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## EVALUATION OF THE CATHETERIZATION OF THE CARPAL JOINT AND THE REPEATED INTRARTICULAR INJECTION IN DONKEY (With 3 Figs.)

By

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تقييم إستخدام القسطرة بالمقارنة بتكرار  
الحقن في مفصل الرسغ في الحمير

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أجري هذا البحث علي إثني عشر من الحمير البالغة طبيعية المفصل من الناحية الإكلينيكية وقسمت الحيوانات الي مجموعتين : المجموعة الأولى : تم إستخدام قسطرة في مفصل الرسغ لجمع عينات من السائل الزلالي للمفصل لمدة ٧٢ ساعة - المجموعة الثانية : تم جمع نفس العينات من السائل الزلالي لمفصل الرسغ لنفس المدة بتكرار إختراق الإبرة للمفصل . وتم تقييم استخدام القسطرة وذلك بمتابعة الحيوانات إكلينيكيًا وكذلك دراسة الصفات التشريحية والهيستوباثولوجية . وأوضحت النتائج أن إستخدام القسطرة تمكن من تكرار جمع العينات أو حقن نفس المفصل دون إحداث أي ضرر له .

### SUMMARY

Twelve adult donkeys with clinically normal carpal joints were used in this study. The animals were divided into 2 groups (each of 6 donkeys). In group, 1: 2.5 cm long catheter & 0.8 mm in diameter was placed percutaneously into the palmarolateral pouch of the joint. The catheter was fixed in place with adhesive tape. While in group, 2: The carpal joint was exposed to repeated needle puncture. The donkeys were euthanized at 24, 48 and 72 hours postoperatively. Macroscopic and microscopic examinations were performed on the dorsal portion of the joint capsule and the palmarolateral pouch of the catheterized and non-catheterized joints (in the case of repeated intra-articular injection of the joint).

Gross examination of the synovial fluid proved that it was yellow and clear at all times of the catheterized joint, while the same result was obtained at the first two times in case of using needle puncture but

SAMIA M. SELEIM, et al.

the following samples were mixed with blood. The presence of this blood could be probably attributed to rupture of subsynovial capillaries when synovial villi were traumatized by needle puncture. The degree of the inflammatory reaction was minimal when using catheterization.

It could be concluded that catheterization of the joint was for easy and atraumatic serial acquisition of synovial fluid specimens from the same joint over several hours with minimal synovial irritation and blood contamination of the specimens.

## INTRODUCTION

The carpal joint space is continuous with a palmarolateral pouch, that is located in area between the lateral styloid process of the distal portion of the radius cranially, the long tendon of insertion of the ulnaris lateralis muscle caudally and the accessorioulnar ligament distally. This pouch communicates openly with the palmar and dorsal portion of the joint space. The proximal extent of the synovial sheath of the superficial and deep flexor tendons lies medial to the palmarolateral pouch of the carpal joint (SISSON and GROSSMAN, 1975).

It is well known that catheterization of the joint is designed for easy and atraumatic serial acquisition of synovial fluid specimens from the same joint over several hours. The possibility exists that repeated specimen acquisition alone may adversely affect the variables measured in the synovial fluid (PERMAN and CORNELIUS, 1971 and KENT LLOYD, et al. 1988).

Serial obtained synovial fluid specimens frequently required in order to investigate the synovial distribution of systemically administered antibiotics and nonsteroidal anti-inflammatory agent (MEAGHER, 1970; BEECH, et al. 1979; Mc LLWRAITH, et al. 1979 and STOVER and POOL, 1985).

The frequency of repeated intra-articular injections will vary. Such factors as degree and duration of inflammation and relative response on the part of the joint to previous injection will need to the proposed time interval for reinjection (HOLLANDER, 1953 and VAN PELT, 1965).

In the course of arthrocentesis, an occasional sample become contaminated with fresh blood at the time of aspiration by using a needle puncture (HUBBARD and PORTER, 1943; MURDOCH and WILL, 1962 and VAN PELT, 1962).

The purpose of this study is to compare a catheterization method of the carpal joint in donkey that would allow several acquisition of synovial fluid specimens, with the repeated intrasynovial injection in donkey.



## CARPAL CATHETERIZATION

**MATERIAL and METHODS**

Twelve adult donkeys (50-70 kg b.wt) with clinically normal carpal joints were used. They were divided into 2 groups (each of 6 donkeys). In each animal one carpal joint was selected for catheterization or used for repeated acquisition of synovial fluid specimens and the other limb left as a control. An area of skin (2 cm<sup>2</sup>) overlying the palmarolateral pouch was shaved and prepared aseptically. The site of catheter (or needle) was palpated as a depression located between the accessory carpal bone and the distolateral portion of the radius. In group (1) 2.5 cm long, 0.8 mm in diameter catheter was directed distomedially into the palmarolateral pouch. The stylet was removed and the catheter was capped with an infusion plug. The catheter was fixed in place to the skin with adhesive tape then bandage. In group (2) the carpal joint was exposed to the repeated needle puncture at the same seat twice daily for 5 successive days.

