perpendicular to the spinal cord and slowly advanced with the bevel pointed cranially, until the epidural space was identified.

The distance between the skin to the epidural space was measured by noting the distance between the needle hub and the skin puncture site and subtracting this distance from the total length (91 mm) of the needle. The stylet was removed from the needle. The length of the catheter, that must be introduced into the epidural space, was measured before its introduction. The epidural catheter was introduced into the needle and advanced cranially until its tip was positioned between the first and second or between second and third lumbar vertebra. In order to verify the correct position of the epidural catheter in the first trials one ml urografin was injected and radiographs were taken (Fig. 1). The catheter was fixed by means of adhesive tape to the previously shaved skin at the lumbosacral region.

The desired amount of anaesthetic solution was slowly administered (1 ml/minute). The time to onset and duration of analgesia were deterimined. Desensitized skin area was detected by the donkey's response to superficial and deep skin pinpricks.

RESULTS

The average length of the spinal needle from the skin to epidural space at the lumbosacral region was 5.8 cm (5-6 cm). The total length of the epidural catheter from the level of skin puncture to the catheter tip varied between 25 cm and 36 cm with an average of 30.3 cm. The average length of the catheter within the epidural space was 24.5 cm.

Epidural injection of 1 ml lidocaine hydrochloride 2% at the level of first or second interlumbar space produced unilateral (2 animals) or bilateral (8 animals) analgesia. The dorsal lumbar region and the lateral abdominal region except a narrow strip (2 cm in width) just cranial to the tuber coxae were desensitized (Fig. 2 a). The onset of the analgesic effect was after 10 minutes (after 7 minutes in the left side and after about 15 minutes in the right side). The analgesic period in this group after the first injection ranged from 30 to 40 minutes which was maintained by the second injection (0.5 ml xylocaine 2%) for further 30 minutes.

Epidural injection of 2 ml lidocaine hydrochloride 2% (group B) produced bilateral blockade in 9 donkeys without any effect on the motor function of the pelvic limbs. The area of the last three ribs, the dorsal lumbar region, the lateral abdominal region, the cranial third or half of the gluteal region as well as the cranial half of the lateral aspect of the thigh were desensitized (Fig. 2 b). The analgesic effect began after 7.3 minutes (5-8 minutes) and the analgesic period lasted for 60 minutes (50-75 minutes). It was found that the fractional bolus of 1 ml lidocaine H CL 2% just after return of skin sensation prolonged the duration of analgesia for another 40 minutes.

Injection of 3 ml lidocaine hydrochloride 2% epidurally through an implanted catheter (group C) induced rapid bilateral blockade in all animals (after 3-5 minutes). Five to eight minutes post injection, all donkeys in this group can not remaine in the standing position. All the region of the body wall caudal to the 12th rib were desensitized (Fig. 2 c). The analgesic period lasted for 60-75 minutes.

DISCUSSION

An improved technique in the donkeys for administration of local anaesthetics through the lumbosacral space into the epidural space is described. This technique can be performed to produce continuous cranial segmental epidural analgesia of the abdominal wall without interfering with motor function of the pelvic limbs. The present study cleared that the interarcual space between the last lumbar and the sacrum is a reliable site for catheter implantation. It is larger than that of the first intercaudal space used by GREEN and COOPER (1984).

In order to facilitate penteration and advancement of the spinal needle, GREENWOOD (1953) and ST. CLAIR and HARDENBROOK (1956) used a wide bore short needle through which the spinal needle was passed, while ARTHUR (1956) made a longitudinal 2-3 cm paramedian skin incision. In the present work there was no need for neither the wide bore short needle nor the skin incision by using sharp spinal needle positioned perpendicular to the skin at the site of introduction.

For perfect catheter implantation, certain precautions must be taken into consideration. The site of spinal needle puncture must be aseptically prepared. The use of special spinal needle (curved tip Tuohy cannula) to catheterize the epidural space permits the catheter tip to make 90° flexion at the L-S intervertebral site and facilitate its cranial advancement without resistance (SKARDA and MUIR, 1983 b). Before insertion of an epidural catheter, a routine part of the procedure should include checking to assure the holes in the catheter are patent. This is particularly important for catheters without stylets whose holes can be obliterated (PRIANO, et al. 1983). The epidural catheter must pass easily forward through the curved tip of the spinal needle. Once the catheter had been advanced beyond the tip of the needle, its withdrawal through the stationary needle was avoided to prevent shearing off of the catheter which act as forgein body in the epidural space (GREEN and COOPER, 1984 and BONATH, 1985). If repositioning

of the needle was necessary after catheter passage, withdrawal was performed by moving the needle and the catheter as a single unit (GREEN and COOPER, 1984). Failure of aspiration of cerebrospinal fluid and blood is essential in ruling out inadvertent subarachnoid (spinal) or intravenous injections.

Lumbosacral insertion of spinal needle and epidural catheter into the epidural space caused only minimum stress reactions and is tolerated by non sedated animals like an intravenous or intramuscular needle puncture as judaged by plasma catecholamines and glycocorticosteriods levels (BONATH, et al. 1985 & 1987).

There are many advantages of this technique. The landmarks for determination of the injection site are definte and can be easily located. Asepsis was easily maintained by the accessibility of the surgical area. The technique promotes uniform anaesthesia of the abdominal wall without interfering with the locomotor control of the pelvic limbs and dangers of forcible casting are avoided.

