VETERINARY EVIDENCE online

Does Physical Therapy after a TPLO Lead to Improvement of the 1-Year Post-Operative Peak Vertical Force?

A Knowledge Summary by

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KNOWLEDGE SUMMARY

Clinical bottom line

Based on the lack of sufficient clinical studies investigating the PICO question, it is not possible to conclude if physical therapy should be recommended as a routine postoperative treatment after TPLO.

Question

Does postoperative rehabilitation improve 1-year postoperative peak vertical force (PVF) after a tibial plateau levelling osteotomy (TPLO) in dogs?

The evidence

A dog needs to undergo a TPLO as a result of a ruptured cranial cruciate ligament. The owner, an ambitious footballer, coincidentally had to operate his knee two years ago for the same reason. He would like to know if the postoperative rehabilitation is comparable and if there is any evidence that physical therapy in dogs provides similar benefits as in humans (van Melick 2016).

Summary of the evidence

Wucherer (2013)	
Population:	Overweight dogs with unilateral cranial cruciate ligament rupture (CCLR)
Sample size:	40 dogs n = 40
Intervention details:	Two treatment groups: n = 19 nonsurgical treatment group (physical therapy, weight loss, and Non-steroidal anti-inflammatory drugs [NSAID] administration) n = 21 surgical treatment group (TPLO + nonsurgical treatment)
Study design:	Randomised controlled trial
Outcome studied:	Subjective: Owners had to complete questionnaires (canine brief pain inventory [CBPI] and VAS [visual analogue scale]) at each outcome measure time. Objective: Functional and clinical scores (peak vertical force [PVF], vertical impulse [VI], body weight and body fat).
Main findings: **(relevant to PICO question):**	Dogs with CCLR treated with surgical and nonsurgical interventions had better outcomes than dogs only with nonsurgical treatment • significant ($P < 0.05$) improvements of pain severity and

	interference score at the 52-week evaluation of the questionnaires • significant (P < 0.05) higher mean PVF at the 24- and 52-week evaluations
Limitations:	Surgery wasn't performed by the same person (board-certificated veterinary surgeon or a surgical resident under the direct supervision of a board-certified veterinary surgeon) AND different surgical procedures (arthroscopy vs. arthrotomy) Due to complications during the time of follow-up (most common cause was the development of contralateral CCLR) dogs were successively excluded from the study. Of the initial 40 dogs only data of 23 were used at the 52-week evaluation.

Au (2010)	
Population:	Medium to large breed dogs with naturally occurring cranial cruciate ligament (CrCL) injury
Sample size:	65 dogs n = 65
Intervention details:	Two treatment groups with different surgical interventions and the same postoperative physical rehabilitation: n = 35 had lateral fabellar suture (LFS) n = 30 had TPLO
Study design:	Non-randomised controlled trial
Outcome studied:	Objective: Radiographic osteoarthritis (OA) and functional/clinical scores (PVF, stifle joint range of motion and thigh circumference)
Main findings: **(relevant to PICO question):**	Increase of PVF from 3 weeks to 24 months but no significant difference between both groups • Mean PVF at 3 weeks evaluation: LFS group (17.57 ±70) and TPLO group (20.65 ± 1.73) • Mean PVF at 24 months evaluation: LFS group (32.27 ±81) and TPLO group (39.00 ± 2.75) Increase of radiographic OA scores from preoperative to 24 months in both groups but no significant difference between both groups (potential OA scores ranged from 0 to 63): • Radiographic score at preoperative evaluation: LFS group (18.5 ±59) and TPLO group (16.38 ± 1.91) • Radiographic score at 24-month evaluation: LFS group (28.21 ± 2.84) and TPLO group (24.31 ± 2.42)
Limitations:	• Significant differences between the groups at the start of the trial: age, weight, breeds and thigh circumference.

	• Dogs were nonrandomly allocated to groups: owners decided the surgical treatment. • Surgery wasn't performed by the same person (surgery residents under the direct supervision of board certified surgeons). • Identical physical rehabilitation regime for all dogs. • Non-exclusion of dogs which developed CrCL injury in the opposite limb or other complications considered to affect function (e.g. implant removal because of infection) • during the postoperative period of the study. • Follow up incomplete. Only approximately 50% of the dogs returned for the 24-month postoperative re-evaluation.

Appraisal, application and reflection

Only two papers relevant to the PICO were found in the literature analysing the ground reaction force (GRF) over a longer time period of dogs with unilateral CCLR after a TPLO and/or physical therapy.

Wucherer et al. (2013) compared, in a randomised controlled trial, overweight dogs with CCLR which were assigned to a non-surgical (physical therapy, NSAID administration and weight loss) and a surgical (TPLO) + physical therapy treatment group. Both groups received the same non-surgical therapy. The physical therapy, which was conducted by the same person, was individually designed for each dog and included at least 6 supervised sessions over 12 weeks. While the non-surgical treatment group had its first session at the beginning of the trial, the surgical group started 2 weeks after the surgery.

The study was able to show that the mean PVF of the dogs in the surgical treatment group was significantly higher after 24 and 52 weeks after the start of the study, compared with the non-surgical treatment group.

In the nonrandomised controlled trial from Au et al. (2010) dogs with CCLR underwent either a TPLO or a LFS as surgical intervention. Both groups were followed by an identical physical rehabilitation regime performed by the same experienced handler. Even if the PVF scores were recorded during 2 years on a regular basis no significant differences between the two groups could be shown. This work has some bias since the two groups were not similar (different age, weight, breeds), the follow up was incomplete and the dogs having developed CrCL injury on the opposite limb or other complications during the study period, were kept in the group. Moreover, the surgeries in both studies were done by different surgeons and were not conducted identically. This will additionally compromise the strength of the results.

In conclusion, there is currently insufficient evidence to prove the benefit of postoperative physical therapy after a TPLO based on an increase in PVF at 1 year recheck follow-up. However, there is some preliminary evidence that rehabilitation may be beneficial for the postoperative period, although further studies are needed. To provide evidence that rehabilitation should be included as routine postoperative treatment after TPLO, a prospective, randomised study should be performed. Dogs should undergo TPLO and rehabilitation by the same individuals following consistent protocols to reduce variability. Dogs should be followed for at least 1 year after surgery.

Methodology Section

Search Strategy	
Databases searched and dates covered:	CAB Abstracts on the CAB Direct interface, date range: 1973 - 2016 and PubMed accessed via the NCBI interface, date range: 1971 - 2016
Search terms:	(dog OR dogs OR canine OR canines OR canis OR puppy OR puppies) AND (TPLO OR "tibial plateau leveling osteotomy" OR "tibial plateau levelling osteotomy" OR "tibial plateau leveling" OR "tibial plateau levelling") AND ("vertical force" OR "ground reaction force" OR GRF OR "force plate" OR "pressure platform" OR plate OR platform OR compression OR force OR pressure)
Dates searches performed:	December 7th 2015

Exclusion / Inclusion Criteria	
Exclusion:	Non English language, non-systematic review, conference papers or summary updates.
Inclusion:	Studies which include rehabilitation, TPLO and GRF at the same time.

Search Outcome

Database	Number of results	Excluded – non-English language publication	Excluded – as didn't include the criteria rehabilitation, TPLO and GRF at the same time	Total relevant papers
CAB Abstracts	80	11	67	2
NCBI PubMed	66	0	65	1
Total relevant papers when duplicates removed				2

CONFLICT OF INTEREST

The authors declare no conflicts of interest.

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