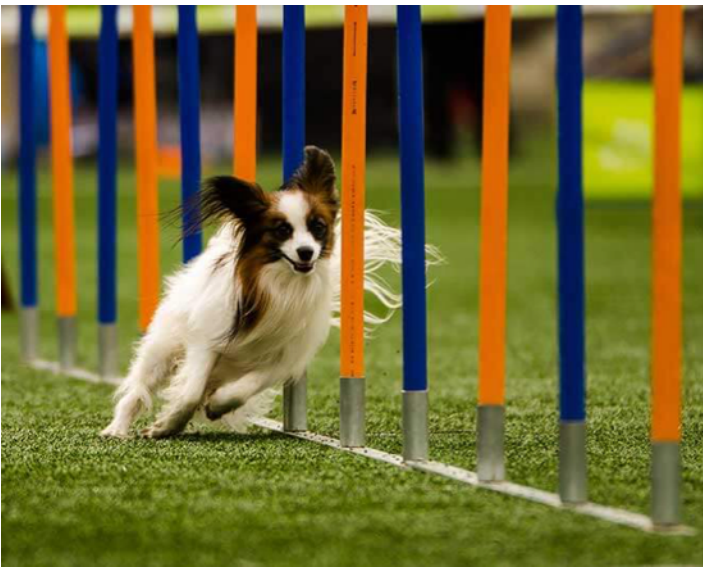


# Four Leg News



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## Spring 2021 – Volume 10 – Issue 2

**CANINE AGILITY RESEARCH UPDATE (PART 2)**

Welcome to the Spring (Northern Hemisphere) Edition of Four Leg News. In keeping with the 'sporting dogs in the literature' theme, this is part 2 of CANINE AGILITY RESEARCH. In this edition, we look at the articles on kinematics as well as the carpus on entering and exiting the A-frame. We dive into injuries to digits and injuries in general to both dogs and handlers. Then we check out a couple of papers on return to sport! JUMP into this newsletter... WEAVE your way through the studies... and CLIMB to higher heights of knowledge on this topic!

Enjoy!

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## Kinetics and the A-Frame...

Appelgrein C, Glyde MR, Hosgood G, et al. **Kinetic Gait Analysis of Agility Dogs Entering the A-Frame.** *Vet Comp Orthop Traumatol* 2019;32:97–103.

**Introduction:** According to two surveys in dog agility, injury occurred in a third of the study population, and the A-frame was considered to be the cause of 29% of these injuries.

The study aimed to quantify the perpendicular and cranio-caudal ground reaction forces observed in agility dogs during entrance and contact of the A-frame at three angles of incline (40°, 35° and 30°); and to assess the effect of a reduction in the angle of incline.

**Materials and Methods: Study #1** (Eight agility dogs were studied) utilized a force plate ahead of the A-frame and a marker at the costochondral junction of the 11<sup>th</sup> rib (to determine velocity).



### Results for Study 1:

1. The mean velocity for all trials was 5.6 m/s, with all dogs galloping prior to entry of the A-frame. The mean velocity at 40° was 5.5m/s, at 35° was 5.5m/s, and at 30° was 5.8m/s. The velocity was not significantly different between the three angles of incline.
2. Changing the A-frame angle of incline from 40° to 30° resulted in a decrease in the peak propulsive forces with less time spent within the propulsive phase.
3. During ascent at a 40° incline, a higher propulsive force, combined with extended time spent in propulsion, is required to maintain forward movement and convert potential energy into forward kinetic energy.

### My Thoughts?

So, it would appear that reduced the angle of the A-frame results in less propulsive forces. Does that equate to more or less injuries? That would be the next thing to study...



## THE CARPUS & THE A-FRAME

Appelgrein C, Glyde MR, Hosgood G, et al. **Reduction of the A-Frame Angle of Incline does not Change the Maximum Carpal Joint Extension Angle in Agility Dogs Entering the A-Frame.** Vet Comp Orthop Traumatol 2018;31:77–82.

