NanoNeedle Scope for Veterinary Applications Scientific Update

The NanoNeedle Scope Operative Arthroscopy System uses high-definition, chip-on-tip, image sensor technology to provide surgeons with a needle-sized camera system. Using the portable imaging system, the surgeon can choose minimally invasive arthroscopy in the operating room using the NanoScope™ system as the main camera or as an adjunct to a traditional camera in a treatment room or in the physician's office. Designed to be a significant improvement in surgical imaging ergonomics and visualization quality, the NanoNeedle Scope is an alternative to MRI imaging and second-look arthroscopy. The scope offers precise, direct image-guided visualization of injections.

Clinical—Canine

Garnier P, Dekerle B, Vial J, Maurice E, Manassero M, Viateau V

Evaluation of a small-bore needle arthroscope for diagnosis and treatment of medial coronoid disease in dogs: a pilot study with short-term assessment. *N Z Vet J.* 2023;71(3):152-158. doi:10.1080/00480169.2023.2181239

- This study's objective was to investigate dogs with elbow dysplasia-associated lameness using the NanoNeedle Scope vs a standard arthroscope. First on cadaveric specimens to determine the safety and followed by clinical patients.
- The quality and extent of visualization were recorded and statistically compared.
- As the cadaver study indicated, the NanoNeedle Scope allowed safe inspection of all structures in medial/caudal compartments.
- In the clinical setting, elbow exploration was successful in all dogs and the treatment (removal of osteochondral fragments) was performed without requiring conversion of a standard arthroscope.

Takeaway

Needle arthroscopy–assisted removal of osteochondral fragments was performed in all dogs with satisfactory short-term clinical outcomes. Needle arthroscopy is a feasible technique for diagnosis and lesion assessment in dogs with a fissured or fragmented coronoid process.

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Evers JS, Kim SE, Johnson MD, Lazarus MA

Accuracy of needle arthroscopy for the diagnosis of medial meniscal tears in dogs with cranial cruciate ligament rupture. *Vet Surg.* 2023;52(6):820-826. doi:10.1111/vsu.13828

- The purpose of this study was to determine the accuracy of needle arthroscopy for diagnosis of meniscal tears in patients receiving TPLO for torn CCLs compared to standard arthroscopy.
- The outcomes of interest were arthroscopy time, viability of menisci, ability to explore, and the presence of tears diagnosed along with the degree of lameness before and after Nano arthroscopy.
- The sensitivity and specificity to diagnose medial meniscal tears with needle arthroscopy were 95% and 100%, respectively.
- Visibility of the menisci was lower ($P < .01$), probing of the lateral meniscus was harder ($P = .0017$), and procedure time was shorter ($P = .073$) with needle arthroscopy when compared to standard arthroscopy. The lameness scores did not differ before and after needlearthroscopy ($P = .25$).

Takeaway

Needle arthroscopy could be performed rapidly with low morbidity and had high accuracy for detecting medial meniscal tears in dogs with cranial cruciate ligament ruptures (CCLRs). Needle arthroscopy is a promising minimally invasive technique for diagnosing medial meniscal tears in dogs with CCLRs.

von Pfeil DJF, Megliola S, Horstman C, Tan D, Glassman M

Comparison of classic and needle arthroscopy to diagnose canine medial shoulder instability: 31 cases. *Can Vet J.* 2021;62(5):461-468.

- The purpose of this study was to compare surgery time, anesthesia time, and costs with classic arthroscopy or needle arthroscopy when diagnosing canine medial shoulder instability.
- All cases (standard arthroscopy, 14 cases; needle arthroscopy, 17 cases) were diagnosed with medial shoulder instability.
- No significant differences were reported for surgery time ($P = .13$) but existed for anesthesia time (35 minutes shorter with needle arthroscopy; $P < .0001$) and invoice (38% lower with needle arthroscopy; $P < .0001$).
- No complications were recorded by the time of the last direct follow-up, which was 12.4 weeks after surgery.

Takeaway

Needle arthroscopy offers an alternative, safe technique to reliably diagnose canine medial shoulder stability. Shorter anesthesia times and lower costs to the client may be advantages of needle over classic arthroscopy.

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Clinical—Equine

Bonilla AG

Standing needle arthroscopy of the metacarpophalangeal and metatarsophalangeal joint for removal of dorsal osteochondral fragmentation in 21 horses. *Vet Comp Orthop Traumatol.* 2019;32(5):420-426. doi:10.1055/s-0039-1688984

- The purpose of this study was to use standing arthroscopy to remove dorsal osteochondral fragmentation of the metacarpophalangeal and metatarsophalangeal joint using a needle arthroscope.
- Osteochondral fragments removed were from the proximal margin of the 1st phalanx in 18 horses (24 joints), in synovial plica in 2 horses (2 joints), or free-floating fragment in 1 horse (1 joint).
- 15 of 27 affected joints were forelimbs, and 12 of 27 hind limbs. All articular structures within the dorsal joint were visible.
- The needle arthroscope was deemed easy to use and maneuver. Only minor complications occurred during the procedure, which was 15-20 minutes for most patients.

Takeaway

All fragments were successfully removed, and needle arthroscopy allowed a thorough evaluation of the dorsal aspect of the joint.

Kadic DTN, Miagkoff L, Bonilla AG

Needle arthroscopy of the radiocarpal and middle carpal joints in standing sedated horses. *Vet Surg.* 2020;49(5):894-904. doi:10.1111/vsu.13430

- The case study examined 6 cadaveric forelimbs (phase 1) and 6 healthy horses (phase 2).
- In phase 1, needle arthroscopy allowed thorough evaluation of the dorsal and palmar recesses of both joints with traditional arthroscopic portals.
- In phase 2, joint evaluation was also thorough, but only dorsal approaches were performed.
- In phase 2, all horses underwent radiocarpal joint arthroscopy. The middle carpal joint was evaluated in only 3 of 6 horses because of limb movement. Complications included moderate movement, mild iatrogenic cartilage damage, and mild hemarthrosis.

Takeaway

The proposed technique offers an alternative diagnostic tool for radiographically silent intra-articular lesions of the carpus while initially avoiding the cost and risks associated with general anesthesia.

Overall Outcome

Needle arthroscopy is proven to be a great alternative to standard arthroscopy for both small and large animals. Also, it is a great option for cutting down time and costs.

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