CASE REPORT

Surgical Management of Concurrent Medial Patellar Luxation and Cranial Cruciate Ligament Rupture in a Chihuahua Crossbreed Dog

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Ind J Vet Sci and Biotech (2026): 10.48165/ijvsbt.2026.22.06.45

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How to cite this article: Reddy, P. V., Rasool, A., Agraham, R., & Savaram, S. (2026). Surgical Management of Concurrent Medial Patellar Luxation and Cranial Cruciate Ligament Rupture in a Chihuahua Crossbreed Dog. Ind J Vet Sci and Biotech, 22(6), 224-228.

Source of support: No specific funding was received for this study.

Conflict of interest: None

Submitted 22/07/2026 **Accepted** 13/09/2026 **Published** 10/11/2026

Medial patellar luxation (MPL) is the most common congenital orthopedic disorder in dogs, with incidence in small breeds 12 times higher than in large breeds (Campbell *et al*., 2010). Approximately 90% of patellar luxations are medial, affecting predominantly small and toy breeds, with bilaterality in ~50% of cases (Perry and Déjardin, 2021; Wangdee *et al*., 2015; Di Dona *et al*., 2018). MPL is a recognized risk factor for cranial cruciate ligament (CCL) rupture, with concurrent CCL deficiency reported in up to 40% of affected dogs (Triegaardt *et al*., 2024). This association results from chronic internal tibial rotation combined with hindlimb muscle atrophy, leading to increased CCL strain. When the patella is luxated, loss of effective stifle stabilization by the quadriceps mechanism further predisposes the CCL to injury and degeneration (Nagahiro *et al*., 2023).

Concurrent MPL and CCL rupture presents a surgical challenge requiring correction of both conditions to restore normal biomechanics. Various surgical strategies exist, including combined tibial plateau leveling osteotomy (TPLO) with tibial tuberosity transposition (TTT), and extracapsular stabilization with patellar realignment (Wemmers *et al*., 2022). For small breed dogs (<15 kg), combined TPLO-TTT is effective but requires surgical precision to minimize complications (Boudrieau, 2009); however, higher cost renders extracapsular approaches a cost-effective alternative (Cook *et al*., 2010). This report describes successful management of concurrent grade 3 MPL and complete CCL rupture in a Chihuahua crossbreed using tibial tuberosity transposition with tension band wiring, trochlear wedge recession, and lateral fabellar extracapsular stabilization.

Case History and Observations

A 4-year-old male neutered Chihuahua crossbreed dog (6.2 kg) was presented at the Orthopaedic Veterinary Clinic, Dubai for evaluation of chronic left hind limb lameness. The lameness was previously managed conservatively but acutely worsened following a fall from a couch, resulting in 48-h of non-weight-bearing lameness with gradual improvement to partial weight-bearing. The traumatic episode occurred ~45 days prior to presentation. General examination revealed normal vital parameters (temperature 38.4°C, heart rate 110 bpm, respiratory rate 24/min). Body condition score was 6/9, indicating mild overweight status (Chun *et al*., 2019). Gait evaluation demonstrated toe-touching weight-bearing lameness graded 2/5 (Waxman *et al*., 2008). Neurologic assessment was normal.

Left stifle palpation revealed Grade 3 MPL - the patella luxated medially at rest, manually reducible but spontaneously reluxating upon release. The patella was permanently luxated most of the time, with the animal exhibiting a crouched, bowlegged stance (*genu varum*). Trochlear sulcus hypoplasia and medial tibial rotation relative to the femoral condyles were noted. Pain-protective stifle stiffening during cranial drawer testing raised suspicion of concurrent CCL pathology, with definitive testing requiring sedation or anaesthesia.