Castilla A, Knotek B, Vitt M et al. **Carpal Extension Angles in Agility Dogs Exiting the A-Frame and Hurdle Jumps.** Vet Comp Orthop Traumatol, 2020 Mar;33(2):142-146.

**Why do the studies?** Observations of dogs entering and exiting the A-frame show extended extension of the carpus and the effects of repetition of this type of loading is unknown.

- The FIRST study evaluated objective measurement of carpal extension angles of dogs *entering* the A-frame to determine whether decreasing the A-frame angle reduces carpal extension.
- The SECOND study was to measure the mean carpal extension angles in agility dogs *exiting* the A-frame and landing after a hurdle jump; and to compare the carpal extension angles with a carpal brace.

### Materials and Methods:

Adhesive reflective markers were attached on unclipped anatomic landmarks over the lateral humeral epicondyle, ulnar styloid process and head of the fifth metacarpal bone; as well as the 11th rib at the costochondral junction as an estimate of the centre of mass.

Study #1: Two-dimensional kinematic gait analysis was used to compare the highest carpal extension angle at three angles of incline; 40° (standard), 35° and 30°, of the A-frame in 40 registered agility dogs that were currently training and competing.

Study # 2 looked at carpal angles with and without a brace on exiting the Aframe and landing after a hurdle jump. (Brace used: Carpo-Flex Sports Wrap; Thera-Paw, Lebanon, New Jersey, United States)

### Results for Study #1:

1. Dogs consistently landed with one forelimb touching the A-frame followed by the second forelimb touching; none landed at the same time.
2. There was no significant difference in velocity between angles of the A-frame.
3. There was no significant effect of A-frame angle on the highest carpal joint extension angle for either forelimb.

### Results for Study #2:

1. There was no correlation between velocity and joint angles or weight and joint angles.
2. There was no clinically significant difference in carpal extension angle with and without the brace.
3. There was no statistical difference in velocity after placement of the brace.

### My Thoughts?

The angle of the A-frame has limited impact on velocity or carpal joint extension on entering or exiting the A-frame

It also appears that carpal braces do not reduce carpal hyperextension.

So, the next questions are, do braces reduce incidence of carpal injury? Does changing the A-frame angle have an impact on injury? All in all, both of these studies are stepping stones to future research.

## WHAT ABOUT INJURIES?

Kerr ZY, Fields S, Comstock RD. **Epidemiology of Injury Among Handlers and Dogs Competing in the Sport of Agility.** Journal of Physical Activity and Health, 2014, 11, 1032-1040.

**Aim of the study:** This study aimed to investigate injury rates, patterns, and factors that predict odds of injury in both handlers and dogs.

**Methodology:** A survey handed out at 5 trials to capture the data with one additional survey handed out at a 6<sup>th</sup> trial in order to capture those missing the first 5 trials due to injuries.

**Results:** The initial survey was completed by 217 handlers reporting on 431 agility dogs. The follow-up survey was completed by 86 handlers.

**People:** Mostly women, mean age of 48.4 years, with over 5 years of experience. Most were normal weight with 1/3 being overweight.

- 31 agility-related injuries were reported; 45.2% occurred in training & 51.2% occurred in competition.
- Most common injuries were the knees and lower trunk and categorized as muscle strains or ligament sprains.
- Causes of injury were running, slipping, and twisting due to front crosses or rapid changes of direction.
- Obese handlers had greater odds of injury

**Dogs:** No difference in sex, mean age was 5 years. The majority were working or sporting breeds with an average of 4 years of experience. 57.5% of dogs were stretched before and 25.1% after agility, 88.2% engaged in a warm-up and 56.6% in a cool-down routine, 56.1% were given supplements/vitamins, 39.9% were taken to chiropractors, 11.6% were taken to acupuncturists, and 23.9% received massages.

- 38 agility related injuries for their dogs; 47.4% occurred during training and 44.7% during competition.
- Injury rates in training and competition were similar between males and females.
- Dogs most commonly injured front paws and shoulders; other sites included back, head/snout, and hind foot. The most common diagnoses were muscle strains and cut/scrapes, as well as ligament strains.
- While 26.3% of injured dogs were able to return to practice within a week, 26.4% required 3 weeks of rest.
- The most common causes were contact with obstacles, and slipping; the most common obstacles involved were A-Frame, Chute, Tire Jump, and Dog Walk.
- Injury was positively associated with dog's age.

