

Medial Patellar Luxation (MPL)

OR

Lateral Patellar Luxation (LPL)

Patellar luxation is the condition where the patella luxates out of the femoral trochlear sulcus instead of tracking up & down within it. Most commonly the patella luxates medially but lateral luxation also occurs. It can occur in any size or breed of dog but is more common in small breed dogs.

Cats have a broad & flat patella & the femoral trochlear sulcus is shallow; therefore the normal cat patella is much more mobile medial to lateral & relatively unstable compared to dogs.

Patellar subluxation is common in cats but, clinically significant patellar luxation is uncommon.

The patella (knee cap) is a movable bone located over the knee that connects the muscles of the thigh to the lower leg. When the patella functions correctly, the dog can use the leg well. Patellar luxation is a dislocation of the kneecap most often seen in small dogs, but any size of pets can have patella luxation. Most of these animals are born with (congenital) this problem & usually both knees are affected. A fall or twisting injury may aggravate the already existing condition.

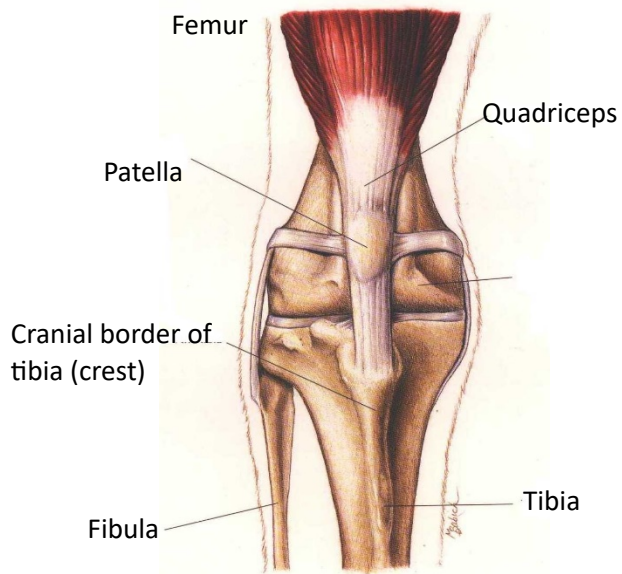
A common symptom of this “trick knee” condition is a dog that occasionally holds the leg while running but spontaneously starts using it again. This happens as the kneecap pops in & out of place (femoral trochlear). Often the dog will give out a short cry or yelp when this happens.

We classify luxating patellas depending on the severity. A Grade I is when the kneecap is mostly in place & pops out on occasion. As the ridge wears down, the kneecap starts moving in & out of place more often & is now a Grade II. When the kneecap is out of place more than in place, it becomes a Grade III. Finally, when the kneecap is out all of the time, the knee is classified as a Grade IV.