Radiographic evaluation under sedation revealed a shallow trochlear groove, internal tibial rotation with medial deviation of the tibial tuberosity, a positive fat pad sign (cranial displacement of the infrapatellar fat pad - an early and consistent finding in CCL rupture reflecting synovial

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effusion), and Grade 1 osteoarthritis with mild periarticular osteophyte formation. These findings, combined with the positive cranial drawer sign, indicated high probability of complete or partial CCL rupture (Fig. 1, 2). The owner was informed of clinical findings and diagnostic options including arthroscopy, MRI, and TPLO. Due to financial constraints, the owner declined advanced diagnostics and requested single-procedure surgical intervention for both conditions.



Fig. 1: Preoperative radiograph demonstrating a positive fat pad sign (infrapatellar fat pad displacement) and cranial tibial translation relative to the femur, indicative of cranial cruciate ligament rupture.

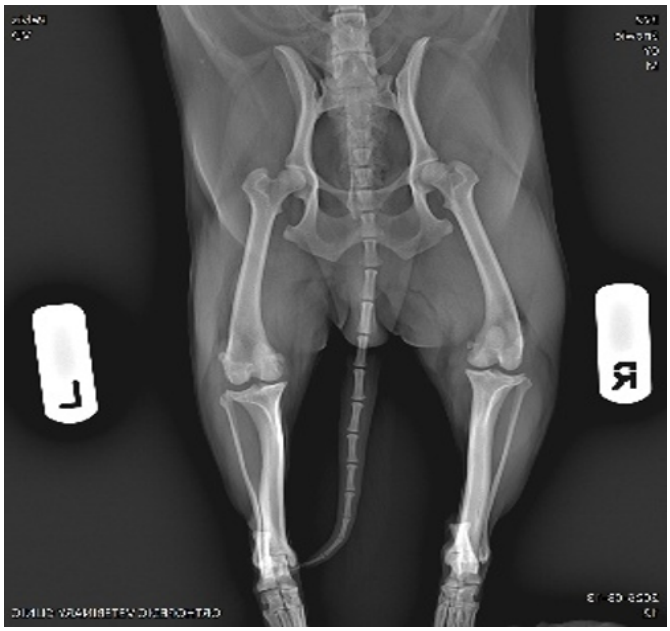


Fig. 2: Radiograph showing medial patellar luxation and internal rotation of the tibia



Fig. 3: Relative positioning of the tibia and femur.

Surgical Management and Discussion

Following a 12-h fast, the dog was sedated with medetomidine (10 µg/kg) and methadone (0.2 mg/kg) IM, and diazepam (0.3 mg/kg) IV. Anaesthesia was induced with ketamine (5 mg/kg) IV and maintained with isoflurane (1.5-2.5%) in 100% oxygen. Preoperative antibiotics (amoxicillin-sulbactam, 25 mg/kg IV) were administered at induction and repeated after 90 minutes. Meloxicam (0.2 mg/kg IV) was given for perioperative analgesia.

The surgical site was aseptically prepared from hip to tarsus. With the dog in lateral recumbency, a lateral parapatellar arthrotomy was performed from mid-femur to proximal tibia. Joint exploration revealed: complete CCL rupture with only frayed remnants; severe periarticular fibrosis consistent with chronic instability; degenerative changes of the medial trochlear ridge; a shallow trochlear groove; and intact menisci. Damaged cruciate remnants were excised (Fig. 3, 4).

Trochlear wedge recession (TWR) was performed using a #15 scalpel blade and oscillating saw to remove a V-shaped bone wedge, creating a deepened sulcus. The procedure continued until approximately 50% of patellar thickness seated within the groove—a standard endpoint for small breed dogs (Fig. 5, 6).

