

A Comparison of Postoperative Care Needs and Complications Between Bilateral Simultaneous and Staged Tibial Plateau Leveling Osteotomy (TPLO) in 192 Cases from 2005 to 2015

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INTRODUCTION

Rupture of cranial cruciate ligament (CrCL) is the most common cause of pelvic limb lameness in dogs (1). The purpose of this retrospective study was to compare postoperative requirements and complications associated with bilateral simultaneously performed TPLO surgeries and staged TPLO surgeries in dogs presenting with bilateral cruciate ligament disease.

Some studies have found a higher risk of complication associated with bilateral simultaneous TPLO surgeries (3-7). In contrast, only a few studies contradict this correlation and revealed similar complication rates for both staged and simultaneous bilateral TPLO procedures (8-9).

MATERIALS AND METHODS

All TPLO procedures were performed by multiple surgeons at Veterinary Medical and Surgical Group (VMSG) in Ventura California from May 2005 to June 2015.

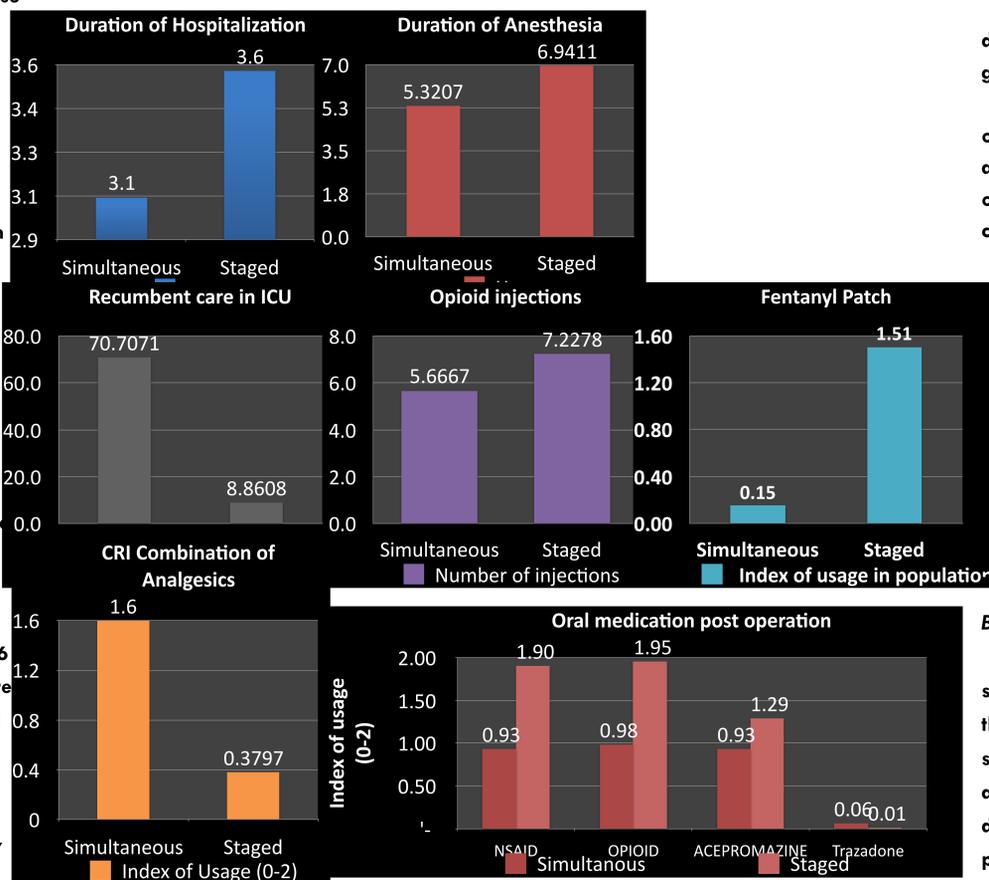
A total of 1565 procedures were performed in this time period. Among this group, a total of 366 cases had bilateral TPLO surgeries. One hundred ninety two cases met our inclusion criteria of clinical bilateral cruciate ligament disease at presentation including 106 simultaneous bilateral TPLO and 86 staged bilateral TPLO surgeries. Cases that were excluded were patients that had more than one TPLO but were not diagnosed with bilateral disease. In the simultaneous group of 106, 6 more cases were excluded because of other problems treated concurrently (for example patellar luxation repair or distal femoral osteotomy) or incomplete medical records. Similarly, 7 cases were excluded from the staged group of 86 for similar reasons.