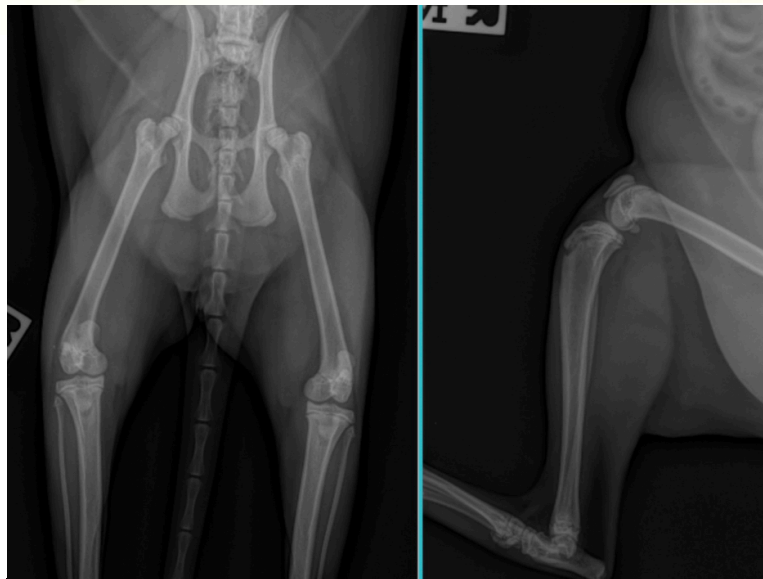
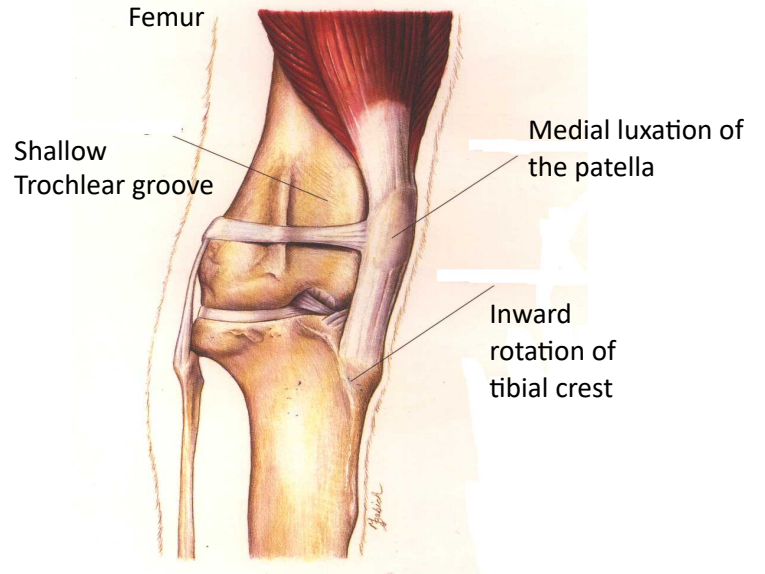
Surgery is usually recommended if your pet is in a great deal of discomfort at all. Several different types of surgery have been developed & your veterinarian will describe the one he or she feels that will benefit your pet the most. Remember, even if your pet does NOT appear to be in pain, luxations make them more prone to rupturing their cruciate ligaments (ACL) inside the knee later in life due to the abnormal strain/stress placed on them with this condition.

If the end of the femur is starting to “bend (femoral varus)” in young patients, surgery should be done immediately; otherwise it should be done around 8 - 10 months of age when growth plates are near or completely fuse & healing is fast compared to middle age & older patients.

Normal Patella



Abnormal Patella



What Options are Available for Treating Patellar Luxation?

Patellar luxations that do NOT cause any clinical sign should be monitored, but do NOT typically warrant surgical correction, especially in small dogs. Surgery is considered in Grades II or greater. One or several of the following strategies may be required to correct patella luxation:

1. Lateral Imbrication/Tightening/Reinforcement

Slack Lateral Soft Tissues: surgical solutions i.e. retinaculum, joint capsule & femero-patellar ligament; if these tissues are loose, then the patella is NOT 'pulled' or constrained laterally i.e. patellar luxation can occur. These tissues are loose in the opposite direction to the patellar luxation, & most likely develop as a result of patellar luxation rather than causing it.

Reconstruction of soft tissues surrounding the kneecap to tighten the opposite side toward which the patella is luxating.

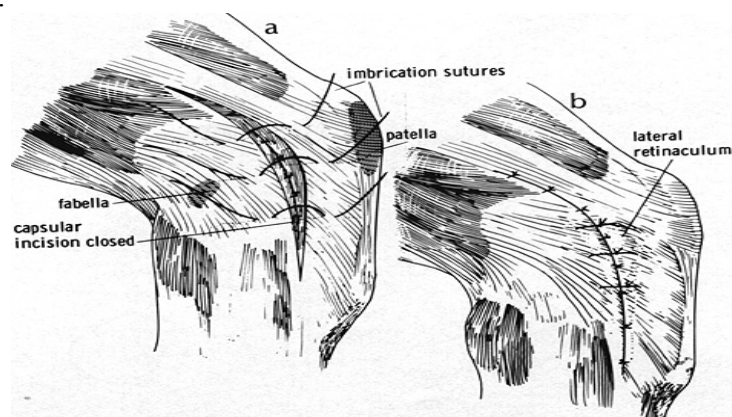


FIG. 80-13 Capsular (fascial) imbrication. (a) The joint capsule is closed with interrupted Lembert sutures. (b) Additional layers of imbricating Lembert sutures are placed in the fascial tissues.