Internal tibial rotation was corrected via partial osteotomy of the tibial tuberosity using a sagittal saw, incising approximately one-third of the tuberosity diameter while preserving the distal one-third as a cortical hinge. The

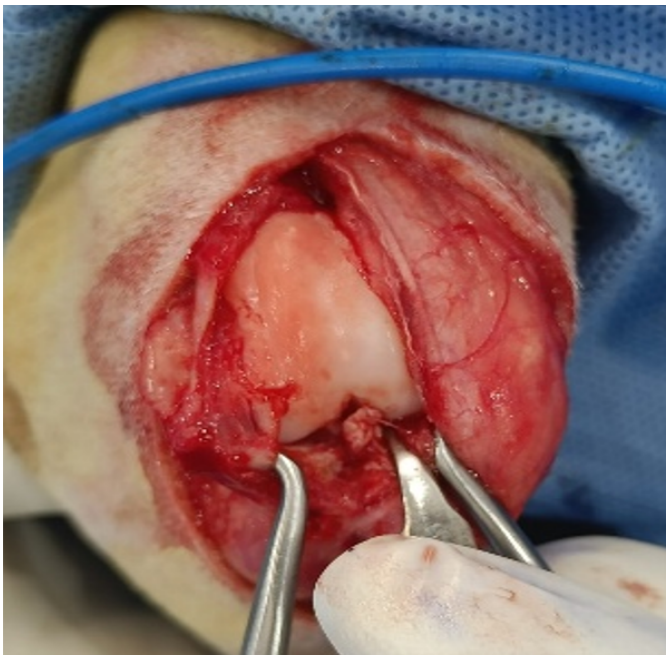


Fig. 4: Intraoperative view of the stifle joint revealing a shallow trochlear groove, erosion of the medial trochlear ridge, and rupture of the cranial cruciate ligament (remnants visible).

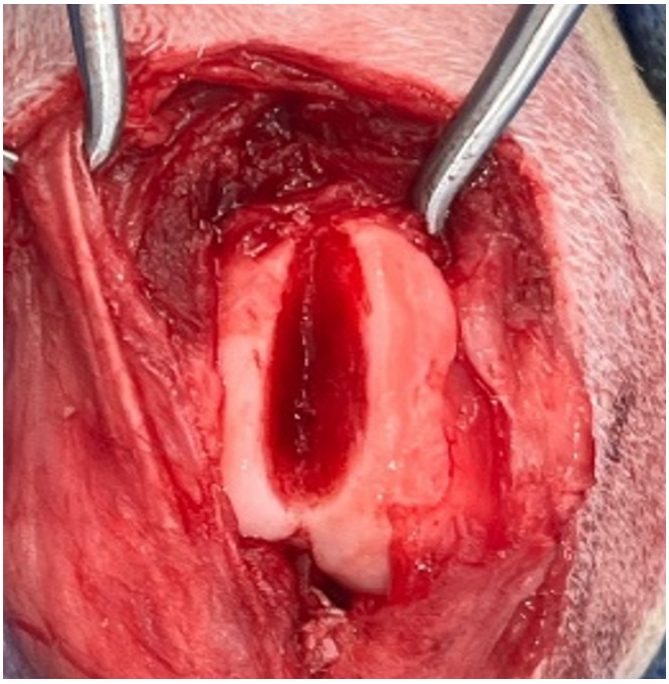


Fig. 5: Femoral trochlea following trochlear wedge recession, demonstrating deepening of the trochlear groove to improve patellar containment

segment was elevated and repositioned laterally, confirmed by aligning the patella, ligament, and tuberosity in a straight line during stifle extension. Two 1.4 mm K-wires were placed across the tuberosity, with a figure-of-eight tension band

