Comparison of Pet-Owner Satisfaction with Stifle Orthoses (Braces) or Tibial Plateau Leveling Osteotomy for the Management of Cranial Cruciate Ligament Disease in Medium to Large Breed Dogs


Take Home Message
Surgical treatment of cranial cruciate ligament disease (CCLD) was associated with a greater number of excellent outcome ratings, and improved owner-assessed lameness grade than non-surgical treatment with a stifle orthosis. However, a high percentage of owners in both groups reported positive satisfaction. Pet owners selecting stifle orthoses should be advised of the potential for complications including persistent lameness, skin issues, non-acceptance of the orthosis, and the possible need for subsequent surgical intervention.

Introduction
Injury to the cranial cruciate ligament is a common cause for the development of hind limb lameness, development of stifle osteoarthritis, and associated pain in the canine patient. Despite the high prevalence, there is still controversy about the best overall course of treatment. Surgical treatment is frequently advocated, and has proven to be effective in the restoration of limb function. The literature most strongly supports Tibial Plateau Leveling Osteotomy (TPLO) as the surgical procedure of choice, allowing return to normal function after surgical treatment of CCLD. Non-surgical management of CCLD has been investigated and is most commonly suggested for dogs weighing less than 15-20kg. However, improvement in lameness with non-surgical management of CCLD has also been reported in dogs weighing >20kg.

Non-surgical management of CCLD has recently changed with the introduction of canine rehabilitation therapy and other novel management options such as stifle orthoses. Orthoses (also referred to as ‘braces’ or ‘orthotic[s] device[s]’) are medical devices used to support or protect an injured leg, and frequently defined as any medical device added to the body to support, align, position, immobilize, prevent or correct deformity, assist weak muscles, or improve function. Anecdotally, stifle orthoses are occasionally utilized for non-surgical management of CCLD. However, to the authors’ knowledge, no peer-reviewed reports of clinical outcome of stifle orthoses for the management of CCLD are available. The goal of this study was to report outcome and satisfaction of pet owners that chose to employ a custom-made stifle orthosis for the management of their dog’s CCLD, in comparison to owners that elected TPLO.

Methods
The Orthopets’ client database was searched for dogs who received a custom-made stifle orthosis for treatment of CCLD (ORTHOsis group) from 2008 to 2013. These cases
were recruited from veterinarians across the US. Only dogs that had not previously undergone surgical intervention for CCLD were included in the study. Dogs that were treated simultaneously with an orthosis in addition to surgical treatment were also excluded. Similarly, CSU’s hospital database was searched for dogs that underwent TPLO surgery for treatment of CCLD (TPLO group) between 2002 and 2013. For each database, only dogs where owners provided an email address were included.

Survey requests were sent via email to the identified clients including questions on the following categories: CCLD presentation (affected limb(s), breed, weight, and age), treatments performed, aftercare, complications, level of client compliance and satisfaction, and considerations made when choosing treatment.

**Results**

**OWNER RESPONSE** - For the ORTHOSIS group, 819 owners were invited to participate in the survey, while 203 owners were invited for the TPLO group. The TPLO group represented owners of dogs presenting between 2002 and 2013, and the ORTHOSIS group cases were identified from orthoses provided between 2008 and 2013. The response rate for the ORTHOSIS group was 25% (n = 203/819) and 37% for the TPLO group (n = 76/203; P = 0.003). Owners were not required to answer all of the questions and for some questions multiple answers were allowed; hence subsequent data is reported including the number of respondents for each question.

**DEMOGRAPHICS** - There were no significant differences for dog weight between the TPLO group (31.4 ± 10.5 kg) and the ORTHOSIS group (34.1 ± 13.4 kg; P = 0.10), or limb distribution (P = 0.68). All dogs in the study were medium to large breed dogs. Dogs in the TPLO group started showing signs of lameness at a significantly younger age than dogs in the ORTHOSIS group (5.5 ± 2.6 years in the TPLO group compared to 7.8 ± 3.6 years in the ORTHOSIS group; P = 0.001).