2. Medial Release

Excessively Tight Medial Soft Tissues i.e. retinaculum & joint capsule. If the soft tissues medial to the patella are too tight, they will constrain its movement by permanently 'pulling' it medially. It is likely that these tissues become tight as a consequence of chronic patellar luxation, rather than causing it.

Reconstruction of soft tissues surrounding the knee cap to release or loosen the same side from which the patella is luxating. The subcutaneous, fascia, +/-muscle & +/-joint capsule may or may not be involved in the medial release. No sutures are placed & the associate tissues are left opened to allow for the knee tissue to scar down.



3. Deepening of the Trochlear Groove

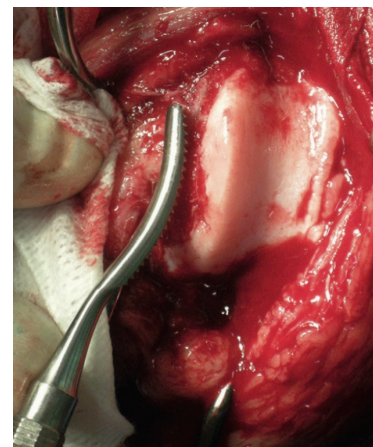
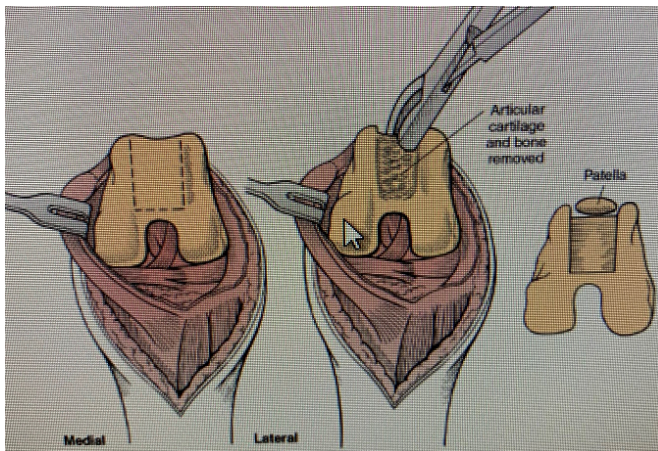
Shallow Femoral Trochlear Sulcus: too shallow a sulcus or insufficiently high medial or lateral trochlear ridges can result in inadequate constraint of the patella & subsequent luxation.

Deepening of the femoral groove so that the kneecap can seat deeply in its normal position & the patella should sit about 50% of the patella height within the femoral trochlear.

3 Optional Procedures which include the following:

a) Abrasive Sulcoplasty (Rasp)

Least favorable option as all articular cartilage is destroyed. This technique is NOT recommended unless no articular cartilage is present, which is unlikely except in revision surgery. Inexperienced surgeons may choose to start using this technique, particularly in very small stifles where the osteotomy techniques may be challenging & carry a risk of fracture of the osteochondral graft or the femur if the cuts are made too deep.



b) Trochlear Block Recession

Best option as it preserves the largest amount of articular cartilage, it enables a larger amount of the sulcus to be deepened, & it creates a deeper femoral trochlea proximally compared to wedge recession sulcoplasty. However, it is also the most fiddly & technically demanding method & requires precise surgical technique