**Discussion:** The injury rates in agility handlers were similar to injury rates seen in other recreational physical activities with rapid acceleration and change in direction, with muscle and ligament sprains being the most common injuries.

**Conclusion:** For recreational activities, including agility, to be effective means of promoting physical fitness, efforts must be made to reduce incidence and severity of injury to both the dog and the handler.

### My thoughts?

So, this was just a pilot study. It did a good job of reporting what it studied. A future study might do well to compare routines of uninjured dogs to injured dogs. (For example, did stretching BEFORE training or competition have an effect on injury rate? Because we know it has a negative correlation in humans). One thing mentioned in the discussion was that injured dogs went for chiro and/or massage, but the survey was not created in such a way as to determine if this was FOR the injury, or supposedly preventative... so that is an aspect that could be improved upon as well.



## DIGIT INJURIES

Sellon DC, Martucci K, Wenz JR, et al. **A survey of risk factors for digit injuries among dogs training and competing in agility events.** J Am Vet Med Assoc 2018;252:75–83.

**Objective:** To identify potential risk factors for digit injuries in dogs training and competing in agility events.

**Design:** Internet-based, retrospective, cross-sectional survey.

**Animals:** 1,081 dogs training or competing in agility events.

**Procedures:** Data were collected for eligible animals via retrospective surveys distributed electronically to handlers of dogs participating in agility-related activities.

**Results:** Data were collected from 207 agility dogs with digit injuries and 874 agility dogs without digit injuries.

Factors associated with significantly increased odds of injury included:

- Border Collie breed
- Long nails
- Absence of front dewclaws
- Greater weight-to-height ratio

Odds of injury decreased with increasing age of the dog.



- Forelimb digit injuries were significantly more common than hind digit injuries.
- Hind limb digit involvement was more typically digits 4 & 5
- Forelimb digit injuries showed no difference from medial to lateral.
- Classification of the injury included sprain or strain, fracture, arthritis, tendon or ligament injury, dislocation or subluxation, broken or ripped nail, or other.
- Injury was reported to be minimal with less than a week of restricted activity for 17 dogs, mild with 1 to 3 weeks of restricted activity for 49 dogs, moderate with 1 to 3 months of restricted activity for 83 dogs, and severe with over 3 months of restricted activity for 58 dogs.



- The most commonly reported causes of injury were participation in agility training or competition (34.3%) or running and playing (35.3%); the rest were injured due to being caught in their kennel or pen, another sport, disease, fighting, or unknown.
- For the 71 dogs with digit injuries that occurred during participation in agility activities, 26 injuries occurred on grass, 23 on dirt, 10 on artificial turf, 10 on rubber mats, and 2 on sand.

**Conclusions and clinical relevance:** Results should be cautiously interpreted because of potential respondent and recall bias and lack of review of medical records. Nevertheless, results suggested that retaining healthy dewclaws, maintaining lean body mass, and trimming nails short for training and competition may decrease the likelihood of digit injuries. Research to investigate training practices, obstacle construction specifications, and surface considerations for dogs competing in agility activities is indicated.

## RETURN TO SPORT AFTER TPLO

Heidorn S, Canapp SO, Zink CM, et al. **Rate of return to agility competition for dogs with cranial cruciate ligament tears treated with tibial plateau leveling osteotomy.** J Am Vet Med Assoc 2018;253:1439–1444.

**Introduction:** There is no single procedure that has been determined to be the best surgical correction of cranial cruciate ligament (CrCL) tears in dogs, so selection is based on surgeon preference and current evidence. Thus far, the rate of return to agility for dogs after surgery for orthopedic disease has not been reported. The current study aimed to determine the rate of return to sport and other factors associated that could evaluate prognosis.