**TREATMENT DECISION FACTORS** - Eighty-one percent (n = 162/199) of selected responses from owners in the ORTHOSIS group were “cost”, “convenience”, or “personal preference” as the most important factors for choosing the treatment of their dog compared to only 25% (n = 17/67) in the TPLO group. Conversely, “veterinarian recommendation” was selected as the most influential by 75% (n = 50/67) of the TPLO group owners compared to 19% (n = 37/199) of owners in the ORTHOSIS group (P = <0.001).

**AFTERCARE** - Sixty-three percent (n = 40/63) of the TPLO group and 53% of the ORTHOSIS group (n = 80/152) did not pursue rehabilitation (P = 0.14). When asked why they did not pursue rehabilitation, 46% of the TPLO group (n = 16/35) and 33% of owners in the ORTHOSIS group (n = 30/92) reported “Not advised of necessity” (P = 0.06).

**OUTCOME ASSESSMENT/OWNER SATISFACTION** - Eighty-five percent (n = 129/152) of owners that pursued orthoses for their dogs, and 90% (n = 57/63) of the TPLO group, replied they would repeat the chosen treatment again if they were given the choice (P = 0.27). A statistically significantly larger number of owners in the TPLO group rated the treatment as either “excellent”, “very good”, or “good” (TPLO: 98%, n = 62/63; ORTHOSIS: 86%, n = 131/152) compared to “poor” (TPLO: 2%, n = 1/63; ORTHOSIS: 14%, n = 21/152; P = <0.001). When comparing owner-reported lameness after intervention, 98% (n = 62/63) of the dogs in the TPLO group and 88% (n = 128/146) in the ORTHOSIS group showed mild/no lameness (P = 0.01; see Table 2).

**COMPLICATIONS** - Forty-six (n = 70/152) percent of owners reported their dogs experienced skin issues while wearing the orthosis and 32% (n = 22/69) of those cases required medical attention and multiple adjustments to the orthosis according to owners. In comparison, 5% of owners in the TPLO group reported complications (n = 4/76). Owners reported 2 cases of suspected patellar tendinopathy, 1 draining fistula that required removal of the TPLO plate, and 1 acute case of NSAID toxicity. In review of the medical records, there were no additional documented complications for the TPLO group. The majority (60%, n = 91/151) of dogs who received an orthosis experienced a 1 to 2 week long adjustment period to get used to wearing the orthosis. Eighty-eight percent (n = 134/151) of owners reported their dog was wearing the orthosis after the initial adjustment period: 43% (n = 65/151) of dog owners reported their dog was wearing the orthosis every day, 15% (n = 23/151) reported 3-6 days/week, and 34% reported less than 3 days/week (n = 52/151). Thirty-eight percent (n = 58/151) of owners reported their dog tolerated the orthosis ‘very well – my dog actually seems to like wearing the device’, 33% (n = 50/151) reported ‘well – my dog seemed reluctant to have the device applied but seems to like wearing the device’, and 19% (n = 28/151) reported ‘fair – my dog seems reluctant to have the device applied and does not seem to like wearing it but will tolerate it.’ Eleven percent (n
of the owners reported that their dog does not wear the orthosis at all: 7% (n = 10/151) reported their dog did not tolerate the orthosis due to fit issues or skin concerns, 2% (n = 3/151) reported their dog didn’t need the orthosis anymore since the lameness had resolved, and 3% (n = 4/151) reported “other” reasons. Five percent reported their dog never tolerated the orthosis (n = 7/151), and 11% (n = 16/151) of the ORTHOSIS group reported that their dog received subsequent surgical procedures on the orthosis-managed limb (TPLO, n = 7; meniscal removal only, n = 4; tibial tuberosity advancement, n = 2; tightrope procedure, n = 2; did not specify, n = 1).

Conclusions

Based on the results of this survey and previous research, it can be concluded that non-surgical treatment is a viable alternative for dogs that cannot undergo surgical treatment for CCLD. If an orthosis is considered as part of this management, owners should be given appropriate counseling regarding potential complications such as skin issues and unwillingness to wear the device, as well as the risk of subsequent surgical intervention. Owners should also be aware that the majority of patients so treated are chronically “orthosis-dependent”. It is also important to note that long-term data on development of osteoarthritis is not available.

References