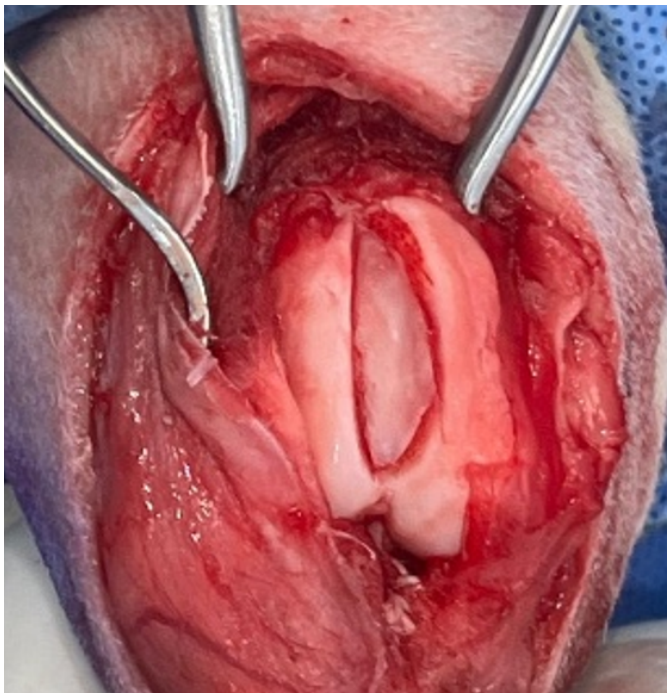


Fig. 6: Image showing proper seating of the patella within the deepened trochlear groove after completion of wedge recession.

wire (0.8 mm) providing compression.

Extracapsular stabilization was achieved using 80 lb (36 kg) nylon leader material anchored around the lateral fabella and passed through a tibial bone tunnel positioned below the tibial plateau angle. The suture was tied with six square knots; postoperative cranial drawer test was negative (Fig. 7).

The joint was flushed with sterile saline. The lateral retinaculum was closed with a vest-over-pants suture pattern using 3-0 PDS. Subcutaneous tissues were apposed with 3-0 PDS and skin closed with 3-0 nylon. Postoperative radiographs confirmed proper patellar positioning and intact fixation (Fig. 8 A,B).

The dog recovered uneventfully and was monitored for 24-h with an Elizabethan collar in place to prevent self-trauma and interference with the surgical site. Postoperative analgesia included oral meloxicam (0.1 mg/kg SID for 5 days). The dog was discharged on day 2 with amoxicillin-clavulanate (62.5 mg BID for 10 days), meloxicam (0.1 mg/kg SID for 7 days), and gabapentin (5 mg/kg q8-12h PRN). Strict exercise restriction was mandated for 6 weeks (leash walks 5 min BID for elimination only; no jumping, stairs, or off-leash activity). The Elizabethan collar was worn for 14 days until suture removal. At 12-day follow-up, lameness had markedly reduced (grade 1/5), with no discomfort on joint manipulation. Stifle stability was maintained on cranial drawer testing; the patella remained seated throughout passive range of motion. The wound was well-approximated without infection or dehiscence. Exercise

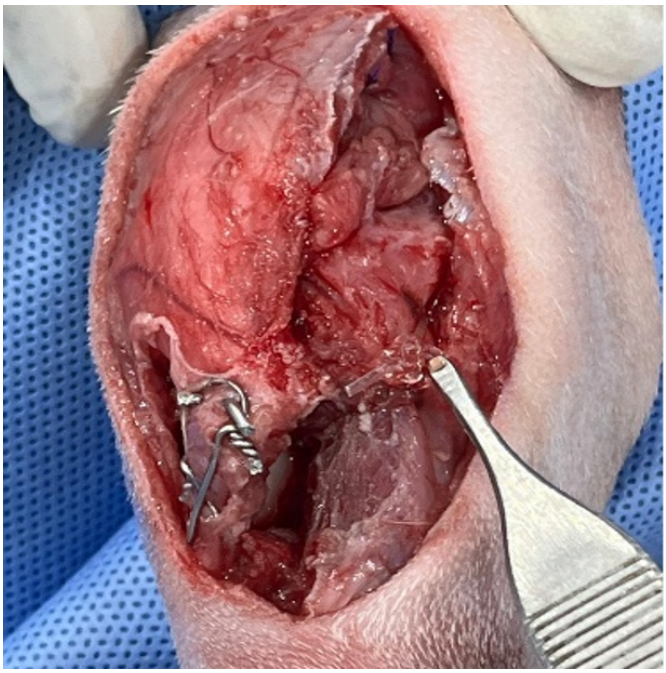


Fig. 7: Intraoperative view of the combined surgical repair: tibial tuberosity transposition stabilized with two K wires and a figure-of-eight tension band wire, accompanied by lateral fabellar extracapsular stabilization (80 lb nylon suture) for concurrent cranial cruciate ligament rupture.