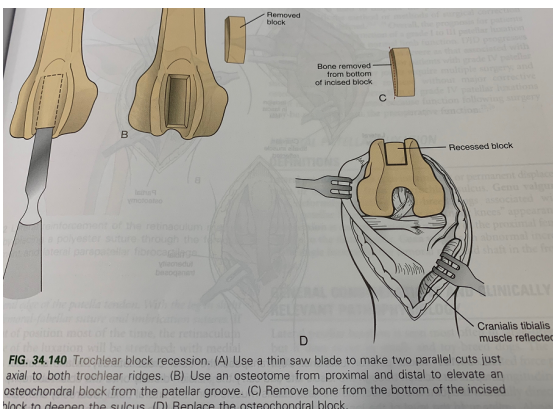
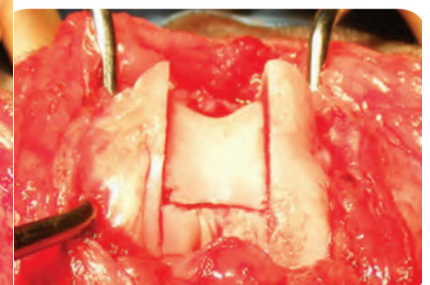
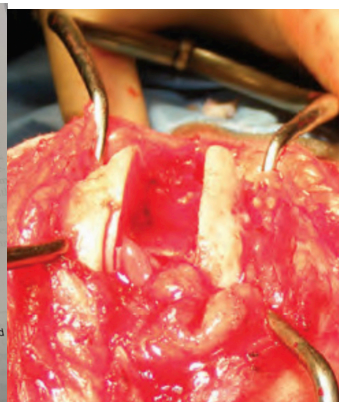


FIG. 34.140 Trochlear block recession. (A) Use a thin saw blade to make two parallel cuts just axial to both trochlear ridges. (B) Use an osteotome from proximal and distal to elevate an osteochondral block from the patellar groove. (C) Remove bone from the bottom of the incised block to deepen the sulcus. (D) Replace the osteochondral block.



c) Trochlear Wedge Resection

This is the next best option as it preserves some articular cartilage, but it does NOT deepen the trochlear sulcus as well as block recession sulcoplasty. It is simpler to perform, can be done with less specialized equipment or experience & the risk of graft fracture is less.

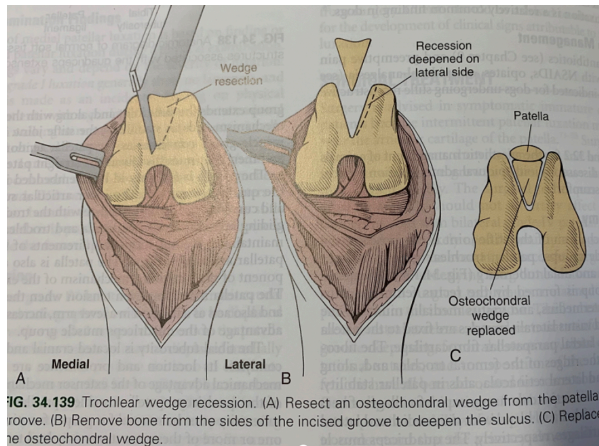


FIG. 34.139 Trochlear wedge recession. (A) Resect an osteochondral wedge from the patellar roove. (B) Remove bone from the sides of the incised groove to deepen the sulcus. (C) Replace the osteochondral wedge.



D) Tibial Tuberosity Transposition (TTT)

Transposing the tibial crest, bony prominence onto which the tendon of the patella attaches below the knee. This will help realign the quadriceps, the patella & its tendon.

