MEDIAL PATELLAR LUXATION AND USE OF A MANUAL 3D PATELLAR REPOSITIONING TECHNIQUE: UPDATES

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Management of Medial Patellar Luxation in Small Dogs and Cats: An Investigation into the Use of a Manual 3D Patellar Repositioning Technique appeared in *Orthopaedic Physical Therapy Practice*, volume 33/number 4 of 2021. I served as primary author on this paper and enjoyed a wonderful collaborative experience with my co-authors Laney Baris, VMD, Donna L. Frownfelter, PT, DPT, FAPTA, and Wendy Rheault, PT, PhD, FASAHP, FNAP. Officers of the Animal PT SIG asked me to provide a recap of the paper and include a review of the 3D technique, along with updates over the past 24 plus months. For review, the Abstract is included as follows:

Background and Purpose: Medial patellar luxation (MPL) is a common condition managed with surgery, medication, and observation. There is a lack of literature regarding specific conservative MPL intervention. Conservative treatment is important for milder non-surgical cases to prevent progression of luxation and future joint degeneration. The purpose of this retrospective study is to document and investigate the significance of manual 3D repositioning technique, developed by Dr. Susan Davis, on outcome scores of small dogs and cats having MPL grades one or two. **Methods**: Data from 37 eligible medical records were statistically analyzed using Wilcoxon signed rank test. **Findings**: A statistically significant difference ($p < .01$) was found using manual 3D patellar repositioning in reduced lameness and improved functional scores for a combined sample size of 37 canine and feline patients between initial evaluation and discharge and in a separate analysis of 29 dogs ($p < .01$ lameness, $p = .001$ function). Results were inconclusive ($p = .011$ lameness, and $p = .014$ function) in separate analysis of a smaller sample size of 8 cats. **Clinical Relevance**: Physical Therapy for MPL grades one and two should include manual 3D patellar repositioning in small dogs and cats. An average of 6 visits is effective, though neutered males may take longer. **Conclusion**: Manual 3D patellar repositioning is effective in reducing lameness and increasing function in small dogs and cats having MPL grades one and two.

Key Words: instability, mobilization, patellofemoral dysfunction

I developed the manual 3D patellar repositioning technique (3D technique) in response to a need for small animals in a shelter, with mild lameness due to patellar luxation, to find their forever homes. In a crowded shelter environment, pets having signs of physical impairment are often passed over by potential adopters. Dr. Baris and I discussed the need to intervene with minor luxations to resolve lameness quickly. I began reviewing my experiences with human patients and the patella being most stable in stifle extension. I knew this was also true for non-human animals. Next came the application of normal stifle arthrokinematics during extension in three planes: the dorsal, sagittal and transverse. Thigh and leg rotations occur in the dorsal plane. Stifle flexion, extension and long axis distraction occur in the sagittal plane. Patellar glides occur in the transverse plane. I incorporated these into a manual maneuver, ending with long axis distraction. A cat with medial patellar luxation (MPL) received the first trial application of the technique in a physical therapy program. It was well tolerated. Dr. Baris and I agreed that the technique should be applied to other cats in the shelter having MPL, and then a few small dogs with similar diagnoses. The shelter staff started noticing less 'self-backward limb kicking' in the animals along with reduced lameness. Continued use of the 3D technique led to sustained improvement and increased adoption rates. I began to use the technique on patients in my private practice and observed similar results with less lameness and improved function.

The 3D technique is not a joint mobilization nor a joint manipulation. It is a targeted reduction and relocation maneuver using normal stifle arthrokinematics during extension, occurring in three planes, and referred to as the screw-home mechanism.

Arthrokinematics during stifle flexion are equally important to understand. The unique shape and position of the medial femoral condyle influences thigh rotation during stifle flexion. It is flatter, wider and sits in a cranially-placed position to the lateral femoral condyle. During stifle flexion, the lateral collateral ligament slackens, allowing natural external rotation of the femur on the tibia, driven by the shape and position of the medial femoral condyle. As this occurs, the tibia rotates internally on the femur.