Epidural catheter possible complications are misdirection of the catheter (BONATH, et al. 1984), shearing off of the catheter by the needle (BONICA, et al. 1957), catheter occulusion (PRIANO, et al. 1983), kinking (CLIMIE, 1960) and knotting of the catheter (HEHRE, et al. 1960). However, these complications were recorded rarely by the aforementioned authors and were not observed in any of the limited number of donkeys in this study, although the catheters were threaded a considerable distance.

The present work cleared that the administration of 2 ml lidocaine 2% gave satisfactory anaesthesia of the flank area (group B). Increasing the dose of the xylocaine to 3 ml lead to weakness of the pelvic limbs to the degree that the animal could not remaine in the standing position and lied down. On the other hand injection of 1 ml of th local anaesthetic produced analgesia of a narrow area of the flank.

The quantity of the local anaesthetic for repeatd doses, extrapolated from the recommendation in the horse, was one half of the initial induction dose (GREEN and COOPER, 1984). This volume appeared clinically to be effective.

The duration of analgesia and the desensitized area were increased by using larger doses. This can be explained by spreading of the anaesthetic solution within the epidural space which is dependent not only on the position of the tip of the epidural catheter but also on th rate of injection.

Unilateral epidural analgesia was recorded in 2 donkeys in group A. The cause could be attributed to the use of the small volume of local anaesthetic solution. In addition to the possible placement of the catheter at the ventrolateral surface of the cord, theraby restricting the deposition of local anaesthetic to one side (SKARDA and MUIR, 1983 a). HEHRE, et al. (1960) attributed unilateral epidural analgesia to lateral escape of the local anaesthetic solution through patent intervertebral foramina.

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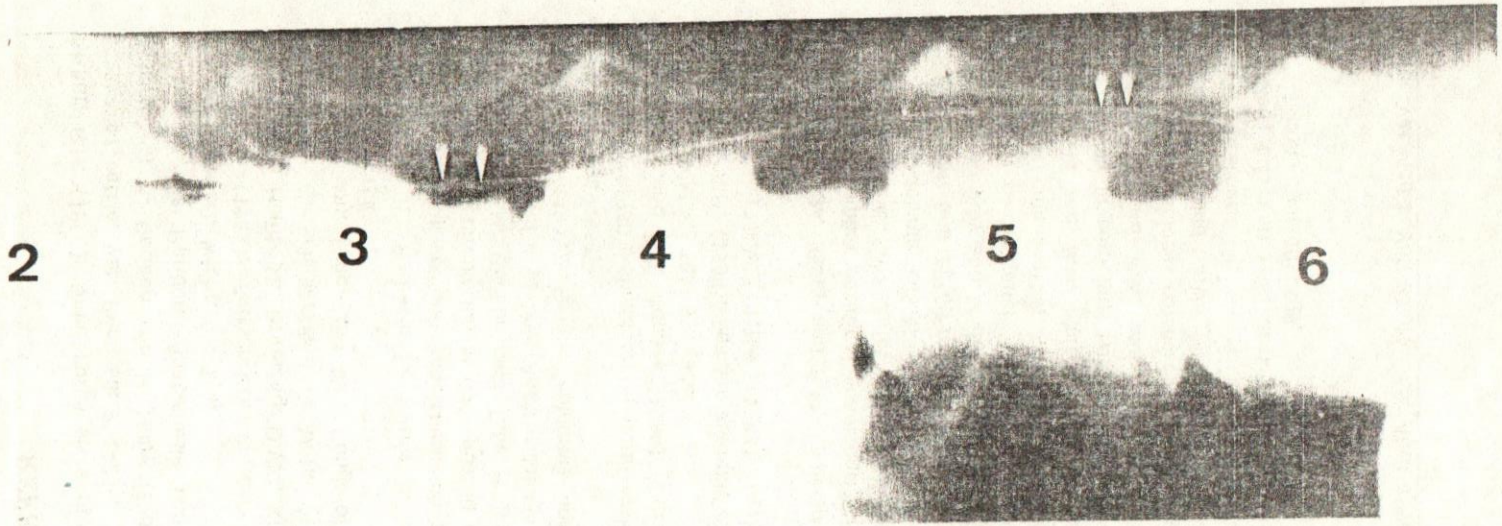

Fig. (1): Correct position of the epidural catheter. The tip of the catheter lies at L2

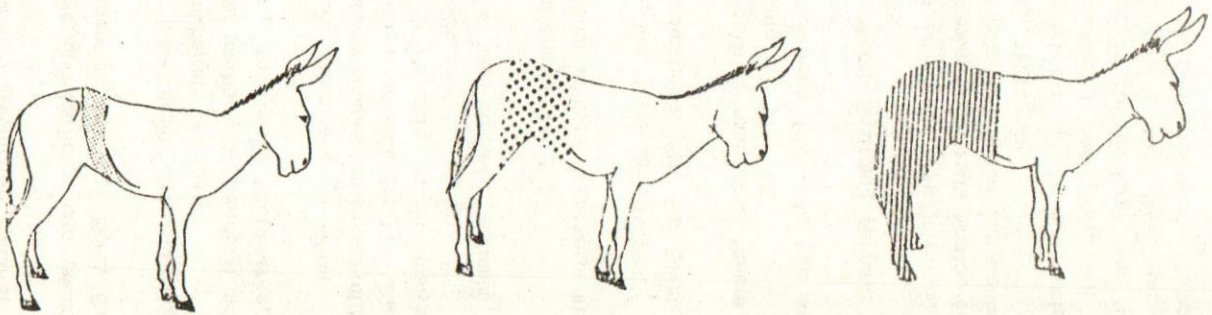

Fig.(2): The desensitized area after injecting I ml, 2 ml and 3 ml xylocaine H cl 2%.