Tibial Tuberosity Transposition Surgery

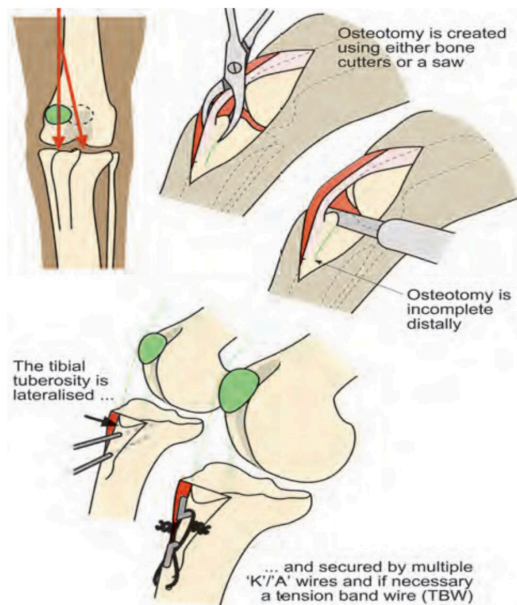
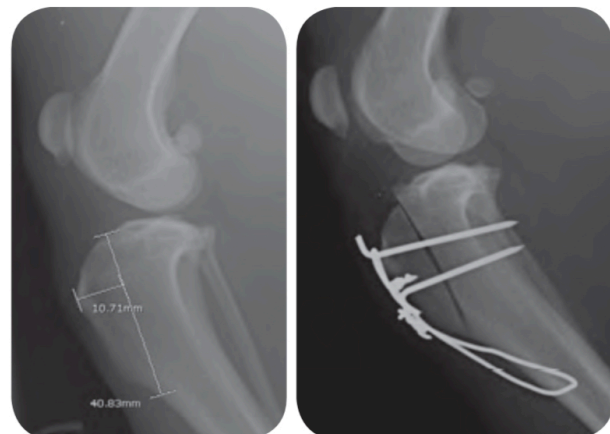
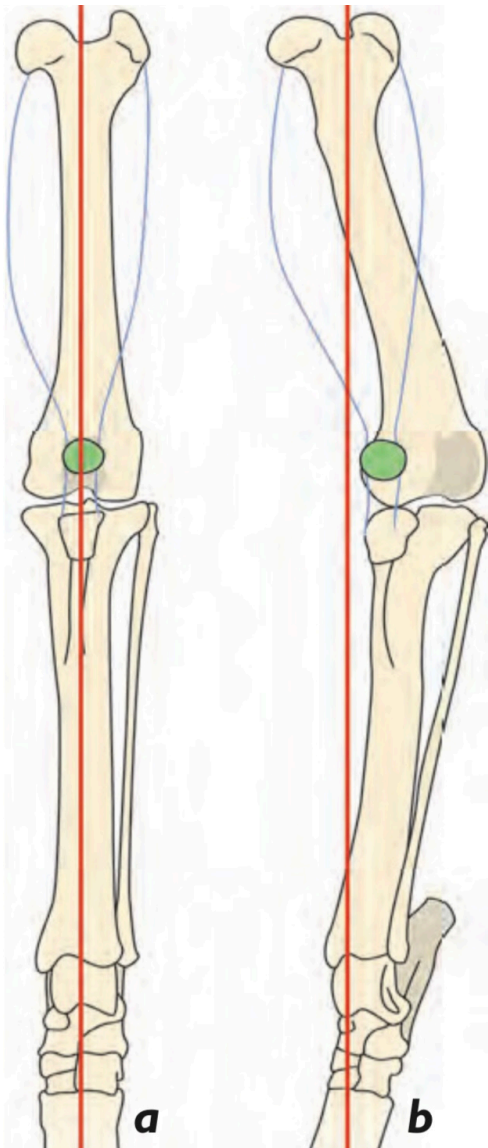


Fig 25 shows a postoperative radiograph with a good to large sized tibial tuberosity. If the osteotomy is made in the wrong position, either the tibial tuberosity or the tibia are at risk of fracture.



Malalignment Of The Quadriceps Mechanism (Usually in Patella Luxation Grade IV (4) &/or Chronic Cases)



a. conformation of pelvic limb of normal dog.
b. conformation of pelvic limb of dog with medial bowing (varus) of the femur, internal rotation of the tibia and medial tibial tuberosity malpositioning i.e. malalignment of the quadriceps mechanism relative to the femoral trochlear sulcus, and medial patellar luxation.
Red line indicates central axis of the limb.

The stifle extensor mechanism comprises the quadriceps muscle with the origin of the 3 vastus muscles on the proximal femur & rectus femoris on the pelvis just cranial to the acetabulum (pelvic joint rim), the patella, patellar tendon & tibial tuberosity. The relative position of these, in particular the patella & the femoral trochlear sulcus is important. For normal patellar tracking, the line-of-pull of the quadriceps mechanism & the patella should lie directly over the femoral trochlear sulcus.

Factors that affect quadriceps alignment are:

1) Bowing of the “distal femur varus”. This changes the position & alignment of the femoral trochlear sulcus relative to the quadriceps mechanism. Femoral bowing can be assessed from physical assessment, radiographs & CT images (best diagnostic available), but interpretation can be challenging & the normal range is NOT been well defined.