Each donkey was euthanatized immediately after 24, 48, 72 hours post operative (removal of catheter or after the last repeated puncture with needle) with collection of synovial fluid. The dorsal portion of the joint capsule, the palmarolateral pouch and the controlled carpal joint were excised. The joint cavity as well as the joint capsule were examined carefully and samples for histopathological examination were fixed in 10% buffered formalin. Sections were and stained with haematoxylin and eosin (H & E).

**RESULTS**

The clinical signs associated with the repeated acquisition of synovial fluid from the carpal joint in donkeys were slight to moderate degree of lameness, slight swelling and passive movement of this joint revealed pain. The catheter was introduced into the palmarolateral pouch without difficulty, while in some cases minimal redirection of the catheter was necessary to insert it completely into the joint (Fig. 1).

The position and potency of the catheter within the joint was confirmed by the appearance of a small amount of synovial fluid. Painful swelling was noticed at the site of needle puncture with the appearance of the contaminated synovial fluid with blood. In all animals, the catheter remained patent and functional for 72 hours.

Macroscopic and microscopic changes were mild in the synovial membrane of the catheterized carpal joint when compared with the non-catheterized joint. On microscopic examination the villous synovial membrane in the catheterized joint showed mild hyperaemia blood vessels associated with very mild inflammatory cellular infiltrations. The most common of them were neutrophils (Fig. 2). On the other hand the

SAMIA M. SELEIM, et al.

repeatedly injected joints showed chronic inflammatory reaction associated with lymphocytic cellular infiltrations. The villous epithelium manifested degenerative and necrobiotic alterations (Fig. 3).

The articular catheterization was reliable method and more innocuous for obtaining the multiple synovial specimens from a single joint, also in cases of repeated intra-articular injection, with less blood contamination and synovial irritation.

### DISCUSSION

As the authors concluded in the results, catheterization of the joint is designed for easy and atrumatic serial acquisition of synovial fluid specimens from the same joint over several hours, the possibility exists that repeated specimen acquisition alone may adversely affect the variables measured in the synovial fluid. Similar findings were reported by (PERMAN and CORNELIUS, 1971 and KENT LLOYD, et al. 1988).

Acquisition of several synovial fluid specimens from the carpal joint via a catheter appears to be more innocuous than are repeated arthrocentesis (VAN PELT, 1960; VAN PELT, 1971; WAGNER, et al. 1982 and STOVER, 1985).

The present study indicate that painful swelling was noticed at the site of the repeated needle puncture with the appearance of the containated synovial fluid with blood. These results are inareement with those recorded by (BROWN, et al. 1982; STOVER and POOL, 1985 and KENT LLOYD, et al. 1988). The contamination of synovia with blood was attributed to rupture of subsynovial capillaries when synovial villi were traumatized by needle puncture. (VAN PELT, 1962; MURDOCH and WILL, 1962 and VAN PELT, 1965).

Traumatically induced hemarthrosis often was observed after repeated intra-articular injections and multiple arthrocentesis of the same joint. These findings were also stated by (VAN PELT, 1962; WAGNER, et al. 1982 and KENT LLOYD, 1988).

### ACKNOWLEDGMENT

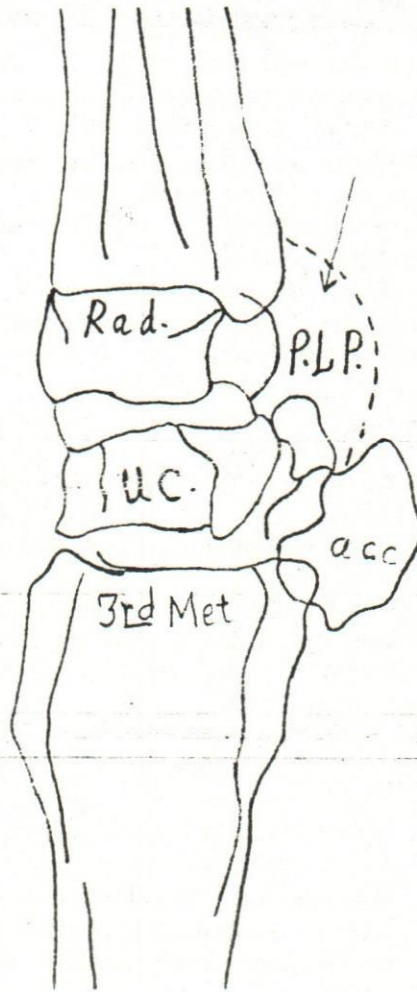
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## CARPAL CATHETERIZATION