The TPLO was performed following arthroscopy in every case, allowing minimally invasive evaluation of the stifle joint and meniscal treatment (Meniscectomy and meniscal release as required). All simultaneous and 98.7% of staged TPLO cases had epidural analgesia after induction. Also, Soft Cast was placed post-surgery for all staged cases and 99% of simultaneous cases. The remaining 1.0% had Modified Robert Jones bandage post operatively.

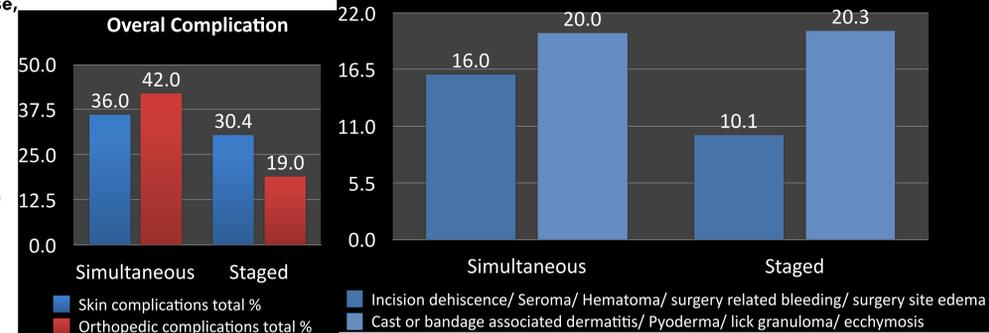
For all of pre-operative and post-operative parameters, an accumulation of the values (duration, quantity...) was noted. For some parameters an index of usage (between 0-2) was defined for convenient comparison. For example, if in a population of 10, a medication was used for 4 patients in the first surgery and 6 patients in the second surgery, the administration index will be calculated as $(4 \div 10) + (6 \div 10) = 1.0$. Similarly for situations that none or all of patients have received the medication in both surgeries this index will be 0 and 2 successively.

Only complications related to the surgical limb were of the interest in this study. Complications such as constipation post operatively, temporary cough post anesthesia, any regurgitation or diarrhea, etc. during hospitalization were not included in this study. Complications have been categorized into the following 3 groups: skin related, Orthopedic and neoplasia. Also Skin and orthopedic complication groups were divided into 2 and 8 subgroups respectively.

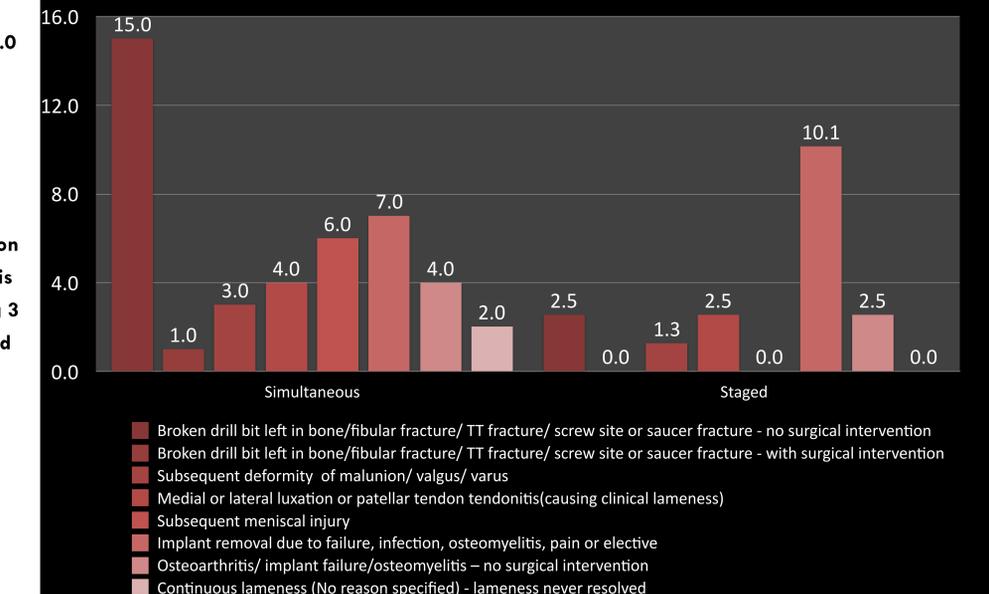
RESULTS



B) COMPLICATIONS



Classification of Orthopedic complications



DISCUSSION/CONCLUSION

A) Anesthesia & Surgery and Post-op care:

Hospitalization and anesthesia time for simultaneous TPLO surgeries were about half a day and 1.6 hour shorter than for combined duration of both TPLO surgeries in the staged group. Minimal extra cost was associated with the increased duration in the staged group.