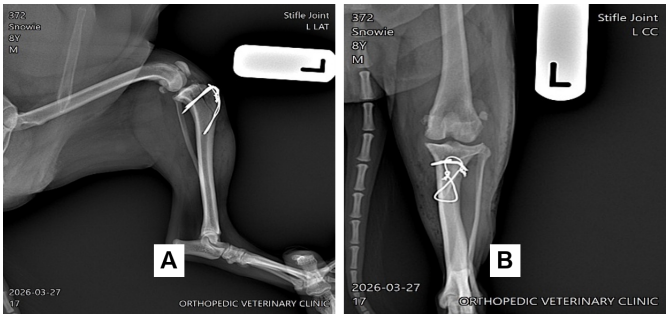


Fig. 8: Postoperative radiographs of the stifle joint. Lateral view demonstrating proper patellar positioning within the trochlear groove (A). Craniocaudal view showing intact tension band wiring and tibial tuberosity transposition (B).

restriction continued for an additional 4 weeks (total 6 weeks), followed by gradual return to normal activity. By 45 days, the dog was weight-bearing normally. This case demonstrates successful management of concurrent grade 3 MPL and complete CCL rupture in a Chihuahua crossbreed using combined tibial tuberosity transposition with tension band wiring, trochlear wedge recession, and lateral fabellar stabilization.

The association between MPL and CCL rupture is well established, with concurrent deficiency in up to 40% of dogs presenting for MPL correction (Triegaardt *et al*., 2024). Chronic MPL causes internal tibial rotation, altering CCL biomechanical forces (Faulkner *et al*., 2026). When the patella luxates, loss of normal quadriceps stabilization leads to abnormal joint kinematics and eccentric CCL loading (Campbell *et al*., 2010). In this case, the 45-day history and intraoperative periarticular fibrosis suggest CCL rupture developed in the setting of pre-existing MPL, consistent with this pathogenic model. Concurrent MPL and CCL rupture management must address both conditions while respecting owner financial constraints. For larger dogs, TPLO is considered the biomechanical gold standard, and combined TPLO-TTT is effective in small breeds up to 15 kg, though surgical accuracy is essential to avoid complications (Redolfi and Grand, 2024). However, TPLO costs 2-3 times more than extracapsular stabilization, which may be equally effective in small breed dogs (<15 kg) with advantages of lower cost, shorter surgical time, and reduced osteotomy-associated morbidity (Cook *et al*., 2010).

In this case, trochlear wedge recession was selected over block recession, thus the 50% patellar seating goal was achieved intraoperatively. Tibial tuberosity transposition with pin and tension band wiring is biomechanically validated and was considered robust in this small breed dog with appropriate exercise restriction. Extracapsular lateral fabellar stabilization provides dynamic stability by limiting cranial tibial translation during weight-bearing while allowing periarticular fibrosis for long-term stability (Cook *et al*., 2010). The vest-over-pants retinacular closure provides secure apposition and reinforcement, reducing dehiscence and postoperative relaxation risk (Johnson and Dunning, 2005).

In conclusion, the approach used provided excellent short-term outcomes with resolution of lameness, restoration of stability, and no complications. Combined extracapsular stabilization with patellar realignment represents a viable, cost-effective alternative to TPLO, particularly in dogs <10 kg. Long-term follow-up is recommended to monitor for progressive osteoarthritis or late complications.

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