## REFERENCES

- Beech, J.; Kohn, C. and Leitch, M. (1979): Therapeutic use of gentamicin in horses: Concentrations in serum, urine and synovial fluid and evaluation of renal function. *Am. J. Vet. Res.*, 38: 1085-1087.
- Brown, M.P.; Stover, S.M. and Kelly, R.H. (1982): Gentamicin sulfate in the horse: Serum, synovial, peritoneal and urine concentration after single dose intramuscular administration. *J. Vet. Pharmacol. Ther.*, 5: 119-122.
- Hollander, J.L.; Brown, E.M.; Jessar, R.A. and Brown, C.Y. (1953): Hydrocortisone and cortisone injected into artheritic joints. *J. Am. M.A.*, 147: 1629-1635.
- Hubbard, R.S. and Porter, R.C. (1943): The glycolytic enzymes of synovial fluid. *J. Lab & Clin Med.*, 28: 1328-1334.
- Kent Lloyd, K.C.; Stover, S.M.; Passcoe, J.R.; Baggot, J.D.; Kurpershoek, C. and Hietala, S. (1988): Plasma and synovial fluid concentrations of gentamicin in horses after intra-articular administration of buffered and unbuffered gentamicin. *Am. J. Vet. Res.*, 49, 5: 644-649.
- Meagher, M. (1970): The effect of intra-articular corticosteroids and continued training on carpal chip fractures of horses. *Am. Assoc. Equine Pract.*, 16: 405-420.
- McIlwraith, C.W.; Fessler, J.F. and Blevins, W.E. (1979): Experimentally induced arthritis of the equine carpus. *Am. J. Vet. Res.*, 40: 11-20.
- Murdoch, W.R. and Will, G. (1962): Methylprednisolone Acetate in intra articular therapy. *Brit. M.J.*, 1: 604-606.
- Perman, V. and Cornelius, C.E. (1971): Synovial fluid. *Clinical Biochemistry of domestic animal*. 2nd Ed. New York Academic press Inc, 240-242.
- Sisson and Grossman, J.D. (1975): Equine myology. In: Getty, R., Ed. *The anatomy of the domestic animals*. 5th Ed. Vol. 1: Philadelphia, W.B. Saunders Co., 419-431.
- Stover, S.M. and Pool, R.R. (1985): Effect of intra-articular gentamicin sulfate on normal equine synovial membrane. *Am. J. Vet. Res.*, 46: 2485-2491.
- Van Pelt, R.W. (1960): Arthrocentesis of the equine carpus. *Vet. Med.*, 55: 30-43.
- Van Pelt, R.W. (1962): Equine intra-articular injection. *M.S.U. Vet.* 21: 54-62.
- Van Pelt, R.W. (1965): Intra-articular injection of the equine stifle for therapeutic and Diagnostic purposes. *J.A.V.M.A.*, 147, 5: 490-498.
- Van Pelt, R.W. (1971): Mono-articular septic artheritis in horses. *J. Am. Vet. Med. Assoc.*, 158: 1658-1673.
- Wagner, A.F. and McIlwraith, C.W. and Martin, G.S. (1982): Effect of intra-articular injection of orgotein and saline solution on equine synovia. *Am. J. Vet. Res.*, 43: 594-597.



**Fig. (1):** Diagrammatic lateral view of the carpal joint showing the palmarolateral pouch (P.L.P), radius (Rad.), ulnar carpal bone (u.c), accessory carpal bone (acc.) and third metacarpal bone (3rd Met.) the site of injection of the pouch (arrow).



## CARPAL CATHETERIZATION

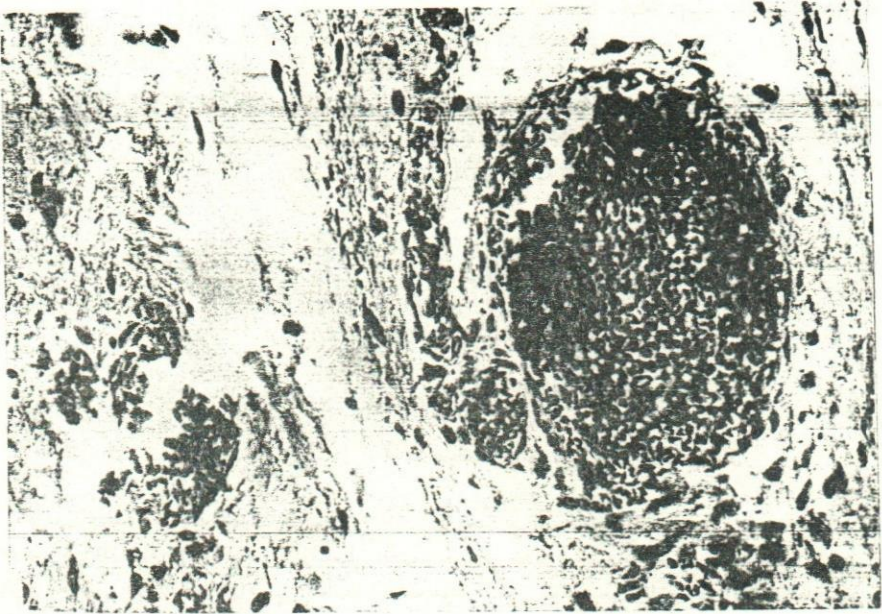


Fig. (2): Showing hyperaemic blood vesseles and mild inflamatory changes (H&E X400).



Fig. (3): Showed chronic inflammatory reaction associated with lymphocytic cellular infiltration.