2) Tibial malformation called “tibial valgus” i.e. a rotational (torsional) deformity of the tibial tuberosity can cause malalignment of the quadriceps mechanism due to abnormal positioning of the tibial tuberosity relative to the femoral trochlear sulcus. Bowing of the proximal tibia; often the proximal tibia is bowed in the opposite direction to the distal femur.

3) Hip conformation & pathology; for example cranio-dorsal hip luxation causes functional foreshortening of the femur with external rotation; this in turn causes quadriceps/femoral trochlear sulcus malalignment & patellar luxation can occur.

Other surgical produces may be used to correct patellar luxation, but these are more demanding procedures. TPLO or lateral fabella suture may be used with concurrent cranial cruciate ligament disease. Corrective osteotomies of the distal femur &/or proximal tibia may be performed if there is significant femoral/tibia malalignment. Partial patellectomy may be performed in cats if patellar luxation cannot be constrained using traditional means. Correct any hip luxation problems.

Post-Surgical Care of Patella Luxation Repair

Home patient care after orthopedic surgery is critical to the success of the surgery. Allowing your pet too much activity may alter the anticipated outcome of the surgery.

The following instructions will be your guide to HOME CARE:

(Note: if your pet is walking normally, no matter how soon after surgery, you may stop all rehabilitation exercises, but continue leash restriction for a minimum of 8 weeks to allow full bone healing).

WEEK #1

- Pain management with NSAID (carprofen) & analgesia (tramadol +/- gabapentin) for the next 14 days then as needed through WEEK #2-8. Sedation (acepromazine +/- trazodone) if needed.
- Elizabethan Collar (e-collar) or No Bite Collar until sutures removed on day 14 to prevent infection & licking wound.
- Confined patient into confined area with no access to furniture.
- Jumping, running & playing should be avoided as this can cause premature loosening of pins necessitating additional surgery at additional cost.
- If pet sleeps in bed at night, this should be avoided to prevent inadvertent jumping from bed while you are sleeping. Jumping causes the most forces on the trochlear tuberosity which was moved laterally & is held in place by pins +/- additional wire.

DAY 1, 2, 3

1. ICE-PACK over a clean towel to the knee 2-3 TIMES DAILY for 10-15 minutes
(If no bandage has been applied.)

DAY 4, 5, 6, 7

2. HOT-PACK over a clean towel to the knee 2-3 TIMES DAILY for 10-15 minutes.
(If no bandage has been applied & inflammation is NOT present).
3. MASSAGE QUADRICEPS MUSCLES exercise 2-3 TIMES DAILY for 5-10 minutes before & after pROM.
4. PASSIVE RANGE OF MOTION (pROM) exercise 2-3 TIMES DAILY for 10-15 slow repetitions.
(Gently flex & extend knee while patient lay on his or her side).
5. SLOW LEASH WALKS exercise 2-3 TIMES DAILY for 10-15 minutes.
6. LASER THERAPY (optional) DAILY: available through some veterinary facility.

WEEKS #2 & #3

- If your pet's limping or pain appears to worsen after running out of pain medication, please call & request a refill for as long as it continues to help.
- Schedule a recheck with your veterinarian at week 2 after surgery to remove any sutures & evaluate progress on lameness & at home physical rehab exercise.
- At WEEK #3: most patients begin to bear some weight, but every pet is different & some may take longer.

1. MASSAGE QUADRICEPS MUSCLES exercise 2-3 TIMES DAILY for 5-10 minutes each time before & after pROM.
2. pROM exercise; gently flex & extend knee 2-3 TIMES DAILY for 10-15 slow repetitions. (STOP pROM exercise if your pet is using the leg correctly).
3. SLOW LEASH WALKS exercise 2-3 TIMES DAILY for 10-15 minutes.
4. LASER THERAPY (optional) TWICE WEEKLY.