**Materials and Methods:** Medical records of dogs undergoing TPLO on a stifle joint at a private veterinary practice over five years were evaluated and dogs were included if they were active in agility competitions within the year prior to injury and surgery.

**Results:** Questionnaires were completed for 21 female (19 spayed) and 10 male (8 castrated) dogs. Age at the time of surgery ranged from 2.2 to 10.1 years, and body weight ranged from 4.5 to 84.1 kg. The time from TPLO to questionnaires ranged from 1 to 8 years.

- 65% of the dogs returned to competition, and 35% did not return.
- No difference was identified between the return and non-return groups with age and body weight, or sex.
- 50% of the dogs in the return group had a partial CrCL tear, and the other half had a complete tear; and 30% had bilateral tears.
- For dogs in the non-return group, 36% had a partial tear and 64% had a complete tear; 18% had bilateral tears. 30% of the dogs in the return group and 36% dogs in the non-return group had concurrent meniscal injury at the time of TPLO.
- In the return group, 80% had mild osteoarthritis, 10% had none, and 10% had moderate osteoarthritis.
- In the non-return group, 73% had mild osteoarthritis and 25% had moderate osteoarthritis. There was no significant differences between groups.
- Mean duration of recovery was 7.5 months and none reported re-injury to the affected limb.

**Conclusion:** The data suggested that the prognosis for returning to agility competition was good for dogs undergoing TPLO. None of the evaluated lesion characteristics were associated with return to competition.



## RETURN TO SPORT AFTER INJURY

Tomlinson, J. and Manfredi, J. **Return to Sport after Injury: A Web-Based Survey of Owners and Handlers of Agility Dogs.** *Veterinary and Comparative Orthopaedics and Traumatology* Vol. 31 No. 6, 2018.

**Introduction:** Previous surveys looking at canine agility injury rates have showed an injury rate of around 30%, which is high compared with other species. There is little information on return to agility after injury, particularly whether or not dogs return to the same competition level. This study aimed to report the percentage of dogs returning to agility competition after orthopaedic injury and compare their pre- and post-injury competition levels.

**Materials and Methods:** An online survey with 18 questions was distributed to veterinarians and an agility community, with a response rate of 19.5% (427 responses).

*Note:* Those that had post-surgical rehabilitation were re-categorized as conservative management. Rehabilitation was not evaluated because the type was not specified in the current survey.

### Results:

- The majority of respondents were from North America, and the rest were from Europe and Australia, Central America, Africa, Asia, with 1.1% undeclared.
- Most of the dogs were 5 to 7 years old, but ages ranged from less than 2 years to greater than 11 years.
- 80 breeds were represented, with the majority being neutered or spayed. The average weight was 18.1 kg.
- 131 dogs had surgery and 296 had conservative treatment.
  - Areas of injury for surgical treatment were carpus (0.7%), hip (4.6%), hock (3%), stifle (54%), shoulder (16.8%), toe fracture (2.3%), tendon injury (5.3%), vertebrae (3%) and other (5.3%).
- The return to competition rate in this survey is comparable with other species; with 53% of dogs returning to competition at the same jump height.
- A comparison of treatments showed that 50% of dogs that had surgery and 46% of dogs that had conservative treatment reduced their jump level in competition.
- Of the dogs that did not return to competition, 54% of dogs that had surgery and 65% of dogs that had conservative treatment were jumped at reduced height.
- In this study, 37 of the 71 dogs that had stifle surgery returned to sport.
- The main indicator for shoulder surgery in this study was a soft tissue injury to either the tendon or ligament. When comparing these two surgeries for soft tissue lesions, the rate of return to competition was similar.
- 23.8% of the responses indicated that age was a reason for dropping the level. Of these dogs that returned to competition at a lower level, preventative measures was the sole reason given by 21% of the responses. 65% of the responses noting preventative measures also included current illness/injury as a reason. Since both new and ongoing issues were combined, the survey results were limited, although it shows that multiple injuries does occur in agility dogs.

### My thoughts?

For this paper, I'm going to pull a line from the article itself.

“Medical professionals should be assessing about whether dogs are recovered enough before return to competition and who is determining their ability to compete.”



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