The opposite occurs with arthrokinematics during stifle extension. The lateral collateral ligament tightens and pulls the leg into external rotation because of its attachment to the fibular head. Articulations and ligamentous connections between the tibia and fibula cause the tibia to rotate in tandem with the fibula. The screw-home mechanism takes place as the tibia and fibula externally rotate on the femur, and the femur internally rotates on the tibia.

Therefore, the 3D technique uses femoral internal rotation and tibial/fibular external rotation during stifle extension. Long axis distraction concludes the technique, with a minor assist by the practitioner's index finger for patellar glide if the latter is necessary for full repositioning.

The following video links display the 3D technique on my Youtube channel:'

- Video 1 (Canine example)
  https://www.youtube.com/embed/3EwTnbMgzMA
- Video 2 (Feline example)
  https://www.youtube.com/embed/JJM5CW8xHkE

In most practices, Physical Therapists do not regularly intervene with patellar luxations until they present in grades 3 and 4, at which point the patients undergo trochleoplasty or other surgical procedures. Intervention consists primarily of post-operative rehabilitation. The results of the study validate the significance of applying the 3D technique within a PT program for patients having MPL grades 1 or 2. This indicates that we should advocate for earlier intervention in patellar luxation to help prevent progression of milder forms of MPT into grade 3 or 4.

Short-term goals for the 3D technique used within a patient intervention plan include rapid relocation of the patella in its normal position within the trochlear groove; facilitate of this position with fewer luxations; higher and sustained outcome scores for function and gait.

The 3D technique must be included within an entire treatment program and is not meant to be used in isolation. Current evidence (see Reference list) shows that the use of a manual technique is important in the treatment of patellofemoral dysfunction, along with exercise, and specifically: prior to exercise. A typical treatment session consists of the following:

- the application of modalities: cold laser, electrical stimulation, tPEMF, ESWT, etc.
- techniques to prepare the soft tissues: massage, myofascial release, acupressure
- manual correction of the patella into a cranial or caudal direction if found in Baja or Alta starting position
- stretching tight muscles or groups of muscles impacting medial luxation: sartorius, rectus femoris, adductor groups, etc
- at this point apply several repetitions of the 3D repositioning technique, even if the patella goes right into position on the first attempt. Hold the position for several seconds, then release smoothly. Repeat 3 to 5 times
- apply appropriate stabilizing exercises at the end of the session
- instruct the pet owner in the 3D technique, along with home exercises, including daily controlled leash walking
- approximately 6 visits are needed to achieve the desired goals

Most pet owners are willing to learn the 3D technique. Others are uncomfortable touching and maneuvering the limb and still others, though willing, are not competent. My experience teaching it to pet owners finds approximately 60% are comfortable performing the technique at home, with compliance in follow-through at least 3 times per week, several reps each session. Review of the technique by onsite home visit, or video/zoom virtual session, confirms competency by the pet owner. I have had varying degrees of success when teaching this to professional colleagues. When I taught the 3D technique as part of a live in-person CEU course on Stifle and Patellofemoral Instability last September, most Physical Therapists and Veterinarians learned it quickly and naturally, though a few struggled with long axis distraction, applying it as a hard pull at the end of the technique, startling the pet. I reviewed the long axis distraction as a smooth ending to the technique, and not a separate pull or jerking motion. This may have occurred due to handling an unfamiliar animal, and stress of performing a new technique in a live setting with others observing. In the home clinic or the patient's home setting, application of the technique should be fairly straightforward.

Several months after the paper appeared in OPTP, I made efforts to follow-up on outcomes of patients included in the study. Pet owners, animal shelters and veterinary clinics received communication by email or phone. I obtained status information on only eight (five feline, three canine) out of the 37 patients. This was largely due to those from shelters having been adopted and difficulty obtaining accurate contact information for the current owners. One canine patient, a Wheaten terrier, developed a meniscal and CCL tear. The remaining 7 maintained either full resolution of MPL symptoms or an occasional brief exacerbation. None developed MPL grade 3 or 4.

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