WEEKS #4 & #5

1. MASSAGE QUADRICEPS MUSCLES exercise 2-3 TIMES DAILY for 5-10 minutes each time before & after PROM.
2. pROM exercise 2-3 TIMES DAILY for 10-15 slow repetitions. (STOP pROM exercise if your pet is using the leg correctly).
3. SLOW LEASH WALKS exercise 2-3 TIMES DAILY for 15-20 minutes.
4. SIT-STAND exercise 2-3 TIMES DAILY for 5-10 repetitions. (Use sling for assistance for added support if needed).
5. CAVALETTIS exercise 2-3 TIMES DAILY for 5-10 repetitions. (Use a ladder & lay the ladder on the ground then have the patient walk over & through).
6. UNDERWATER TREADMILL exercise (optional) ONCE DAILY for 10-15 minutes.
7. LASER THERAPY (optional) TWICE WEEKLY.

WEEKS #6 – 8

- Schedule another recheck with your veterinarian at week 6 after surgery to evaluate your pet's progress.
1. MASSAGE QUADRICEPS MUSCLES exercise 2-3 TIMES DAILY for 5-10 minutes each time before & after PROM.
 2. SLOW LEASH WALKS exercise 2-3 TIMES DAILY for 20-25 minutes.
 3. SIT-STAND exercise 2-3 TIMES DAILY for 10-15 repetitions.
 4. INCLINE WALKS or HILLS or RAMPS exercise 2-3 TIMES DAILY for 5-10 minutes.
 5. CAVALETTIS exercise 2-3 TIMES DAILY for 10-15 repetitions.
 6. SWIMMING exercise 2-3 TIMES DAILY for 5-10 minutes (Wear life vest for support if needed).
 7. UNDERWATER TREADMILL exercise (optional): 2-3 WEEKLY for 15-20 minutes.
 8. LASER THERAPY (optional) TWICE WEEKLY.

WEEKS #9 – 12

- At this point, your pet's healing should be complete & should gradually return to full activity by the end of 12 weeks.
1. SLOW LEASH WALK exercise 2-3 TIMES DAILY for 25-30 minutes.
 2. SIT-STAND exercise 2-3 TIMES DAILY for 10-15 repetitions.
 3. INCLINE WALKS or HILLS or RAMPS exercise 2-3 TIMES DAILY for 10-15 minutes.
 4. CAVALETTIS exercise 2-3 TIMES DAILY for 10-15 repetitions.
 5. SWIMMING exercise 2-3 TIMES DAILY for 10-15 minutes.
 6. UNDERWATER TREADMILL exercise (optional) 2-3 TIMES WEEKLY for 20-30 minutes.
 7. 8. LASER THERAPY (optional) TWICE WEEKLY.

TABLE 34.13 Sample Rehabilitation Protocol for Patient With a Patellar Luxation Repair

Treatments/ Modalities	Day 1-3	Day 4-14	2-5 WK	5-8 WK	8+ WK
Pain medications	As directed	As directed	PRN	PRN	PRN
Cryotherapy Cold Pack	10-15 min 3 times daily to the affected stifle	Use after exercise for 15 min	PRN	PRN	PRN
Heat therapy Hot Pack	First session immediately after surgery	Apply heat to the muscles before PROM as long as inflammation is not present	PRN	PRN	PRN
Massage	5 min 3 times daily gentle massage	Continue twice daily	Twice daily	Twice daily	Only if desired
PROM (Passive Range of Motion)	8-10 repetitions 2-3 times daily Limit motion to sagittal plane only	Continue twice daily within comfortable range	All joints affected limb 8-10 reps Sagittal plane only		
Laser Therapy	Daily	Every other day for first week then 2 times weekly	Twice weekly	Twice weekly	Discontinue
Walks	5-min supported leash walk 2-3 times daily for toileting only	Increase each walk by 2-3 min each week	Increase by 5 min each week	Increase by 5 min each week Add gentle inclines at week 6	15- to 20-min walks 2-3 times daily Add inclines and trotting as returns to normal
NMES		10 min twice daily to quadriceps and hamstrings of affected leg	10 min twice daily to quadriceps and hamstrings of affected leg	10 min twice daily to quadriceps and hamstrings of affected leg	
Balancing		5 min twice daily on soft foam	5 min twice daily soft foam pad	5-10 min twice daily unstable surface	PRN
Cavalettis (begin at 4 weeks) Rails, Ladder			Low rails 5-10 reps twice daily	10-15 reps twice daily	10-15 reps twice daily increased height
Sit to stand (begin at week 4)			Start with sling or elevated hind end 5-10 reps twice daily	10-15 reps twice daily	15-20 reps twice daily
Weaves				Slow, 10-15 reps twice daily	15-20 reps twice daily increasing speed
Stairs					Start at 1 flight twice daily working up to 5 flights, adding 1 flight per week at a slow speed
Underwater treadmill			5-10 min daily at a slow speed	15-20 min 2-3 times weekly	15-30 min twice weekly until released from rehab
Swimming (Begin at 6 weeks)				5-10 min daily	10-15 min 3-4 times weekly