Also, none of the patients in the staged TPLO group needed urinary catheter post-operatively whereas most of patients in simultaneous group had urinary catheter for average of 1.4 days. Longer urinary catheter maintenance and hygienic care post operatively was required with more intensive recumbent care in the simultaneous group causing a moderate increased cost for the client and increased patient management.

The staged TPLO group received 1.5 more total opioid injections for both surgeries than the simultaneous group. Also, the staged TPLO cases underwent epidural analgesia twice. Most of the staged TPLO patients were on a fentanyl patch post operatively whereas most simultaneous TPLO patients were on CRI of an analgesic and mostly a combination of different analgesics (Opioids, Ketamine, and Lidocaine) which was also more expensive and demands ICU recumbent care. This difference was felt to be primarily surgeon preference for analgesia and pain management.

Regarding oral medications used post-operatively, the usage index in staged TPLO cases was significantly more in the simultaneous group (about 1.5 to 2 times) for NSAID, Opioid and Sedatives. A cost savings would thus be realized for oral medication in patients undergoing simultaneous bilateral TPLO.

B) Complications:

The simultaneous TPLO group had a higher rate of complications post-surgery than the staged TPLO group. Complications related to the skin for simultaneous group was higher than the staged group. This difference is mostly for complications related to incision site such as seroma formation, infection and dehiscence which may reflect compromised aseptic and technical skills in longer procedures. Complication related to soft cast rubbing was not different between these two groups however it was expected that bilateral casting predisposes to a higher rate of cast rubbing complications.

Among 8 categories of orthopedic complications, 7 categories had higher rate of incidence in simultaneous group. In contrast, one orthopedic subgroup which includes conditions causing implant removal was higher in staged TPLO group. A closer review of these implant removal cases revealed a lower tendency to have a culture and also a lower infection rate in cultured instances for staged TPLO cases and that often the TPLO implants of the first limb were electively removed at the time of the second limb TPLO. In addition, concurrent procedures (such as meniscectomy) performed for correcting the lameness in some cases, might be an indication for more proactive nature of implant removal for the staged group rather than a required surgical obligation (as it was for simultaneous group). It was concluded that due to the higher rate of postoperative complications, more intense postoperative recumbent care, and longer anesthesia times for patients receiving bilateral TPLO in one simultaneous session, staged bilateral TPLO may be considered a more manageable and cost-efficient approach for dogs sustaining bilateral cranial cruciate injuries in our facility.

The key limitation in this review was that patients were not randomly selected for each treatment group, but instead, that decision was made by the surgeon. The retrospective nature of the study is another limitation. It was the intent of the study to compare the perioperative costs and management to pet owners of bilateral TPLO cases performed in one simultaneous session versus those staged into two sessions. However, since prices for services changed over the 10-year study period, we were not able to analyze actual cost differences directly.

Selected References:

- Ilke VL, Robinson DA, Evans RB, Rothschild MF, Conzemius MG. Estimate of the annual economic impact of treatment of cranial cruciate ligament injury in dogs in the United States. J Am Vet Med Assoc 2005; 227:1604-1607
- Williams JE, Beggs DA, Hauptman JG, DeCamp CE. Benefits of pre- and intraoperative planning for tibial plateau leveling osteotomy. Vet Surg. 2014 Feb; 43(2):142-9.
- Reddy NH 2nd, Tomlinson JL, Dodam JR, Hornbostel JE. Complications with and owner assessment of the outcome of tibial plateau leveling osteotomy for treatment of cranial cruciate ligament rupture in dogs: 193 cases (1997-2001). J Am Vet Med Assoc. 2003 Jun 15; 224(12):1726-32.
- Little PG, Scott HW. Tibial plateau leveling osteotomy in small breed dogs with high tibial plateau angles using a 4-hole 1.9/2.5 mm locking plate. Vet Surg. 2014 Jul; 43(5):549-57.
- Bergsien DH, Barnhart MD, Kees CE, Danielson BG, Brouman JD, DeHoff WD, Schertel ER. Radiographic and clinical changes of the tibial plateau after tibial plateau leveling osteotomy. Vet Surg. 2004 Sep-Oct; 33(5):468-74.
- Itzpatrick N, Solano MA. Predictive variables for complications after TPLO with stifle inspection by arthroscopy in 1000 consecutive dogs. J Am Vet Med Assoc. 2010 Jun; 39(4):460-74.
- Blatt TJ, Anderson M, Gorse MJ, Madsen R. Complications associated with tibial plateau leveling osteotomy: a retrospective of 1519 dogs. Can Vet J. 2014 Mar; 55(3):249-54.
- Pergh MS, Rajala-Schultz P, Johnson KA. Risk factors for tibial tuberosity fracture after tibial plateau leveling osteotomy in dogs. Vet Surg. 2010 Jun; 37(4):374-82.