ADDITIONAL INSTRUCTIONS

1. Licking at the incision should be prevented because it may lead to chewing at the sutures causing a wound infection. It may be necessary to bandage the leg or use an Elizabethan collar (e-collar) to prevent licking.
2. Bandages, if used, should always be kept dry & clean. Any odors &/or persistent licking are indicators that there may be a potential problem & should be checked by your veterinarian immediately. Bandages & splints (if applicable) should be checked within a few days then weekly by your veterinarian.
3. Feed your pet its regular diet but reduce it by ~20% to allow for reduced activity.
4. Mild swelling may occur near incision or low on limbs (edema). Your veterinarian should check moderate or severe swelling / fluid drainage immediately.
5. Use of a joint protective supplement with glucosamine & chondroitin is highly recommended for at least 6 months if your pet does NOT have arthritis. If your pet does have arthritis, it is recommended to use this supplement for the life of your pet.

COMPLICATIONS

As with any surgical procedure, complications can occur. Unlike human patients who can use a sling or crutches, our patients do NOT know enough to stay off a healing limb so restricted activity is a major responsibility of the pet owner. Failure to follow these instructions carefully can lead to delayed healing or even failure of the sutures & implants. Additional surgery & expense will apply.

The most common complication is delayed healing, where, despite our best efforts to stabilize the joint, individual patients respond slower than others. Occasionally, your pet may develop a small pocket of fluid called a seroma, around the metal pin we use to secure the transposed bone. See your veterinarian if this swelling is larger than a grape.

Lastly, although this surgery has a 90% percent success rate, some patients will still have a lower grade patella luxation than before surgery. Fortunately, most will have no discomfort & NOT need additional surgery.

If your pet is NOT using the leg by week 3 or if your pet starts using the leg & then stops using the leg or stops improving week by week or worsens week by week, please inform your primary veterinarian.

FOLLOW-UP INSTRUCTIONS

BANDAGES

- Support/pressure bandage placed post-operatively to be removed in 1-3 days; remove immediately if slips, gets wet, or toes feel cold or swollen.
- Please monitor your pet's ability to urinate over the next 1-2 days.
Rarely, patients that had an epidural will have transient urinary retention, straining to urinate but no stream is observed.
This can lead to a ruptured bladder after several days & kidney failures if you do NOT seek immediate treatment.
- Recheck every 2 weeks after suture removal to evaluate progress & remove external sutures if applicable.
- Please use an Elizabethan Collar or Bite NOT Collar (Amazon or Drs Foster & Smith online) on your pet after bandage removal to prevent licking of the incision as this is the number one cause infections.

MEDICATIONS

- Start antibiotic, anti-inflammatory, pain medication & +/-sedation as directed by your primary veterinarian.
- Start Dasuquin, Cosequin, Phy-Cox-JS or Glycoflex (joint supplement) & Omega 3 fatty acid supplement & use for 3 months to minimize osteoarthritis during healing for life due to underlying osteoarthritis go slow the progression over time.

DIET

- Start on joint health prescription diet food like Royal Canin Mobility or Science Diet J/D.

If you would like assistance with your pet's exercise recovery, please let your veterinary team know so we can provide a referral to a local veterinary physical rehabilitation center. If you have any questions, please feel free to ask your primary veterinarian &/or veterinary surgeon.

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